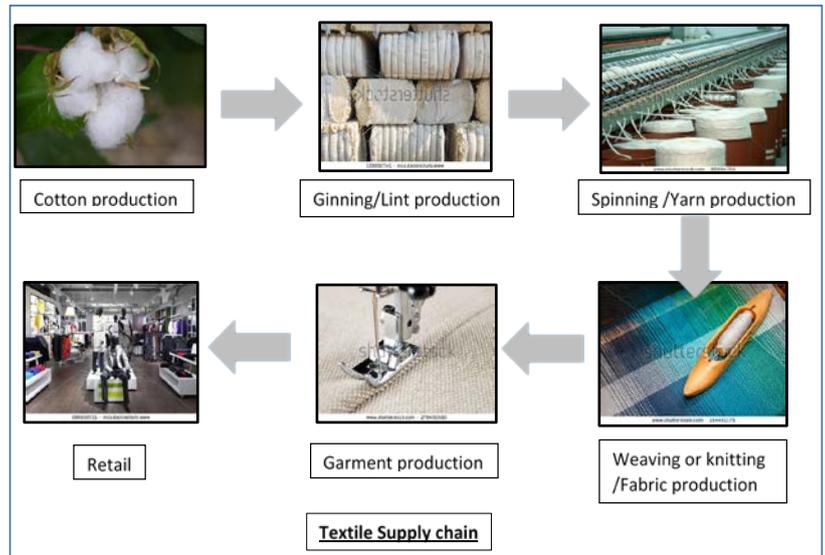


Sustainability, Traceability, Technology:

A case study on Cotton Textile supply chains

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Introduction

The paper will describe the importance of sustainability in the textile supply chains of apparel brands and the role of new age technology in implementing traceability as an integral part of sustainable supply chains.

One of the major challenges for European and American brands (especially apparel brands) is the lack of transparency in their complex supply chains in India, China, Bangladesh and other Asian countries. They neither have the resources nor the time to monitor the various processes starting from raw material crop production (cotton in the case of apparels) to end retail taking place in the other half of the world. But incidents like the Rana Plaza factory accident in Bangladesh, which claimed more than 386 workers' (living at wages as low as \$38 a month) lives due to the collapse of a building (Luckerson, 2013), have shaken the world and question the role of western retailers in ensuring safety measures at workplaces throughout their chains. Ethical labour, health and safety, fair wages and enhanced livelihoods (especially for poorest of the poor amongst others) are some of the hygiene measures that ought to be taken at various levels in the chain. In the process to ensure sustainability and exercise more control, 'Traceability' of sustainable goods through the chain comes as another hurdle for brands in order to maintain seamless supply of sustainable products. The demand pull from the market and the end consumer for sustainable products is a very critical aspect in creation of a business case for owners of various processes in the supply chains to adopt sustainability. Without traceability, the brands ability to ensure this pull gets hampered.

Technology is certainly helping to create this pull by facilitating tracing and tracking of sustainable products throughout manufacturing chains to help brands and consumers gain more confidence in the products they buy. We aim to discuss here various Traceability tools used for tracking sustainable products using the example of complex cotton textile supply chains to understand the role of Technology in implementing Traceability and sustainability.

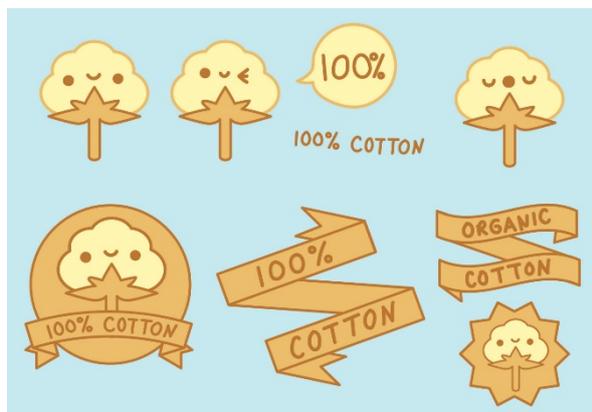
Need for sustainable Cotton supply chains and various sustainable alternatives

Several factors make the cotton supply chain in India a very complex one. Most actors in the supply chain are small-scale and decentralized, and those small-scale actors are often disorganized and labour-intensive. The supply chain is inundated with problems of inefficiency, wastage, contamination in the form of trash content, as well as unsustainable use of inputs, such as water, pesticides and fertilisers (WWF and YES bank, 2012).

Conventional cotton production is characterized by a high usage of water, haphazard use of pesticides and insecticides, and little regard to soil health and biodiversity. Today there are many alternatives to conventional cotton production. A few of these include: Organic cotton, Better Cotton, REEL cotton, Fairtrade cotton, recycled cotton, Cleaner Cotton and Cotton Made in Africa (CmiA).

Those companies that are at the forefront of sustainability are investing in their supply chain in various ways. From paying a premium for sustainably produced cotton, to forward contracts and pre-financing, there are many ways that buyers can support farmers. Although brands are becoming increasingly aware of the need to work closely with their supply chains, there is still a long way to go, as we'll see when we look at the challenges facing alternatives to conventional cotton.

Organic Cotton can be defined as cotton grown from non-genetically modified seeds, without the use of



any synthetic agricultural chemicals such as fertilizers and pesticides. The benefits claimed by organic cotton include: increased bio-diversity, a balance between pests and beneficial insects, improved soil fertility, no health risks from pesticides, and healthy organic food crops. Additionally, organic cotton production may allow for: the facilitation of farmer groups, sale at a premium price, lower input costs and lower financial

risk for farmers. The top two standards organizations for organic cotton are OCS (Organic Content Standard) and GOTS (Global Organic Textile Standard). In addition, Indian Standard for Organic Textiles (ISOT) has been developed under the National Programme for Organic Production (NPOP), India but is yet to be implemented.

Better Cotton is sustainable cotton that follows the standards of the not-for-profit organization Better Cotton Initiative (BCI). BCI Standards are focused on: production principles and criteria, capacity building of farmers, an assurance program, connecting supply and demand in the chain of custody, communicating stories from the field and results and impact.

REEL Cotton is cotton produced within CottonConnect's REEL (Responsible Environment Enhanced Livelihoods) program. It is a customized, location-specific program for brands and retailers to support more sustainable cotton production.

Fairtrade Cotton follows the standards set by Fairtrade International. Fairtrade is a standard that ensures that farmers receive a premium price that they can use to cover production costs and fund community development projects. Standards have been developed for various types of producer and trader organizations and focus on the following common principles: social development, economic development, environmental development and forced and child labour. When combined, Fairtrade cotton and organic cotton certifications are considered the "gold standard" in sustainable cotton production.

Recycled Cotton refers to cotton that is recycled, rather than disposed off at the end of its use. Similar to paper, cotton is made of fibres which wear out over time. Because of this, recycling cotton often means down cycling to be made into rags, carpets, insulation or stuffing. When a consumer purchases clothing made from "recycled content," it is made from scraps in a factory that would normally have been thrown away. Instead, they have been broken down into fibres to create a new piece of clothing. Usually recycled cotton used to produce clothing or apparels is mixed with virgin cotton to provide adequate strength required by ready to wear apparels.

Cleaner Cotton is the name for "responsibly grown fibre produced by cotton farmers enrolled in the Sustainable Cotton Project." This is a US-based campaign promoting the growth of cotton which uses non-GMO seed, biologically based integrated pest management practices, and prohibits the use of the 13 most toxic chemicals in conventional cotton (Sustainable Cotton Project, 2015).

Costs for implementing various sustainable alternatives

Implementing sustainability at any level in supply chains can be a resource and cost intensive affair for a brand. The extra cost for sustainability borne by brands is in turn passed on to the end customer in the form of product premium if it cannot be taken care by only the CSR budgets. This extra cost of sustainability usually comes to brands in two forms:

- a) One time sustainability program intervention cost: This is the one time cost incurred by brands usually over a period of 3 years to implement sustainable practices in the production of raw cotton

by farmers, health and safety of processing factory operators, sustainable chemical management practices, green logistics & retailing etc.

- b) Recurring and variable procurement costs for sustainable products: This is the more complex form of costs incurred by the brands for ensuring that sustainable products are actually part of their supply chain and the finished good can be labelled or called sustainable. Various costs involved here are in the form of sustainable processed raw material premium, Seed integrity verification (in case of Organic), 3rd party verification and certification etc.

While **Organic Cotton** comes at a very low sustainability premium from the farmers (1-2%), the intermediary processors (spinners and fabric producers mostly) charge a significant premium on account of the high demand and relatively lower supply. The certification (~£10,000 for the Organic certification of the entire supply chain) and regulatory costs are added onto this by the processors and brands to charge a net premium of 20-25% over the conventional products from the end customer.

The **Better Cotton Initiative (BCI)** has a sliding volume fee structure for its members as per the amount of sustainable cotton procured. They provide 3 types of membership – Pioneer membership (€ 225,000 fixed fees), Standard membership (€ 14,000 -100,000 sliding calculation) and learning membership (€ 6,000). This includes the intervention costs along with the procurement costs for sustainable fibre. Because BCI uses a system of Mass Balance (explained later in the paper), the product level labelling and certification is not possible but the brands can use the BCI adverts in their stores and media to communicate their commitment to sustainability.

Fairtrade: In addition to the Fairtrade market price for Cotton, the brands must pay a Fairtrade Premium of 5 cents per kilo of Fairtrade seed cotton. This is used by the producer organizations for social and economic investments such as education and health services, processing equipment and loans to members. Fairtrade Minimum Prices for organic cotton are 20% higher than the price for conventional Fairtrade cotton. In addition to the Fairtrade price, the buyers must pay a Fairtrade Premium of €0.05 cents per kilogram of Fairtrade seed cotton. This is used by the producer organisations for social and economic investments such as education and health services, processing equipment and loans to members. In addition, for the implementation of Fairtrade standards with the supply chain partners, an additional €50,000 could be required for investment on annual basis. The product with a Fairtrade label is 30-40% more expensive for the end customer.

Business Case for apparel brands to invest in sustainability

“New innovations and the introduction of ethical products into the mainstream retail market are expected to drive market growth over the next few years, as will widespread consumer attitudes and beliefs regarding the importance of an ethical and environmentally-friendly future.” (Key Note, Green and Ethical

Market Assessment, 2012). The Ethical product market has grown to a value of £50.76 billion in the UK as of 2011, which marked impressive year on year growth between 2007 and 2011. Estimates suggest that it'll grow to reach nearly £76.7 billion in 2016 (Key note, 2012). The numbers clearly show that there is huge potential in the apparel retail industry to bring environmental sustainability along with social and economic sustainability for all the farmers and workers employed in the trade and chain. The brands also feel the heat due to the increasing pressures from various stakeholders like governments, media and other environmental, social and governance vigilantes.

From a market perspective also, it makes sense for investment in sustainability and supply chain transparency – Data from a Forbes survey highlights the changing customer behaviour and that consumers are increasingly moving from mindless consumption to mindful purchases:

- 1) New breeds of consumers are emerging in major world markets that expect style as well as sustainability
- 2) New expectations from consumers of what matters most for brands (Kindness and Empathy: up +391%, socially responsible: up +63%) (Forbes, Understanding the Spend Shift 2010)
- 3) 33% of the global population and 91% of the 'Aspirational'* are willing to pay more for products produced in a socially and environmentally responsible way (BBMG and Globescan, 2013)
- 4) 45% of this aspirational population resides in India and China (BBMG and Globescan, 2013)

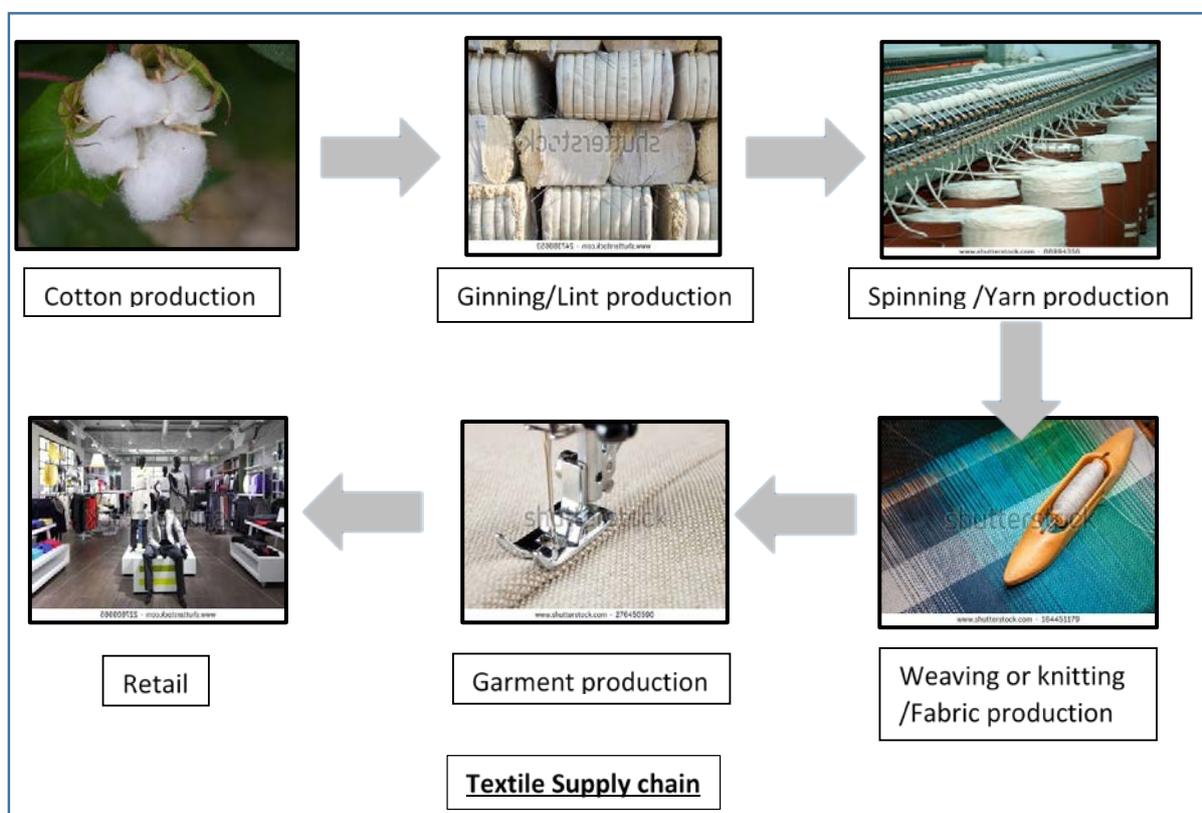
Aspirational - 2.5 billion people worldwide - Materialists who define themselves in part through brands and yet they believe they have a responsibility to purchase products that are good for the environment and society*

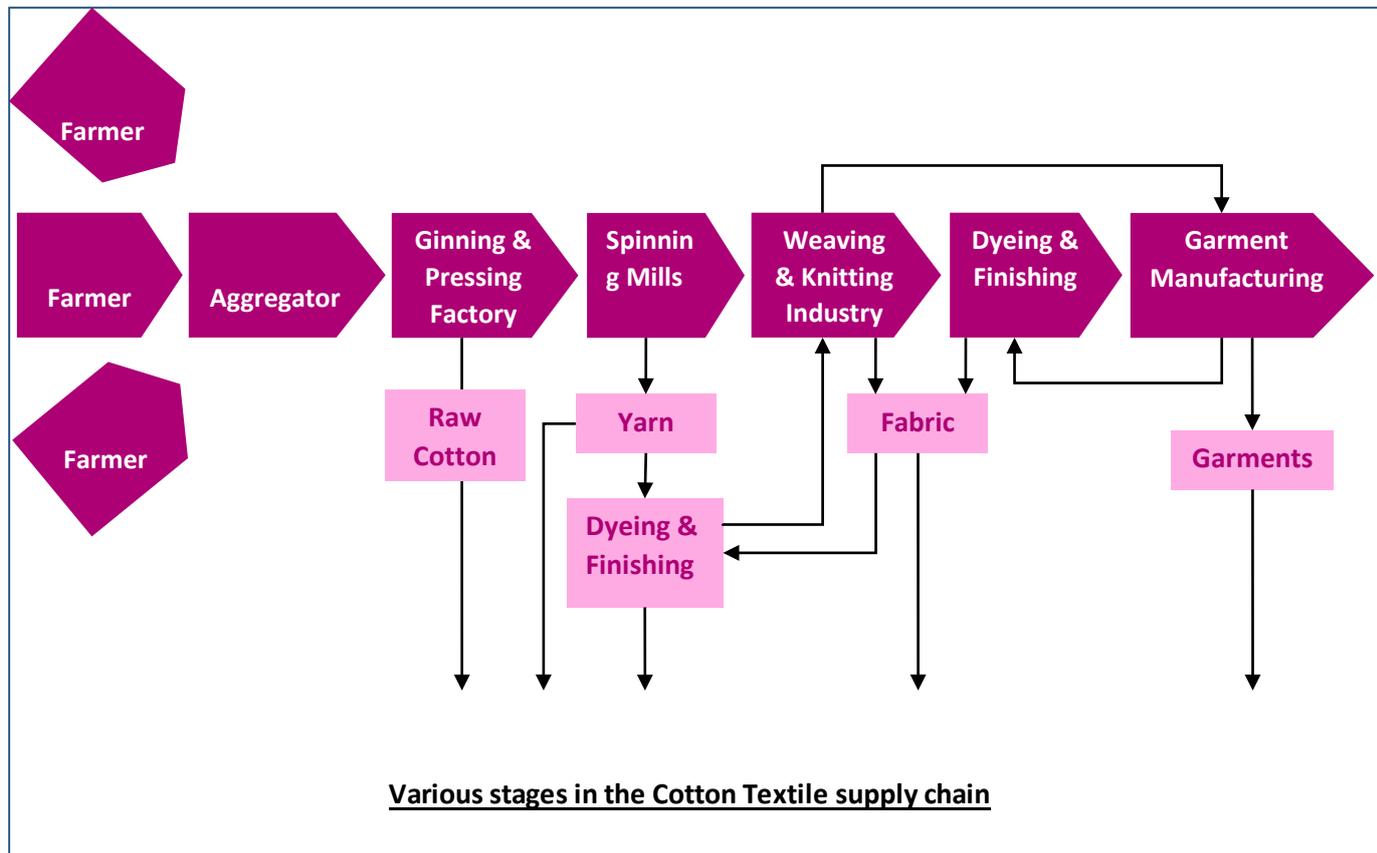
As evident from the data above, the need for apparel brands to have an in-depth understanding of their textile / apparel supply chains has been rising. This trend is seen not only in Europe, which has been farther along on the sustainability journey than other parts of the globe, but also consumers in the rising economies in India and China are increasingly conscious about purchasing products which are produced ethically and sustainably.

Traceability as a tool to implement sustainability

Transparency in supply chains becomes a major challenge for brands aiming to implement sustainability at every level. Most brands have still not been able to penetrate below the first tier (garment manufacturer) of their chains. Traceability has become a larger concern for brands as high-profile incidents have come to light demonstrating that many companies are unable to point to where their products come – much less who created them, the conditions they were created in and the impacts on the environment. Awareness of where their products comes from becomes an important first step to initiate any kind of intervention to

improve the livelihoods of farmers growing their cotton & workers processing their products, to deploy sustainable farming to produce their cotton and use more sustainable processes for its conversion into high quality textile and garments. These growing risks arising from globalization of supply chains – in addition to recent increases in consumer and stakeholder preferences for ethically sourced products, have led to sustainability becoming a core procurement requirement. For example, when state-sanctioned child labour in Uzbekistan came to light, Wal-Mart and Tesco vowed not to buy clothing made with cotton farmed in this region (Greenbiz, State of Green Business: Supply chain transparency ramps up, 2015). This seems like a straightforward commitment, but the Fair Labor Association found that it's almost impossible to categorically deny that Uzbek cotton has been used because there are no established data points through which the cotton used in a finished garment can be traced (Fair Labor association, Tracing the cotton supply chain, 2010).





Source: WWF and YES bank, 2012

According to the United Nations Global Compact, **Traceability** is the ability to identify and trace the history, distribution, location and application of products, parts and materials, to ensure the reliability of sustainability claims, in the areas of human rights, labour (including health and safety), the environment and anti-corruption.

As part of ensuring traceability and transparency, supply chain mapping is an important exercise to track down the various nodes in the chain till the very last node of the Cotton farming region from where the cotton for the apparel comes. Despite the fact that more people are talking about and understand the importance of supplier sustainability, many companies have not taken the proactive steps necessary to map and understand their supply chains. A 2013 UN Global Corporate survey found that although 83% of companies see the importance of suppliers adhering to global sustainability principles, only 18% support their suppliers in setting and reviewing goals, and just 9% take steps to verify adherence (UN Global Compact 2013). This gap is important because without working with their suppliers and understanding the supply chain, no company can make transparency or sustainability claims and they will be held accountable for the purchases they make, regardless of whether they know what's going on or not.

The benefits of Traceability are apparent in the long run to every stakeholder in the chain. While the end customer (the brand) gets the much needed confidence in its supply chain and the ability to communicate

its ethical production stand to external stakeholders, the consumers get the confidence to purchase products which are coming from a sustainable production chain. For primary producers and suppliers, the credibility of bigger brand names as their customers bring in easier finance options and price premiums though certification.

Those attempting to trace their supply chain will follow one of the following systems of traceability, listed in order from most stringent (and most costly) to least stringent (and least costly).

System	Benefits	Limitations
Identity Preservation	<ul style="list-style-type: none"> • End product contains 100% sustainable cotton • Each end product is fully traceable to its exact source • Good for Organic or Non GMO textile chains to maintain integrity and ensure adherence to testing standards 	<ul style="list-style-type: none"> • Not feasible for all industry players as it is the most expensive system • Introducing and maintaining is resource-intensive due to logistical challenges
Bulk Segregation	<ul style="list-style-type: none"> • End product contains 100% sustainable cotton • Good for both Non GMO and GMO cotton chains as it is not as cost prohibitive for the brands to introduce as Identity preservation 	<ul style="list-style-type: none"> • Logistics are costlier than mass balance as sustainable cotton must be kept completely separate from conventional cotton at all times in the supply chain • Sustainable cotton is not fully traceable to the exact farm where it was grown
Mass Balance	<ul style="list-style-type: none"> • Actively involves all supply chain actors in the sustainable cotton market in a first step toward a fully traceable supply chain • Cost-effective solution • Solution to have a wider base to the sustainability umbrella than focussing on just the niche 	<ul style="list-style-type: none"> • No guarantee that the end product actually contains sustainable cotton because sustainable and conventional are mixed throughout the supply chain

Data Source: (WWF, 2013)

Modules of standard traceability systems:

- **Supply Chain Management** modules support the logistical and operational aspects of cotton from production to final product
- **Data monitoring and analysis:** A lot of the data collected at the base to support the traceability can be used for sustainability reporting and communication to various stakeholders
- **Traceability** modules function to increase visibility and understanding of all actors and processes throughout the value chain

- **Cross-functional** modules stretch across the system, supporting management and organization of the program

Various Traceability systems

TraceBale

CottonConnect, a standard neutral organisation working to ensure sustainable supply chains for various apparel brands, has been working on a bottom up Traceability system called 'TraceBale'. It works bottom up from the farmer to spinner (in its current form) to collect production data and capture inter-node transactions to trace and track the flow of sustainable cotton and planned to track processes further up till the retailer in the next stage. TraceBale:

- Starts at the very beginning of the chain - with the farmer, enabling complete chain of custody
- Records inputs used by farmer to track sustainable cotton growing practises
- Is an Identity segregation model - assigns unique IDs throughout the supply chain stages – Heap ID, Bale ID, Yarn ID etc.
- Records transaction data between Farm and Gin, and Gin to Spinner
- Enables Procurement teams to check real time lint and seed cotton availability
- Enables Brands and Retailers to have real time access to Impact assessment data
- Powered by Cloud technology – can be updated in the field, and then uploaded to the Cloud once the Field exec has Wifi access.

Other Traceability systems

 <p>GeoTraceability</p> <ul style="list-style-type: none">•15 modules to support data collection, management and traceability•Used by cotton farmers in Ghana	 <p>BaaCode</p> <ul style="list-style-type: none">•Merino wool retailer allows customers to trace garment back to farmer via a unique number entered on their website
 <p>ChainPoint</p> <ul style="list-style-type: none">•Services to support traceability, audit & certification, monitoring & evaluation, supply chain analytics and story-telling	 <p>Jeanologia</p> <ul style="list-style-type: none">•Environmental Impact Measuring software assesses water & energy consumption, chemicals & worker health
 <p>HistoricFutures</p> <ul style="list-style-type: none">•String allows companies to map supply chain by asking suppliers questions•Partnership with M&S to trace materials	 <p>GS1</p> <ul style="list-style-type: none">•Uses electronic product code RFID numbers, allowing items to be scanned in bulk, in boxes, at up to 10 metres away
 <p>PCCA</p> <ul style="list-style-type: none">•Builds on USDA's PBI system to trace cotton through the entire supply chain•Customers can view farmer details	

Risks and Potential Issues of Implementing a Traceability System

An initial analysis of risks of implementing a traceability system, as well as recommendations for mitigating these risks

- **Farmer trust in technology:** Though the model will introduce incentives for farmer participation, there may be trust issues in adapting the technology and trusting the information provided.
 - It is critical that the implementing partner has built a trusted relationship with the farmers and that training clearly explains where the information is coming from and how to use the technology.
- **Participation throughout the supply chain:** While there are incentives for farmers to participate in this model, the benefits are not as clear for ginning, spinning, weaving, processing and garment factories.
 - The demand for participation of actors in the supply chain must be driven by the end brand or retailer. Brands and retailers must require use of the system and documentation prior to making purchase.

- **Access of Brands/Retailers to their supply chain:** End brands and retailers often only have access to their immediate supplier that makes standardization, requiring use of a system and validation of documentation difficult.
 - Functionality which allows each supply chain actor to request information and ask questions of the previous supply chain actor. Existing technology like HistoricFutures provides a platform for this.
- **System ownership of supply chain actors:** Those throughout the supply chain may initially use the system, but encouraging long-term adaption and commitment may be difficult without follow-up from the implementing organization.
 - It will be important to identify “power users” of the system at each point in the supply chain. These users should be adept at utilizing the technology and willing to serve as an advisor to peers and to the implementing organization.
- **Sustainability of the model:** Both REEL (CottonConnect’s sustainability intervention) and Organic programs are three-year models. A lack of follow-up or planning for how the model can continue after that period will result in an eventual abandonment of the program.
 - At the farm level, implementing organization (or local partner) must identify “master farmers” within the farmer producer organization. During the program, the partner should work with the master farmers in developing training materials and building training skills of those farmers. Following the three-year program, the organization must maintain contact with the master farmer at key points in the cotton production process to ensure that the group is on track and following production principles. Additionally, the implementing organization should arrange a follow-up visit to the farms in the year after the program is completed.

A combination of careful change management planning and implementation can help ensure that users of the system understand the benefits and embrace long-term adaption.

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