

GLOBAL MARKET REPORT

Cotton prices and sustainability

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Market Overview

Although the COVID-19 pandemic reduced cotton production, supply and demand are expected to remain fairly balanced.

Cotton has been the most consumed fibre in the textile industry from the 1700s, when it played an important role in the Industrial Revolution, to 2002, when it was overtaken by polyester (Brain, n.d.; Common Objective, 2021a; Riello, 2022). To this day, it remains the most consumed natural fibre, representing almost a quarter of all fibres processed by the global textile sector (Common Objective, 2021b). Although the cotton plant was originally a perennial found in the wild, it is now cultivated as an annual plant, reaching 1–2 metres in height and yielding fibre and seed-bearing flowers or bolls that are harvested by both hand and machine. Hand-harvested cotton fibre typically results in higher-quality harvests with less trash content, while machine-harvested cotton often includes organic debris such as leaf remnants. Cottonseed is then ginned to separate the

cotton lint, destined as a raw material for the textile sector, and seeds, which are crushed to extract cottonseed oil for human consumption and meal for livestock. Cotton lint is used in non-woven goods, such as cotton swabs or feminine hygiene and baby products or spun into thread or yarn that is knitted or woven into fabric. It is also used for sewing to produce a variety of textiles that we commonly enjoy.

Although many cotton varieties are grown around the world, about 90% is *Gossypium hirsutum* (or upland cotton), which yields short fibres for a variety of applications. *Gossypium barbadense* (or Pima cotton), which comprises 8% of all cotton grown, originates in South America and yields extra-long fibres used primarily to produce fine fabrics (Barnhardt Purified Cotton, 2019). *Gossypium arboreum* (or tree cotton), originally from India and Pakistan, and *Gossypium herbaceum* (or levant cotton), originally from Southern Africa and the Arabian peninsula, comprise less than 2% of global production and are used in various products, including fabrics and medical gauze (Barnhardt Purified Cotton, 2019).

LIVELIHOODS

Cotton cultivation provides direct livelihoods for 100 million households in 75 countries, of which 90% are in lower-income countries.

Cotton varieties can also be categorized into genetically modified (GM) and non-GM varieties. GM varieties have a strong foothold in the cotton sector and have come to dominate the varieties grown in the highest-producing countries, such as India, China, Pakistan, and the United States (Canadian Biotechnology Action Network, 2022). Due to the economic importance of cotton, many varieties continue to be developed around the world. Australia has developed more than 100 varieties to support its USD 2.5 billion industry. Bangladesh recently developed locally suited varieties in record time using nuclear technology to provide domestically grown cotton for its USD 25 billion–USD 30 billion ready-made garment export industry (CSIRO, 2021; Daya, 2021; Houssain, 2021).

Cotton has become very common in our daily lives. From the clothes we wear to the medical equipment used to treat us, cotton fibres are found everywhere. The cotton sector has grown into a multi-billion-dollar industry and continues to play a key role in supporting the textile sector. The processing of raw cotton products (cotton seed, cotton lint, and cotton linter) was reported to have a global retail market value of more than USD 18 billion in 2021 and is projected to exceed USD 22 billion by 2027 at a compound annual growth rate (CAGR) of 3.58%. Raw cotton products underpin the global textile sector, estimated to be worth almost USD 1,000 billion in 2021, and are projected to have

a CAGR of 4% from 2022 to 2030 (Grand View Research, 2022; Research and Markets, 2022). Described as the “most widespread profitable non-food crop in the world” (World Wildlife Fund, 2022) cotton cultivation provides direct livelihoods for 100 million households in 75 countries, of which 90% are located in lower-income countries (Fairtrade Foundation, 2022; Food and Agriculture Organization of the United Nations [FAO], 2015). An additional 350 million people support cotton farming and basic processing by providing labour, transportation, ginning, baling, and storage (Fairtrade Foundation, 2022). Cotton farming is essential to the global textile sector, employing around 25 million people—as about half of all textiles are made of cotton (Menke, 2017; World Wildlife Fund, 2022).

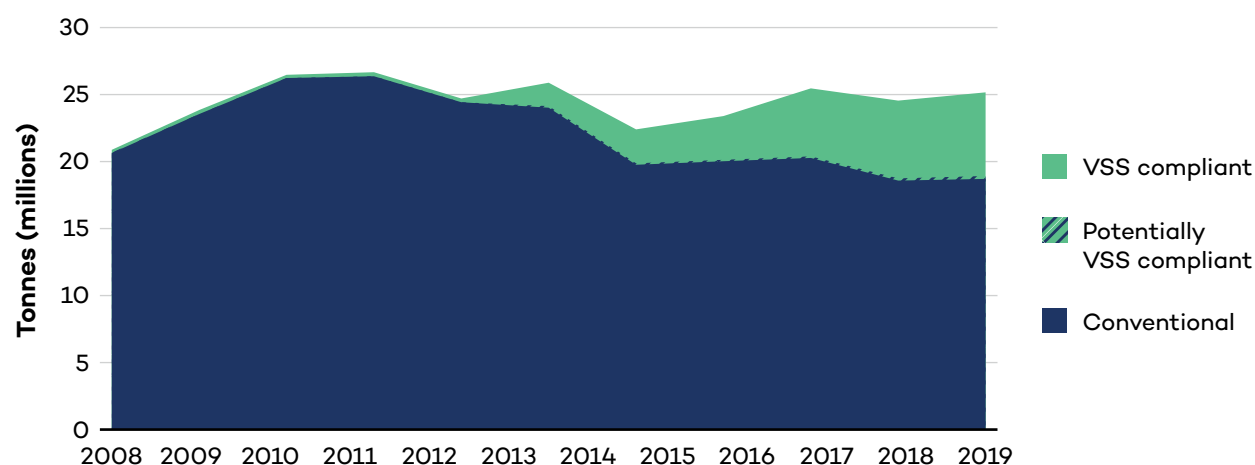
Cotton lint production grew from approximately 22.5 million tonnes (Mt) in 2008 to 25.2 Mt in 2019 from cultivating 34.5 million ha, according to the FAO (2019). Cotton lint production slowed over the last decade, as its CAGR of 1.04% from 2008 to 2019 contracted to -0.56% from 2014 to 2019. Although a significant proportion of global cotton production is used to support domestic textile sectors, more than one third of global production was exported over the last 5 years (i.e., about 37% in 2020), providing an important source of foreign exchange revenues for exporting countries (Johnson et al., 2022). Since 2016, the United States, India, and Brazil have consistently been the largest producing countries and exporters of cotton lint, exporting about 3.8 Mt, 1 Mt, and 2.1 Mt, respectively, in 2020, while China, Vietnam, and Bangladesh have consistently been the biggest importers, importing about 2.2 Mt, 1.4 Mt, and 1.2 Mt

in 2020, respectively (FAO, 2019). Global cotton supply and demand have fluctuated over the last 5 years but have remained fairly even (Johnson et al., 2022). Still, the U.S. Department of Agriculture (USDA) projects that, despite a 3.2% increase in global cotton production estimated for 2022/23, demand will outstrip supply in this period as the world economy rebounds after the pandemic, reducing stocks by around 0.5 Mt (Johnson et al., 2022). Going forward, the Organization for Economic Co-operation and Development and FAO (2021) predict a relatively balanced market until 2030, though the effects of the Russia–Ukraine war, including risks of a global recession in 2023, are still uncertain (World Bank Group, 2022).

The COVID-19 pandemic affected the global cotton sector as consumers typically slow

or stop spending on non-essentials, such as clothing, during crises (Bender, 2020). For instance, apparel imports in the United States and the European Union (EU) were respectively down USD 2.7 billion and USD 4 billion in April 2020 compared to April 2019 (Muhammad et al., 2021). Although disruptions to global cotton production were fairly minimal, producing countries experienced the effects of the pandemic differently and at different times (Grain Central, 2020). Shipping disruptions meant that cotton orders often had to be delayed, leading to a 30% drop in cotton futures prices between February and early April 2020 and stockpiling in anticipation of rebounding prices (Bender, 2020). For instance, export revenues dropped an average of 34% across the following least

Figure 1. Global cotton production from 2008 to 2019: Cotton that complies with voluntary sustainability standards (VSSs) reached 25%–26% of total production



Note: Conventional production volumes do not comply with a VSS, while VSS-compliant production volumes refer to cotton produced in compliance with at least one VSS. Production volumes that are defined as potentially VSS compliant cannot be definitively identified as conventional or VSS compliant with the data currently available.

Source: FAO, 2019; Meier et al., 2021.

developed countries: Benin, Burkina Faso, Chad, Malawi, Mali, Mozambique, Togo, Uganda, United Republic of Tanzania, and Zambia. As a result, some farmers in these countries reduced their total area planted in cotton (Sub-Committee on Cotton, 2021). Mali saw its total cotton area planted decline from 365,450 ha in June 2019 to 26,632 ha in June 2020 (Kone et al., 2020). Overall, according to the FAO, the total area of harvested cotton land fell by 3% from 2019 to 2021. The effects of the pandemic on the cotton sector are expected to persist for at least a couple of years as cotton prices recover and farmers adjust to challenges such as timely access to agricultural inputs (Sub-Committee on Cotton, 2021). Going forward, the COVID-19 pandemic may result in the industry diversifying manufacturing locations to reduce dependency on Asia and lower logistics and transportation costs. This outcome could favour countries in West Africa that are closer to consumer hubs in Europe and North America and that can grow premium, more sustainable cotton (Wright, 2022).

Climate change can dramatically affect cotton-growing areas, requiring farmers to adapt promptly.

Climate change is expected to affect global cotton production, as cotton plants need specific temperatures and moisture levels to produce fibres of sufficient quantity and quality (Hughes, 2021). While on the one hand, cotton productivity improves with increased carbon dioxide (CO₂) levels—the

plant captures it, promoting photosynthesis and plant growth—on the other hand, projected temperature increases and more frequent extreme weather events could be detrimental to global production (Hughes, 2021). Some of these extreme weather conditions include heat stress, extended droughts, extreme rainfall, and flooding, which can lead to landslides, wildfires, extreme winds, and storms, all of which can adversely affect cotton plant growth and productivity (Cunneen & Owain, 2021). Under a more extreme business-as-usual scenario (Representative Concentration Pathway 8.5—a global mean temperature increase of 2.0°C by 2045 to 2065), at least one of the climate hazards listed above will drastically affect half of all cotton-growing areas by 2040 (Cunneen & Owain, 2021). On the other hand, Jans et al. (2020) report that improved cotton yields due to increased atmospheric CO₂ concentrations may offset climate-related cotton losses. They maintain that the effects of climatic changes on irrigated cotton will likely be minimal and that rainfed cotton will be more vulnerable (Jans et al., 2020). Nevertheless, they warn that their modelling results are optimistic as CO₂ concentration effects on cotton yields and heat stress effects on cotton production pose uncertainties that should not be overlooked (Jans et al., 2020).

Cotton farmers will need to adapt to less predictable growing conditions and more extreme climatic events. Measures that can be adopted to improve cotton farming resilience include diversifying production, adopting soil and water conservation practices, lessening reliance on synthetic agricultural inputs, and using improved varieties. Cotton can be intercropped with food crops such as

corn, sorghum, and millet, which can give farmers another source of income and a means to maintain household food security. It can also be cultivated with nitrogen-fixing cover crops such as lentils and beans, which can improve soil moisture and fertility and prevent erosion. A significant portion of the world's cotton is irrigated using inefficient systems, offering opportunities to conserve water in many cotton-growing regions. Reducing costly synthetic inputs can make cotton farming operations less dependent and more profitable. Cotton is one of the top users of pesticides in the world, and synthetic fertilizers account for a large portion of the crop's greenhouse gas (GHG) emissions (Kone et al., 2020). Due to its economic importance, many cotton varieties have been bred to suit local growing conditions and offer temperature-tolerant and pest-resistant properties. Adopting climate-resilient varieties offers an important opportunity for farmers to adapt to changing climatic conditions. For that to happen, it is essential for farmers in least developed countries to have access to these varieties and have the support and training needed to test and adjust them to their conditions and adapt their farming practices as needed (Mandumbu et al., 2021). It is clear that cotton farmers will have to become more resourceful and their practices more diversified by varying cropping patterns and livelihood activities to face changing weather patterns, which will affect various parts of the global cotton value chain in unpredictable ways (Cunneen & Owain, 2021).

Despite its vulnerability to the effects of climate change, cotton farming has climate change mitigation potential. Growing cotton sequesters carbon in its plant biomass and

fibres. The cotton plant sequesters 0.5 kg of CO₂ per kilogram of fibre produced (Hughes, 2021). Organically grown cotton has a particularly low carbon footprint, as it does not use synthetic fertilizers, which can release nitrous oxides—a powerful source of GHG emissions. Cotton is more climate friendly than most synthetic fibres used in the textile sector, emitting at least a third less GHGs per kilogram of fibre produced. In fact, the higher share of GHG emissions associated with the life cycle of a cotton-made fabric is during consumer use (30% to 60%), specifically the energy required to wash and dry it, followed by its manufacture (20% to 30%), and lastly by the cotton production (5% to 10%) (Hughes, 2021). Cotton also readily biodegrades within 12 weeks, whereas synthetic fibres do not (Hughes, 2021). Cotton is a fibre that clearly enhances the potential for the textile sector to mitigate climate change and be more sustainable.

Cotton produced in compliance with VSSs offers the potential to build resilience and tackle climate change.

Numerous efforts are underway to shift the cotton sector toward sustainability and resilience. One of these efforts, the implementation of VSSs, first started in cotton more than 20 years ago. Cotton-growing practices that comply with VSSs can help build climate resilience in several ways. For instance, Better Cotton requires farmers to implement specific climate adaptation activities as well as measures to manage

MARKET VALUE

More than 2.5 million farmers produced 6.24 Mt to 6.46 Mt of VSS-compliant cotton with a farm gate value of USD 3 billion to USD 5 billion.

CAGR

Conventional production declined at a CAGR of -0.98% from 2008 to 2019 and -4.88% from 2014 to 2019.

VSS-compliant production grew at a CAGR of 39% to 40% between 2008 and 2019 but slowed to between 28% and 29% from 2014 to 2019.

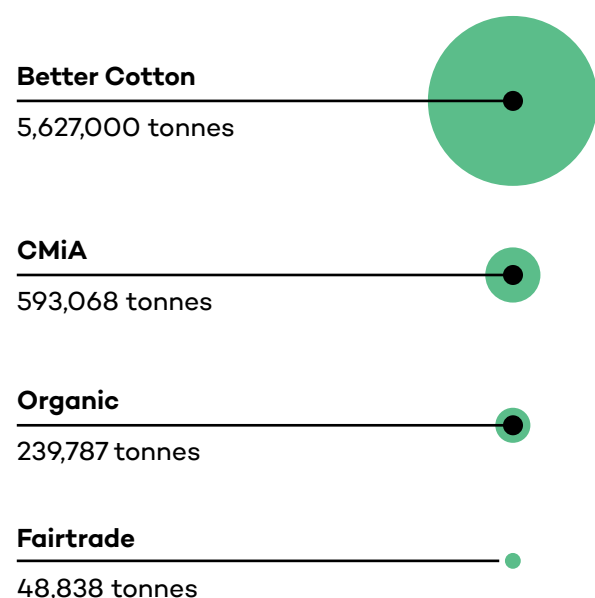
water efficiency in water-scarce areas. The Organic standard avoids the use of synthetic pesticides, while Better Cotton and Cotton made in Africa (CmiA) require farmers to adopt integrated pest management practices to reduce their use. Lower use of synthetic pesticides can help maintain soil health and prevent pesticide runoff into water streams. Furthermore, the three standards support the implementation of other soil and water conservation measures, such as the use of organic matter, mulching, water harvesting and recycling, and more efficient use of irrigation systems. All these measures can help maintain fertile soil that retains moisture while protecting water sources, which can help the plant cope with dry spells (Voora et al., 2022). Implementing VSSs allows farmers to differentiate themselves from conventional cotton in the marketplace (Voora et al., 2020). In exchange for adopting more sustainable farming practices, farmers can label their products as VSS compliant or produced in accordance with a VSS.

In 2019 more than 2.5 million farmers produced a total of 6.24 Mt to 6.46 Mt of VSS-compliant cotton lint with a farm gate value of USD 3 billion to USD 5 billion, increasing by 0.44 Mt to 0.49 Mt from the previous year (Meier et al., 2021). The most prominent VSSs in the cotton sector, ordered by 2019 production volumes, include Better Cotton (5.63 Mt), CMiA (0.59 Mt), Organic (0.24 Mt), and Fairtrade (less than 0.05 Mt). Growing at a CAGR of 39% to 40% from 2008 to 2019, VSS-compliant cotton now represents 25%–26% of total global production. Despite this impressive growth, there are signs that the supply of VSS-compliant cotton may be slowing, as its CAGR dropped from 28% to 29% from 2014 to 2019, limiting the availability of more sustainably grown cotton (Meier et al., 2021). Since VSSs have already proliferated in the largest cotton-producing countries, their continued expansion may be slowed as they move into lower-producing countries.

The availability of VSS-compliant cotton sold as conventional product is another challenge impeding its long-term viability, as some companies source VSS-compliant cotton at conventional prices to enjoy their risk-mitigation benefits at lower prices. For instance, certified Organic cotton farmers report that they must sell part of their production as conventional cotton; only about half of Fairtrade cotton was sold as such in 2016, and a little more than 20% of CMiA- and Better Cotton-produced cotton in 2018 was purchased as such (Sustainable Cotton Ranking, n.d.-a). Research suggests that just 25% of cotton produced more sustainably was sourced as such in 2018 (Sustainable Cotton Ranking, n.d.-a). Cotton farmers who cannot sell their product as VSS compliant do not receive premiums

How much cotton is compliant (by VSS)?

Figure 2. VSS-compliant cotton production volumes in 2019



Source: Meier et al., 2021.

and consequently struggle to pay VSS-compliance costs. COVID-19 supply chain disruptions have aggravated this challenge and affected the economic viability of VSS-compliant cotton farmers, as some farmers struggled to sell their produce (World Trade Organization, 2021).

According to our analysis, in 2019 about 92% of VSS-compliant cotton came from Asia (India, China, and Türkiye). The leader was India, with a production of about 349,786 tonnes. Africa followed with about 4% of total VSS-compliant production (grown in Tanzania, Uganda, and Benin). Our analysis indicates that India, China, the United States, Uzbekistan, and Brazil offer VSSs with the greatest potential to expand based on the size of their conventional cotton production.

Among the least developed cotton-producing countries, Burkina Faso, Mali, Sudan, Chad, and Ethiopia offer VSSs the greatest opportunities to enable sustainable development by requiring producers to adopt more sustainable cotton-farming practices based on their share of global cotton production, the limited presence of VSSs, and their Human Development Index.

As importantly, VSS-compliant cotton farming can affect yields. In 2019 VSS-compliant cotton yields were higher than conventional cotton yields in 11 countries and lower in 17. Nevertheless, VSS-compliant yields tended to be higher in larger cotton-producing countries such as India, the United States, Brazil, Pakistan, and Türkiye. China and Australia are exceptions, as VSS-compliant cotton yields were lower than conventional cotton yields in 2019 (FAO, 2019; Meier et al., 2021).

Demand for more sustainable cotton may continue to rise, fuelled by brands' commitments and increased awareness among youth.

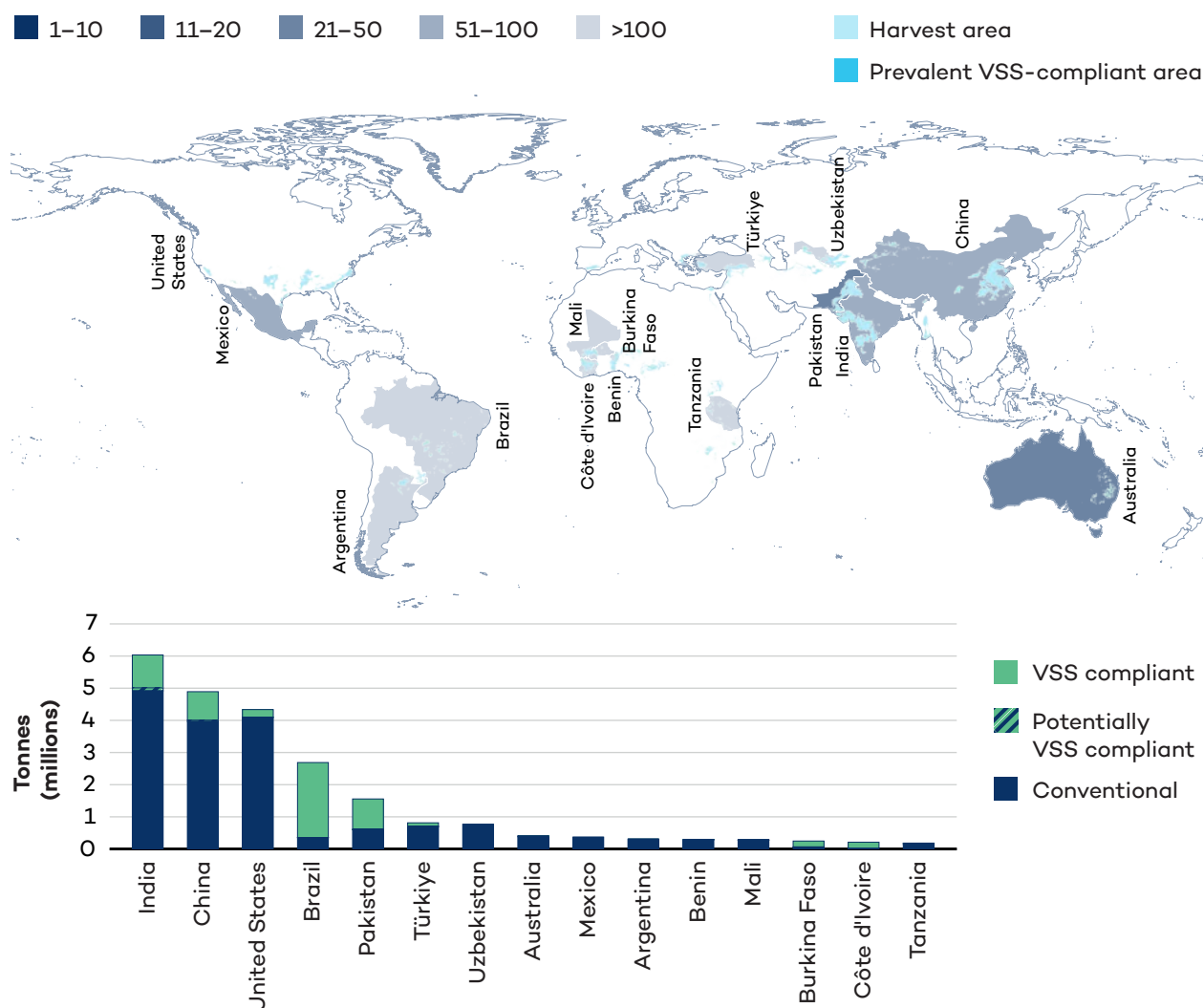
Consumption of VSS-compliant cotton remains concentrated in Europe and North America driven by regulations, consumer preferences, and corporate sustainability commitments. Upcoming EU due diligence rules will require companies to source more sustainable materials and mitigate the environmental and social risks of their operations. For instance, the

EU's Corporate Sustainability Reporting Directive is particularly relevant for the cotton sector. This directive, which has been recently adopted by the European Parliament, will require eligible companies

to disclose information based on a set of metrics about their operations and those of their suppliers regarding environmental and social issues, including water, pollution, climate change, working conditions, and

Figure 3. Cotton growing regions of the world: Distribution of cotton production in the top 15 producing countries in 2019

Climate Risk Index score for 2000–2019



Notes: Countries with lower Climate Risk Index scores have been most impacted by extreme weather events in the reference period. Data for prevalent VSS-compliant areas is not available for cotton in the sources consulted for for the 2022 series.

Sources: Eckstein et al., 2021; FAO, 2019; Meier et al., 2021; Voora et al., 2020.

respect for basic human rights (ENVIZI, 2022). These metrics are known as the Sustainability Reporting Standards and are currently under development. The cotton sector has historically been associated with water scarcity due to the inefficient use of water sources and irrigation systems, as well as soil and water contamination due to the excessive use of pesticides and runoff. Human rights infractions, such as forced labour and poor working conditions, are also found on cotton plantations (Voorra et al., 2022). Thus, companies operating in the cotton textile sector may need to collect data regarding these issues to report corporate operations in compliance with the upcoming Sustainability Reporting Standards (ENVIZI, 2022).

VSSs operating in the cotton sector support practices that aim to address these concerns. EU companies and their suppliers could use VSSs to mitigate potential social and environmental risks and comply with reporting requirements. Nevertheless, it is still too early to say whether VSSs could be a useful tool for cotton textile companies to comply with this EU regulation, which could bolster sustainable cotton demand in Europe (European Commission, 2022). Alternatively, VSSs may need to adapt and align their criteria to the European Sustainability Reporting Standards and the type of third-party assurance and external auditing that will be required.

A 2019 survey found that about 25% of Polish, Italian, and Spanish consumers were likely to buy clothes made from more sustainable materials, such as those certified as Organic or Better Cotton (IPSOS Mori, 2013). A 2020 survey in the United States found that 66% of participants were aware of the cotton and textile sectors' detrimental

impacts and that 31% of Generation Z consumers were willing to pay more for environmentally friendly clothing compared to 12% of Boomer consumers (BoF & McKinsey & Company, 2020). Although willingness to pay does not necessarily translate into actual purchases, recent research suggests that demand for more sustainable clothing will increase post-COVID in both Europe and the United States (U.S. Cotton Trust Protocol, 2020).

Rising awareness among youth and disposable incomes in the growing middle class in emerging economies (ITC, 2021), especially in Asia, are also driving demand for VSS-compliant cotton. Greater awareness and the younger generation's willingness to pay for more sustainable clothing are important, as youths have become the largest consuming cohort. Indian activist organizations such as Fashion Revolution India are working to improve the sustainability of the Indian apparel sector by convincing consumers to move away from "fast fashion," which has detrimental impacts (Fashion Revolution, n.d.; Singh & Dusanj-Lenz, 2019). In Brazil, a major cotton producer, there are efforts to promote the consumption of more sustainable clothing, including Eco-Fashion Week, established in 2017, which showcases more eco-friendly clothes made with organic cotton or recycled or biodegradable materials (Salyer, 2019; Simionato, 2022; World Sustainability Organization, 2021).

China, the largest textile and apparel producer and consumer, launched educational campaigns and implemented laws—such as the Clean Production Act and the Circular Economy Promotion Act, adopted in 2002 and 2009, respectively—to influence Chinese consumers to purchase

more sustainable clothing (Kim, 2021). Despite these efforts, important social and environmental concerns remain in the Chinese textile sector. For instance, Xinjiang, the largest cotton-producing and exporting region in China, drew media attention in 2021 after cases of forced labour were reported among Uyghur farmers, who were potentially engaged in the supply chain operations of major brands and VSSs (Congressional-Executive Commission on China, 2020; Glover, 2021; Keaten, 2022).

As consumers across the world become more aware of the socio-ecological impacts of their clothing, they are increasingly attracted to brands that use more sustainable materials (BoF & McKinsey & Company, 2020). Brands and retailers have responded by sourcing more sustainable cotton. For instance, Better Cotton reported that consumption complying with its scheme rose to 1.7 Mt in 2020 from 85,000 tonnes in 2013 (Better Cotton Initiative, 2021), and large textile manufacturers reported that 11% of the cotton they consumed in 2020 was certified Organic (Textile Exchange, 2021). Consumer demand has also driven retailers to develop clothing lines made with pre-consumption (i.e., fabric by-products) or post-consumption (i.e., clothes, bedding) recycled cotton. Recycled cotton can save up to 20,000 litres of water per kilogram of cotton used, redirect garments from landfills, and reduce carbon emissions (Cottonworks, n.d.; Edge Fashion Intelligence, n.d.). In addition, companies are implementing supply

chain mapping and traceability systems to identify all the tier suppliers, better track the cotton they purchase back to its origin, and collect product sustainability information. This traceability is particularly important for certified Organic cotton, as recent fraud in India's organic cotton sector exposed the challenges associated with maintaining the integrity and reliability of organically grown cotton, which normally garners higher prices from field to retail (Wicker, 2022).

As shown in Figure 4, some of the largest cotton-consuming brands and companies reported using an equivalent of 0.84 Mt of cotton lint in 2020, up from 0.83 Mt in 2017. From the total cotton lint consumed in 2020, these firms reported that 0.72 Mt, or 85%, was more sustainably sourced cotton, either compliant with a VSS, in transition,¹ or recycled cotton, up by almost 0.3 Mt since 2017.² Apparel brands such as Nike, Marks & Spencer, IKEA, and H&M met their 2020 sourcing commitments, while Tchibo, Otto Group, and C&A Group have almost met theirs. A new development in sustainable sourcing commitments includes Inditex aiming to source 100% of their cotton from more sustainable sources by 2025. If Inditex, C&A Group, Tchibo, and Otto Group achieve their sustainable sourcing targets, that would add 0.130 Mt more sustainable cotton by 2025.

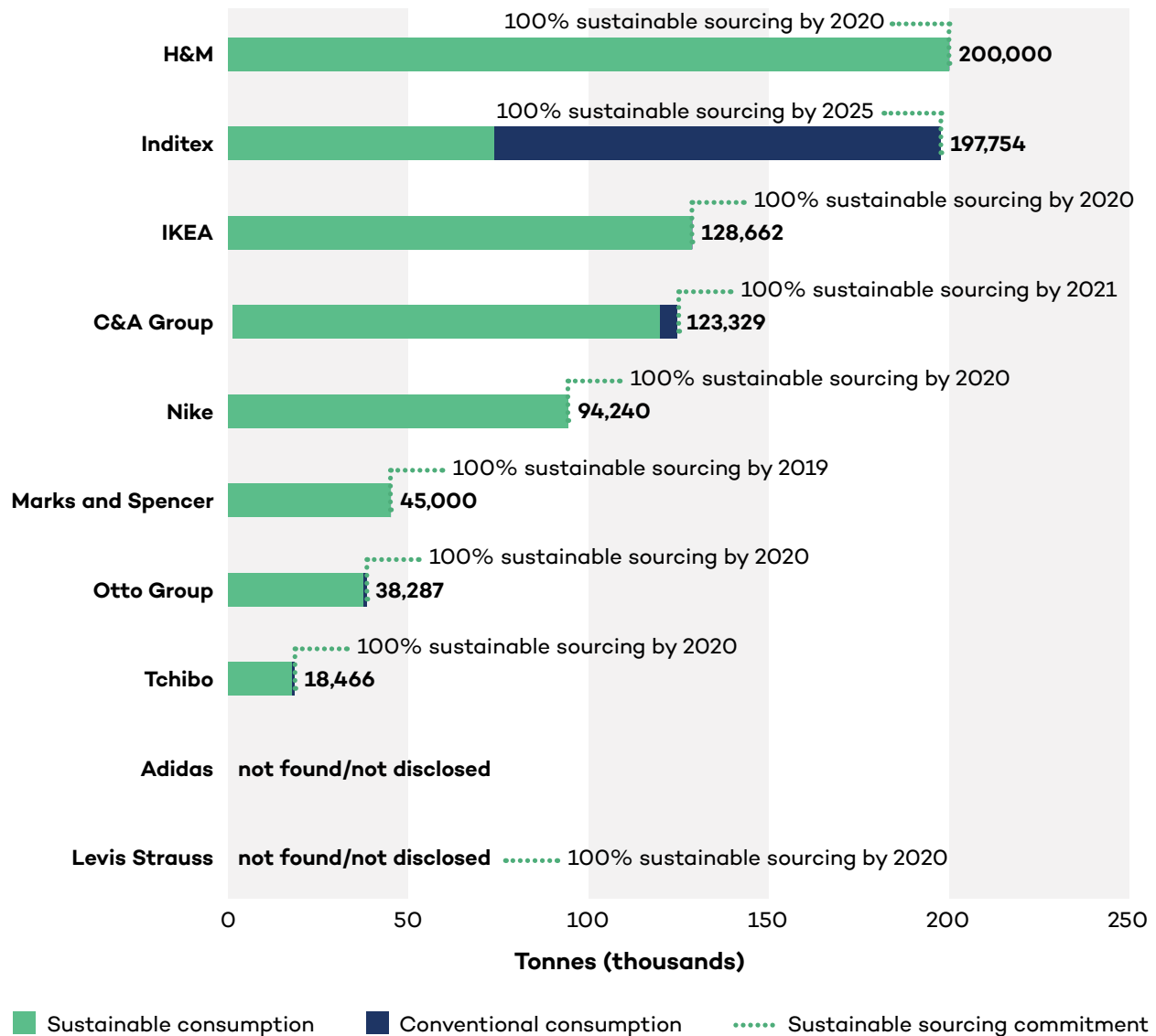
Although VSS-compliant cotton production has slowed in recent years, textile brands and retailers have maintained or reached their

¹ IKEA includes cotton from farmers that are in transition to comply with the Better Cotton standard in the total volume of cotton sourced from more sustainable sources. This cotton is labelled by the company as "Towards Better Cotton."

² This difference might be due to a higher volume of more sustainable cotton sourced and/or increased transparency in more sustainable volumes sourced.

Progress on sustainable sourcing commitments

Figure 4. Major apparel manufacturers and retailers consuming cotton, their sustainable sourcing commitments, and progress in 2020



Sources: Authors' own estimations; Cristina Graack, personal communication, October 20, 2021; C&A, 2020, 2021; H&M Group, 2018, 2021; IKEA, n.d., 2021; INDITEX, 2021; Levi Strauss & Co, 2019; Marks & Spencer, n.d.; MDS, n.d.; Nike, 2020, 2021; Otto Group, 2021; Siegle, 2012; Sustainable Cotton Ranking, n.d.

100% sustainable sourcing commitments, while others may soon define ambitious targets to meet climate objectives. All these commitments should have far-reaching effects across global cotton value chains. Still, forecasting VSS-compliant production in the cotton sector is difficult, as global events such as the COVID-19 pandemic, Russia's invasion of Ukraine, and the expected global recession can have unpredictable impacts on the cotton textile sector. A more pessimistic outlook weighs the slowing, short-term VSS-compliant production growth trend more heavily. This outlook foresees VSS production rising steadily to reach about 9 Mt by 2025 due to a shift toward other corporate sustainability initiatives, such as cotton recycling programs, and a continued inability to sell VSS-compliant products as such.

A more optimistic outlook weighs the increasing long-term VSS-compliant production growth trend more heavily and projects a more rapid increase to just over 13 Mt by 2025.

Various potential futures exist between these two outlooks. Although growth in VSS-compliant production has slowed in the last 5 years, we predict that it will continue to rise steadily, reaching almost 12 Mt by 2025. We expect demand for sustainable cotton to continue growing, motivating sustainable cotton sourcing commitments, and believe that cotton farmers will enjoy more success selling their harvest as VSS-compliant product. Consequently, we expect VSS-compliant cotton production to range from 9 Mt to 13 Mt by 2025.

A Dive Into Cotton Prices

Internalizing external costs in pricing models is critical to building a more resilient and competitive cotton sector.

Pricing is an important factor, as it can determine if cotton farmers stand to gain financially from complying with VSSs. Efforts to shift toward sustainability, such as by abiding by VSSs, are partly driven by a need to internalize the external costs associated with the industry. For instance, the external costs of Indian smallholder cotton production in 2016 was EUR 4.20/kg for conventional raw or seed cotton versus EUR 2.92/kg for

raw cotton complying with one or more VSSs and with less detrimental socio-ecological impacts, as certified farms usually had lower rates of water and input use, underpayment, and income disparity between workers (Grosscurt et al., 2016).

Furthermore, certified cotton farms in India were found to be 52% more profitable than conventional cotton farms, with yearly profits in 2016 of EUR 365/ha compared to EUR 240/ha (Grosscurt et al., 2016). Internalizing these external costs would make VSS-compliant cotton prices more competitive with conventional cotton. Therefore, examining how cotton prices intersect with the sector's sustainability is paramount.

As with other agricultural commodity markets, global cotton prices are largely correlated with macroeconomic instability and shifts in supply and demand. Cotton is traded in the futures markets, with New York and Liverpool as the dominant points of reference for pricing and daily market activity. Cotton prices are often measured by the Cotlook A Index, which is an average of the five lowest price quotations from a selection of upland raw cotton that is most traded internationally (Cotlook Outlook, 2021). The index serves as a reference for many buyers and traders to determine prices paid to ginner.

The cotton sector has historically been sensitive to external shocks that have led to large price swings. The textile and apparel sector, the main driver of cotton demand, is highly susceptible to recessions, as clothing and household goods purchases are sensitive to economic booms and busts (Muhammad et al., 2021). A drop in demand for textiles leads to an increase in cotton stocks and, subsequently, a drop in prices. For instance, in 2010 and 2011, prices shot up to an average of USD 2.07/kg to USD 3/kg because of a demand–supply imbalance, driven mainly by rising cotton consumption in China and poor harvests in Pakistan (PTI, 2010). In 2015, declining imports from China and large global stocks caused average world prices to fall to USD 1.40/kg and lowered the incentives for farmers to grow cotton (USDA, n.d.).

More recently, demand for cotton decreased amid government restrictions on the free movement of people and shop closures in the wake of the COVID-19 pandemic. Also, shipping disruptions at the time meant that cotton orders often had to be delayed. All this led to a drop in cotton future prices

in February and early April 2020 to about USD 1.40/kg and to cotton stockpiling in anticipation of rebounding prices (Bender, 2020). In 2021, cotton prices rose to an average of 40% higher than in 2020 due to increasing prices of grains and oilseeds, including cottonseed oil, coupled with the recovery in global consumption of cotton-based goods as global restrictions on movement eased and shops reopened (Mestre, 2021; OECD & FAO, 2022).

Weather conditions, such as less rainfall or frost, can greatly affect a farmer's ability to grow and harvest cotton, resulting in supply decreases and price increases (Richmond Dental & Medical, 2021). For example, large-scale floods in Pakistan in 2010 caused global cotton prices to spike to nearly USD 2.50/kg from about USD 0.70/kg in 2009. And in the United States, Hurricane Harvey ruined a substantial portion of the 2017 crop, pushing cotton prices up temporarily as demand outpaced supply (Barnhardt Purified Cotton, 2018). Cotton also faces strong competition from synthetic fibres such as polyester and nylon, which are made from an oil-based derivative. That means cotton pricing is tied closely to crude oil prices: if oil prices increase, the price of synthetic fibres goes up, leading to an increase in demand for cotton that may ultimately increase its price. In the long term, cotton prices are expected to decrease due to productivity gains and continuing competition with synthetic fibres (OECD & FAO, 2022).

The ongoing Russia–Ukraine war, combined with COVID-19 lockdowns and weather-related challenges, has led to major disruptions in the cotton market and price volatility. Higher energy and fertilizer prices are affecting the cotton and apparel supply

chain, and as the Russia–Ukraine conflict escalates, prices for commodities such as cotton could become higher and more volatile, which could exacerbate already inflationary pressures around the world (Josephs, 2022; Husband, 2022).

In addition, market decisions by China have had a great impact on cotton prices. China is the dominant force in the global cotton market, with prices heavily influenced by local production, purchases, and stock levels. Trade tensions between China and the United States from 2017 through 2019 caused major volatility in cotton prices in a market that was already greatly affected by supply and demand flows (Robledo, 2020). Although China and the United States continue to trade large quantities of cotton, other countries, such as Brazil and India, have become close cotton trade partners with China since 2018, further changing the global market dynamics (Robledo, 2020).

In early 2021 the United States banned all products made in part or entirely from cotton produced in China’s Xinjiang region (S&P Global Market Intelligence, 2021), which produces around 80% of the country’s cotton, as there were reported cases of unfair employment of the Uyghur people, China’s Muslim minority, at cotton plantations. Major apparel brands shifted part of their supply to other countries, such as Egypt and Türkiye, where cotton prices are quite high (Sainsbury, 2021). This shift helped to propel cotton prices to a 10-year high in October 2021, reaching USD 2.55/kg (Thomas, 2021).

Farmers’ prices and incomes are declining amid the complex dynamics of the cotton market.

Smallholder cotton farmers, who are among the poorest in the world, produce more than 60% of the world’s cotton. Many of them live below the poverty line and do not earn enough to support their livelihoods (CottonUpGuide, n.d.). Volatile market prices, rising production costs (particularly on inputs such as pesticides and fertilizers), decreasing yields, and increasing household costs add pressure to the already unstable and inadequate incomes of many cotton farmers. This prevents them from investing in training, adopting better farming practices that can improve soil health, and preserving water sources by using irrigation systems and quality seeds (Fairtrade Foundation, 2020). Indeed, cotton farmers in many developing countries are struggling due to recurring low farm prices and high levels of debt, which contributes to a perpetual cycle of poverty for many (Avadhani, 2020). Therefore, making sure that cotton farmers can make a decent livelihood from cotton is important for the sustainability of growing cotton in developing countries.

Farmers harvest raw cotton, which they sell to aggregators or ginning mills, where seeds are then separated from fibre to obtain cotton lint. The prices that ginning mills or aggregators pay to cotton farmers differ by country and can vary substantially from quoted international values. For instance, while the global average conventional raw cotton price in 2014 was USD 1.94/kg, the price that farmers obtained for their raw cotton, or seed

cotton, ranged from USD 0.74/kg in Pakistan to USD 1.14/kg in Brazil (OECD & FAO, 2021), demonstrating both the variance in pricing and the difference between farm gate and international market prices.

Farmers in developing countries are usually paid based on raw or seed cotton delivered to various collection points (Kabwe et al., 2018). In other countries, such as the United States, farmers are paid after ginning, as the price is determined by the quality and grade of cotton following quality testing (Internal Revenue Service, n.d.). Quality factors such as uniformity, fibre length, colour, and strength are considered in the price and premiums that farmers receive, regardless of how the farmer delivers the raw cotton (ITC, 2007a). Cotton farming systems and government support vary widely between countries. This is important because small farmers in countries such as India or Mali may be unable to purchase the highest-quality seeds due to higher costs associated with them, as they are disadvantaged compared to farmers in economies with more organized systems, such as China, the United States, and the EU, that also support farmers with subsidies for cotton inputs, insurance, or quality seeds (International Cotton Advisory Committee [ICAC], 2020). This puts pressure on small-scale farmers receiving less institutional support.

Cotton farmers get the lowest prices in the value chain, while retailers have pricing power and are better protected from market volatility.

Farmers are at the end of a long and complex value chain, often receiving the lowest prices while bearing high production costs. They are generally at a disadvantage when it comes to price negotiations because they lack access to the same market information as ginners (ITC, 2020). Indeed, many farmers depend on local ginners or traders who buy their raw cotton, often for less than the cost of production (Fairtrade Foundation, 2020). In addition, many small-scale farmers do not belong to farmer organizations, which leaves them little bargaining power or influence on the prices offered.

Cotton is a resource-intensive crop, specifically with regard to irrigation and pesticide usage. As input prices increase, so can production costs. The average production costs of raw cotton vary widely across countries; however, according to ICAC (2016), the average global cost of production of a kilogram of seed or raw cotton was USD 0.46 in 2016, not including land rent and seed value. Fertilizers and harvesting/picking are the most expensive inputs, accounting for 24% and 13% of the total costs, respectively. The same year, the market price hovered around USD 0.65/kg, meaning that most farmers in the world were struggling to reach the breakeven point or the price needed to cover production costs (ICAC, 2016).

Cotton farmers receive a small share of the retail price of a garment, not exceeding 10%, with some sources suggesting that they get just 2%–3% (Fairtrade Foundation, 2020; Rieple & Singh, 2010). Profits for cotton farmers vary across countries and tend to increase with the size of the farms. Small cotton farmers earn the least compared to large and medium-sized farmers in many producing countries. The margins for medium-sized and large farmers in Pakistan are about 12% higher than for small producers (Wei et al., 2020). In the United Republic of Tanzania, cotton farmers' gross profits were about 45% of the income they received when selling a kilogram of raw cotton in 2017, as the country has lower average production costs (USD 0.24/kg) than other countries in the region and the global average (United Nations Conference on Trade and Development [UNCTAD], 2017). This is because the government implemented programs to support farmers, such as extension services, and provides agricultural inputs to farmers.

Ginners are the first in a long line of operators who benefit from the manufacturing processes that add value to the farmer's raw crop. Some ginners buy an entire year's worth of cotton at the start of each season and incur the costs of storage, interest, and insurance internally. Others buy and schedule delivery of raw cotton week-to-week, and prices for services are negotiated in each contract (ITC, 2007a). Ginners obtain 2%–5% of the total value, or the final sales price of a clothing item, while they look to reduce the prices they pay to farmers. In some countries with less government control over the cotton industry, ginners take advantage and buy raw cotton

from farmers at lower prices than the market or just the minimum price set per kilogram (UNCTAD, 2017).

The price of a garment is 25 to 30 times the value of the fibre it contains (ITC, 2007b). The manufacturing process in textiles has many stages with several companies involved, and profits vary considerably among companies, countries, and specific products. Depending on the business model, trade transactions can take place between several different actors. Brands, retailers, or manufacturers often have buying teams or subcontractors who are responsible for buying the cotton on behalf of the company from cotton traders or other intermediaries, which can also be the ginner or spinner (Kering & Textile Exchange, 2021). The spinning and textile production stages obtain about 15% of the total value (the price of a final clothing item); design and apparel production stages obtain about 35%–40%, and retailers obtain about 40%–50% (Mohanty et al., 2019; Rieple & Singh, 2010).

Large international retailers not only make the most profit, but they have also consolidated to dominate the global textile and clothing value chain and gained considerable influence over the choice of production locations while having substantial bargaining power (ITC, 2016). The greater the level of retail consolidation in the market, the greater the pressure on suppliers to reduce prices, as retailers, which are positioned as volume sellers and are under pressure to maintain their competitive advantage by lowering their prices and offering discounts (Robinson, 2013). They also have access to tools to manage their risks by hedging against price volatility, adapting sourcing strategies, and passing

along price changes or higher costs of production to consumers without affecting demand (ITC, 2016).

This suggests that power relations greatly influence price negotiations along the value chain. These large companies, which are usually based in developed countries, purchase large quantities of goods and retain much of the higher value-added portions of the value chain, including research, design, marketing, and financial services, while the labour-intensive activities, such as manufacturing, ginning, and farming, are mostly concentrated in developing countries (ITC, 2016).

Research shows that a small increase in the raw cotton price would significantly improve the livelihoods of cotton farmers but have little impact on retail prices. This is because a textile product's price reflects the value added—and the corresponding cost—in the various processing and manufacturing activities. Some estimate that a 10% increase in the raw cotton price paid to farmers would result in a 1% or less increase in the retail price—which is a negligible amount given that retailers often receive more than half of the final retail price of finished cotton products (Nelson & Smith, 2011, p. 2).

What have VSSs done to pricing in the cotton sector?

Among the VSSs working in the cotton sector, only Fairtrade International has established minimum prices (FTMPs) for raw or seed cotton farmers, which vary depending on the origin country and quality of the raw cotton. It also contemplates a premium on top of the

minimum price and an additional premium for Organic raw or seed cotton. In 2021, for instance, the FTMPs for conventional seed or raw cotton ranged from EUR 0.48/kg in East Africa to EUR 0.53/kg in South Asia, plus a fixed premium of EUR 0.05/kg for all regions and countries. For certified Organic raw cotton, the FTMPs ranged from EUR 0.58/kg to EUR 0.66/kg plus a premium of EUR 0.05/kg in the same regions (Fairtrade International, 2022).

Other VSSs, such as Better Cotton, CmiA, and Organic, have no formalized mechanism for arriving at a price paid to cotton farmers. Traders usually take the commodity price as a reference to set VSS-compliant prices. This is the conventional cotton price quoted in the country of origin or on the international commodity market at a set time, with a percentage increase (often called a price premium) that is supposed to cover the costs of production and certifications, investments in farming operations, training, and others. This premium can range from 5% to 20% depending on factors such as market conditions, country of origin, arrangements between value chain players, and product quality. Prices are agreed upon between buyer and seller and can be negotiated either between producer organizations and ginneries or between mills and weavers or brands, yet they are heavily influenced by conventional commodity market prices (Textile Exchange, 2021).

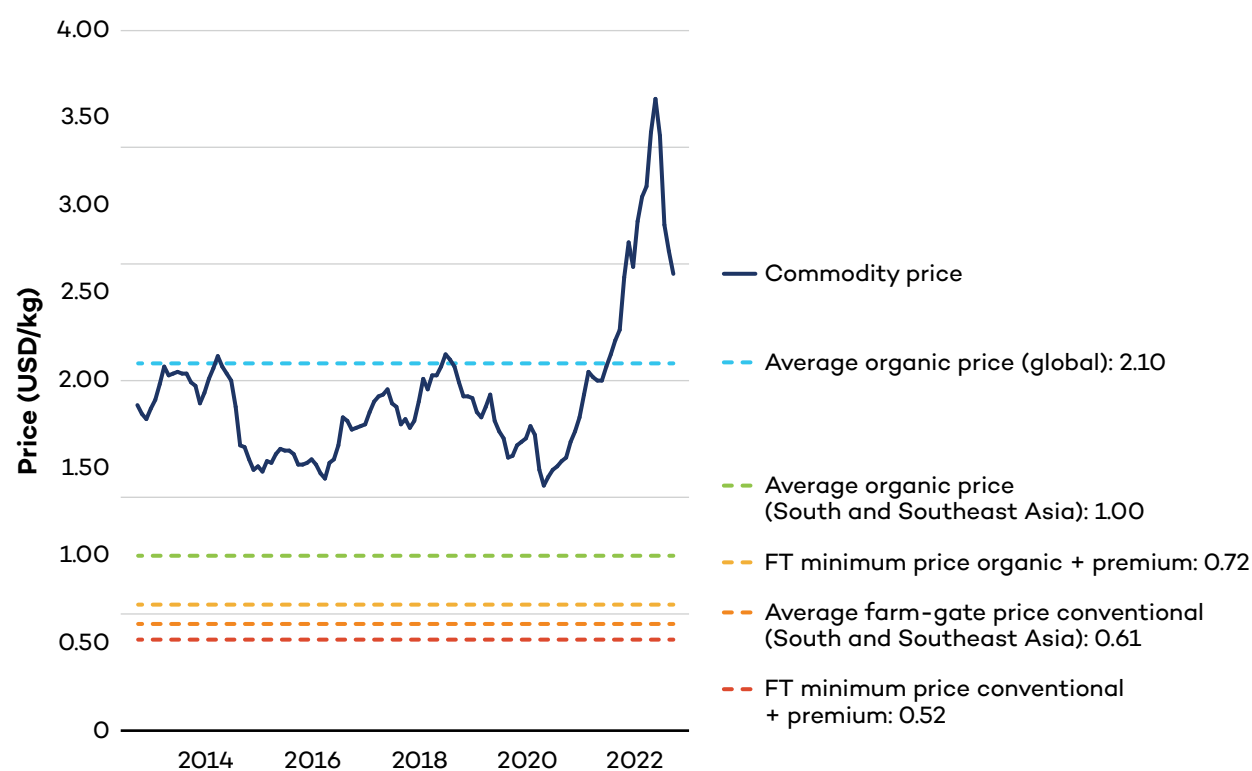
Some examples from a 2019 study by Kering & Textile Exchange in India show that price differentials for VSS-compliant cotton fluctuate at the farm gate and along the supply chain. For instance, at the farm gate level, producers of Better Cotton and Organic cotton received about 5% higher prices than

those for conventional cotton (differentials of USD 0.01/kg to USD 0.03/kg), and in some cases, producers compliant with Fairtrade and Organic–Fairtrade cotton obtained prices about 13% higher than producers growing conventional cotton (a USD 0.08/kg price differential). In other stages of the chain, such as ginning, yarn, and final fabric production, processors of Fairtrade and Fairtrade–Organic cotton received prices between 6% and 9% higher (about USD 0.4/kg) than those processing Better Cotton or Organic compliant only, and 13% higher prices than

those processing conventional cotton (USD 0.71/kg differential).

To better understand the differences between conventional and VSS-compliant cotton prices, Figure 5 illustrates an example of average prices paid for raw cotton to farmers in South and Southeast Asia (India, Pakistan, and Thailand) based on available data. It shows the average international cotton prices from 2012 to 2021 (USD/kg); average farm gate prices for conventional cotton; minimum Fairtrade prices and premiums for conventional and Organic cotton; and average

Figure 5. Average international cotton price against Fairtrade, Organic, and average conventional prices in South and Southeast Asia (USD/kg) for raw cotton or seed cotton at the farm gate



Source: Author's elaboration based on data from Cotlook Outlook, 2021; Fairtrade International, 2020; Indexamundi, 2022; Textile Exchange, 2021.

prices for Organic certification (USD/kg) at the farm gate. It should be noted that the prices represented in Figure 5 are estimates and do not reflect the reality of all cotton growers in the region.

Surprisingly, Figure 5 shows that conventional and VSS-compliant farm gate prices in South and Southeast Asia are well below the international market price. This might be due to the type and quality of the cotton and because FTMPs have not been updated since 2011 and do not reflect the current state of the market. However, farmers in this region producing certified Organic or Fairtrade–Organic cotton received slightly higher prices than those growing conventional cotton. What stands out is that farmers growing certified Organic cotton in the region received prices about 50% higher than those growing conventional or only Fairtrade cotton but still below the international market.

According to Figure 5, FTMPs in the South and Southeast Asia regions are almost at the same level as conventional cotton average farm gate prices. However, it is important to note that when the relevant market price for a product is higher than the FTMPs, then at least the market price must be paid, plus the mandatory premium. This means that Fairtrade- and Fairtrade–Organic-compliant farmers in India, Pakistan, and Thailand may have received considerably higher prices for their raw cotton than conventional farmers when selling their cotton as Fairtrade- and Fairtrade–Organic-compliant during the period analyzed. We can also infer that buyers may be more willing to pay premium differentials for VSS-compliant cotton when international prices are depressed, while premiums are less common when the market price exceeds VSS minimum prices.

Figure 5 also shows that the average global Organic cotton price was higher than the international market price from 2014 to 2021. This might be for several reasons, including higher prices paid to Organic cotton farmers in China due to import restrictions and subsidy policies in the country, as well as factors such as quantity, quality, and type of cotton (Textile Exchange, 2021). We can deduce that farmers in regions other than South and Southeast Asia that might have received this price were more protected from international price swings when selling certified Organic cotton as such. In addition, the current undersupply of certified Organic cotton due to the lack of availability of organic cotton seed and increased demand by manufacturers and retailers has resulted in much higher prices paid for certified Organic cotton at all stages of the supply chain, including the farm gate.

Evidence of the effects of VSSs on cotton farmers' prices and incomes is still inconclusive. However, some studies show positive results for the livelihoods of smallholder farmers adopting VSSs in cotton. Organic cotton farms typically achieve crop incomes 10%–20% higher than conventional ones after farms have fully converted from conventional production (Rieple & Singh, 2010). Growing organic cotton provides a competitive gross margin to farmers due to a combination of premiums and a reduction in input costs because organic production requires less use of agrochemicals such as pesticides. Also, organic farmers implement agricultural practices that can reduce water consumption and GHG emissions (Riar et al., 2017).

For instance, in 2016/17, organic farmers in Benin presented gross revenues like

those of the conventional producer but with significantly lower input costs, resulting in higher per-hectare net incomes (Westerberg, 2017). Organic producers in India obtained 32% higher gross margins than conventional producers in 2010 (Riar et al., 2017). A more recent study in India (Angidi & Bogati, 2020) showed that the production costs of producers of conventional GM cotton were about 21% higher than those of farmers growing organic cotton with comparable yields, revealing that certified Organic cotton can be more profitable while also improving the environmental impacts of cotton farming.

A recent study by Wageningen University of farmers complying with Better Cotton in India from 2019 to 2022 found that farmers associated with this scheme in Nagpur received USD 0.135/kg more for their raw cotton than control groups, representing a 13% price increase (Russell, 2022). The study also reports that farmers complying with Better Cotton increased their seasonal profitability by USD 82 per acre, representing an additional USD 500 in the year. Gains in profits were attributed to price increases as well as cost savings, as cotton farmers complying with this scheme used fewer synthetic fertilizers when adopting more sustainable farming practices, representing about USD 44 in savings in the season (Russell, 2022).

Cotton farmers associated with VSSs such as Fairtrade and Organic can also benefit from other non-monetary factors that can lead to higher incomes. These factors include improved access to land, the possibility of growing other cash crops with the premium received, improved ownership and participation by women in income-generating activities supporting their greater economic

independence, and more resilient production thanks to enhanced soil fertility and crop diversification (Sodjinou et al., 2015). VSSs can also give farmers the opportunity to associate within cooperatives and increase their negotiating power in the marketplace, improve business systems and access to markets, and develop long-term partnerships (Fairtrade Foundation, 2020).

Experts believe that VSS price mechanisms in the cotton sector, such as those implemented by Fairtrade, contribute to more transparency in the sector and a better understanding of pricing calculations. However, there are concerns that VSS-compliant cotton still has a limited market and lacks a formalized system to calculate VSS-compliant cotton prices (i.e., Organic), which makes tracking them difficult and can result in a lack of transparency in sales transactions that does not benefit the farmer in the end.

While many farmers do receive better prices and gross margins for VSS-compliant cotton, such as Organic cotton, there are still some issues in ensuring that price differentials reach farmers. As mentioned above, certified Organic cotton farmers have reported selling part of their production as conventional cotton, and only 25% of cotton produced more sustainably (under Better Cotton, Fairtrade, and others) was sourced as such in 2018 (Sustainable Cotton Ranking, n.d.-a). Also, VSS pricing usually involves many players in the value chain, and the negotiations will depend on market conditions at the time or the urgency of the grower to sell (Kering & Textile Exchange, 2021). Depending on the situation, when a brand procures fabric or finished goods, or even yarn or fibre, in an informal, untraceable system, there is no guarantee that the

differentials for VSS-compliant cotton have reached the farmer because it is not clear if the ginner or intermediary pays this premium to farmers (Kering & Textile Exchange, 2021).

Other supporting measures implemented by public and private sector actors

Cotton-producing countries have implemented policies and programs to shield producers from volatile and low cotton prices. This includes direct payments to producers to support their incomes and government purchases of cotton and buffer stocks to stabilize prices and guarantee domestic supplies (Meyer, 2014). Other policy instruments used by governments include subsidized insurance products to protect farm income during seasons of adversity, limits to volumes of cotton imports to protect domestic industries, and input subsidies to raise yields and lower production costs (FAO, 2021).

Countries such as Brazil, India, and Pakistan have implemented minimum support price system programs. When international prices are high, however, these mechanisms and subsidies tend to decline. For example, they were not supportive in 2019/20 because market prices exceeded government intervention price levels during most of the season. Also, the governments of Senegal and Côte d'Ivoire have modified their cotton policy to incentivize production by raising the price that cotton farmers get instead of subsidizing fertilizers and inputs that can be used to grow other crops (ICAC, 2020). This move aims to boost production in the region

since every year, farmers make a cost-benefit decision on the profitability of growing cotton based on price.

Government subsidies to the cotton sector amounted to USD 8 billion in 2019/20, of which 84% were from China and the United States. In 2019/20, an average of 69% of world cotton production was under government assistance or subsidies, which translates to an average of USD 0.09/kg, largely for farmers in China and the United States (ICAC, 2020).

This is a major concern in the cotton sector, as domestic subsidies, tariffs, and non-tariff barriers to trade—such as rules of origin, labelling requirements, and stringent compliance audits—have heavily distorted the market (Office of U.S. Senator Roger Wicker, R-Miss, 2017; Rajagopal, 2010). Mechanisms such as direct income, price supports, and other subsidies have enabled production to continue to flourish in relatively high-cost countries. This can lead to increased cotton supply and a decline in prices, negatively affecting cotton farmers in developing countries who have fewer support measures.

For instance, the USDA launched the Cotton Ginning Cost-Share program in June 2016 to provide cost-share assistance payments to cotton producers for the 2015 crop and assist with the marketing of cotton. The government payments were based on plantation area and capped at USD 40,000 per person or legal entity (USDA, 2018). The U.S. Farm Bill also offers support to cotton farmers with a marketing assistance loan rate that provides financing to producers so commodities can be stored upon harvest, when market prices are typically low, and sold later when price conditions are more favourable.

These strong government support measures certainly benefit and protect cotton farmers in their home jurisdictions. If they are not applied across the board, however, they can hamper the businesses of farmers in other countries that do not have programs in place to fully support their cotton growers, such as India, which has much less subsidized support in proportion to the total volume of cotton it produces (ICAC, 2020). In West Africa, cotton subsidies can have overwhelmingly unfair effects on farmers, as they are less protected. For instance, in 2013/2014, substantial subsidies contributed to a global cotton price decline that cost African farmers USD 250 million a year (Fairtrade Foundation, 2020).

Aside from government interventions, other mechanisms and tools have been created to make the cotton sector more transparent than other commodity sectors. One of these is the price quotations on the Cotlook A Index, which various industry actors, including buyers, traders, and governments, use as a benchmark to find out prices in their operations (Cotlook Outlook, 2021). For instance, this tool is the cornerstone used by sales managers at West and Central Africa cotton ginneries to decide the price to pay farmers for their raw cotton (Baghdadli, 2007). Other sources, such as the emerging Indian company MR Textiles, also provide information on cotton pricing that is fairly complete. However, it is not clear if farmers of seed cotton are aware of this information.

In addition, various institutions with international scope define policies that influence how the cotton sector operates worldwide and help maintain equitable trade in the cotton market. These institutions include the International Cotton Association

and the World Trade Organization, which act as watchdogs to prevent unfair competition through subsidies and other schemes that obstruct trade for other countries. The agriculture reform agreed upon by the World Trade Organization includes establishing duty-free and quota-free access for cotton exports from least developed countries to developed nations, which can enable farmers in these countries to access markets and increase their revenues.

Finally, development organizations such as the Organic Cotton Accelerator (OCA) have created direct-sourcing models that aim to promote price discovery and promote better prices and incomes for organic cotton farmers in India while supporting brands and retailers on impact measurement. The model offers Indian organic cotton farmers access to a price premium, non-GM seeds, and on-site capacity-building training by trained field staff. Farmers growing Organic cotton under OCA's Farm Program have, on average, earned higher net profits from their cotton than their conventional peers for 3 years in a row, and the program is expected to expand into other cotton-producing countries (Schute, 2021).

Many programs and measures have tried to increase the prices and incomes farmers receive by managing price volatility and production costs. Nevertheless, not all farmers have benefited, and most continue to live in poverty. Cotton is still a commodity crop that is traded on the financial market, which determines the international market price and is disconnected from the dynamics at the farm and the factory. Traders and brokers in the financial market—along with many other actors in the value chain, such as retailers and manufacturers—have

little concern for the social, environmental, and negative impacts of conventional cotton production or the value of more sustainable growing practices. Some of the biggest environmental and social impacts of the textile industry occur in raw material production. Market fundamentals, including trading at low prices, still prevail when setting the price of raw cotton over the work of farmers and the value of adopting better agricultural practices that contribute to environmental conservation and the well-being of producers.

A way forward: What is needed to build a more sustainable cotton value chain?

Cotton farmers' incomes suffer due to not only low farm gate prices but also to other externalities, such as the volatility of input costs and exchange rates. This means that a higher farm gate price does not necessarily mean higher income for farmers. As prices rise, so too can production costs, making cotton farmers even more susceptible to market fluctuations and margin volatility. This reality underscores the need to develop new approaches to address externalities in the cotton sector. The following list of best practices can mitigate the negative effects of price volatility on farmers' incomes while increasing them.

Improving terms and conditions can mutually benefit both parties. Contracts are one of the most important tools used to secure good prices for cotton farmers (Kering & Textile Exchange, 2021), as the

price can be predefined in advance of the growing and harvest seasons. Contracts can also help to define other terms and conditions. For example, VSS price differentials for raw cotton should be included in contracts to increase transparency (Kering & Textile Exchange, 2021). Schedules of payment and premium deliverables can also be included in contracts. Timely and guaranteed sales may be more rewarding and less risky for everyone than a simple premium placed on the commodity price (Kering & Textile Exchange, 2021).

There are also some examples where trade relations between growers and buyers remained stable and intact despite a period of soaring commodity prices. In 2011, some companies and cotton growers agreed on prices early in the growing season, which reflected the parties' agreed costs, terms, and conditions. Some had contracts that included benefits such as timely payments and pre-payment to cover the costs of seeds and other inputs for producers. These arrangements benefited producers in developing countries and also built in security and other benefits for the brands (Kering & Textile Exchange, 2021).

Other examples of good contract practices include apparel brands such as VEJA, which has signed 1-year contracts with cotton farmer associations in Brazil, set a market-decorrelated price per kilogram for Organic cotton, prefinanced the harvest up to 50%, and paid a premium per kilogram of cotton produced that farmer associations must use for community development projects (Textile Exchange, 2019). Other industry actors can follow similar models to directly benefit cotton farmers in their value chains, as well as support the conversion of conventional

cotton production to VSS-compliant models by entering long-term contracts with farmers and offering them higher prices or premiums that reflect this effort.

VSSs can offer better prices and incomes to compliant farmers to help establish living incomes. VSSs in the cotton sector should work toward a clear pricing system and include price models such as premiums or minimum prices that reflect the investments and efforts made to join their schemes. This approach can also protect compliant farmers from low farm gate prices. Organic cotton prices are still based on conventional prices, and in some cases, farmers do not have incentives to switch from conventional production systems. Others, such as Better Cotton and CMiA—the most prominent VSSs in the cotton sector in terms of volumes certified—have not formally incorporated approaches to better remunerate compliant farmers, even if, in practice, farmers may receive price differentials for their cotton.

FTMPs should be reviewed and adjusted to better reflect the market, be more impactful, and provide a cushion for farmers. FTMPs have not been revised since 2011, even though market prices for cotton in India and other major producing countries in recent years have been much higher than that price. If the FTMPs remain below conventional and Organic prices for an extended period, farmers will question why they have committed resources and time without benefiting from it.

Many African and Asian governments have implemented and increased price floors, so Fairtrade International's minimum price and premium—even for Organic—have been

somewhat less useful. As long as market and government prices are well above the FTMP, Fairtrade producers have little incentive and see no reason to comply with Fairtrade International standards; rather, they continue to produce conventional cotton or prefer other certifications that fetch higher prices, such as Organic (Fairtrade International, 2021a). To address these issues, Fairtrade International has implemented a pilot project to pay Fairtrade- and Organic-certified cotton farmers in India extra money or offer an organic differential for Organic cotton on top of the FTMP or the market price, whichever is highest. This includes an extra EUR 0.03/kg of raw cotton as of April 2021. In this case, farmers in India growing Organic and Fairtrade cotton receive about EUR 0.72/kg, including the premiums (Fairtrade International, 2021a). It remains to be seen if this initiative incentivizes the pilot farmers and how it can support an update on minimum prices and premiums or the expansion of the program to other regions.

In addition, the whole smallholder farming system must be considered when reassessing VSS prices and premiums, as farm profitability for many smallholder farmers depends on cotton and other crops. It is therefore important that VSSs, with the support of other actors, including buyers and producing countries, establish benchmarks to define living income reference prices as has been done in other commodity sectors, such as cocoa and coffee.

Buyers, traders, and industry associations can collaborate to improve price transparency for farmers. Several regional cotton associations, such as the African Cotton Association, the Karachi Cotton Association in Pakistan, the

International Cotton Association, and the Committee for International Co-operation between Cotton Associations, have a level of influence that can be used to support efforts to enhance price transparency across the cotton value chain. They can do this by publishing price dashboards and disseminating price-related information so farmers are aware of the different prices in the market and can develop better marketing strategies and strengthen bargaining power.

The difficulty of ensuring a fair price for cotton farmers is a major barrier to scaling up VSS-compliant cotton. While clothing brands and retailers understandably must make profits, their pricing decisions affect millions of people, including farmers and workers along the cotton value chain. More visibility for the processes and price transactions between actors is critical to making prices fairer for farmers. This transparency can be accomplished in parallel with developing product traceability systems to enable brands and retailers to trace the raw cotton's origins back to the farm. Indeed, many manufacturers and retailers know little about their suppliers, where they are located, and the processes, activities, and price negotiations that are involved along the supply chain.

Some companies in the textile and apparel sectors have addressed this issue by creating pilot projects and using emerging technologies so certified Organic cotton can be traced from farm to consumer while trying to engage directly with farmers to ensure premiums are paid. For instance, C&A Group and the OCA partnered to implement blockchain technologies to track transactions along the cotton value chain. C&A Group also piloted OCA's Farmer Engagement and

Development program that collects farm-level data to provide clarity on the prices farmers obtain for their Organic-compliant cotton to ensure payment of premiums to farmers (C&A, 2019). Other retailers, such as KaapAhal, are also working with OCA on similar initiatives to enable price discovery and ensure farmers obtain the premium. This is a positive step to boost transparency in the cotton sector. As consumers and governments call for more sustainable trade practices in the sector, companies need to adapt their processes, including measures to improve the price and income that farmers get.

The entire concept of price

determination needs redefining. In addition to the importance of timeliness of payment and mutually beneficial terms and conditions for cotton farmers when establishing prices to cotton farmers, companies and governments should consider the external costs of growing conventional and more sustainable cotton (or natural capital accounting) to determine the economic value—and cost savings—of sustainability efforts. This price adjustment would need to reflect the external costs of producing less sustainable cotton in the prices of cotton products along the value chain to improve the competitiveness of goods made with more sustainable cotton. Financial incentives from both producing and consuming countries need to be designed to ensure that cotton farmers are being rewarded for implementing sustainable practices that yield positive results. Tools such as the full cost accounting guidelines produced by the Sustainable Organic Agriculture Action Network provide strong economic arguments for policy reforms that incentivize beneficial practices and systems

in agriculture while disincentivizing harmful ones (IFOAM Organics International, 2019).

Investing in all levels of the supply network to ensure that sustainability efforts can be delivered with sufficient premiums for living wages and fair profits could help bring understanding to what farmers are actually receiving and their costs (Textile Exchange, 2021).

Local governments should promote internal regional markets and value generation. Cotton-producing countries have the potential to enhance the trade of raw cotton within economic regions and develop their own clothing industry to offset their reliance on the EU and countries such as China and the United States. Low-income countries can work to develop regional customs unions to provide preferential treatment between member countries and establish import duties on cotton and textiles coming outside the customs union (Koning, 2006). This is what the Economic Community of West African States could do to boost its cotton revenues. Nevertheless, it will need an energetic drive from policy-makers to support its small- and medium-scale textile industry to have the capacity to transform its own cotton into clothing for the local market. A promising development in that direction is the establishment of the first ginning factory dedicated to Organic cotton in West Africa, housed in Burkina Faso.

Low-income countries can also take steps to develop cotton by-product value chains such as cotton stalks, cottonseed oil (which can be used as biofuel), and meal to create complementary sources of revenue for farmers. By expanding and exploiting these value additions, cotton by-products

could contribute to economic growth and employment in regions such as sub-Saharan Africa, where cottonseed oil expansion, for instance, has the potential to replace some oil imports on which the region is dependent (ITC, 2020a). Cotton stalks could be used as a source of fuel, in the preparation of pulp and paper, and even as a substrate for growing edible mushrooms. Cotton cultivation usually generates two to three tonnes of stalks per hectare, but farmers in Africa usually burn them or cut them down to ground level and shred them (ITC, 2020b).

Some innovative techniques related to cotton recycling are also worth exploring. Some companies in the garment and textile sectors have started to implement processes to regenerate cellulosic fibre from cotton waste that is created in the manufacturing process; create pulp from old clothing pieces that is dried and converted into thread; turn old garments into new ones; or separate and recycle cotton and polyester blends at scale. These efforts to promote and scale circularity in the textile sector can also be extended to cotton-producing countries since once apparel is broken down, it requires additional cotton input to be woven into new garments.

For instance, governments in West African countries are looking to pilot the West Africa Regeneration Zone (WARZ) project to support the development of a circular textile and apparel supply base in West Africa. This would include using new recycling technology and smaller-scale near-shore manufacturing hubs that are closely linked to consumer markets in Europe. This project aims to reduce the industry's carbon footprint by creating a shorter supply chain and more product traceability. It can also help integrate fabric recycling processes to produce clothing

amounts tailored to evolving market trends (Wright, 2022).

These efforts can also be supported by increasing recycling capacity and standardizing sorting, collecting, and recycling infrastructure. Even if these techniques are not yet available on a large scale, they have garnered a lot of attention, as there is increasing interest in promoting circularity in the garment and textile sectors. A suitable institutional environment is key to encouraging this value generation from cotton production. Governments should support the sector by promoting infrastructure, communication tools, and processing capacities.

Other examples include logistical support, such as storage, transportation, prefinancing of inputs, insurance, and forward contracting, that protects farmers from external shocks such as price volatility and even permits them to increase their agricultural investments. It is about creating terms and conditions that offer business security and incentives that can make a difference in farmers' net profits.

Governments should support structuring the cotton value chain in producing countries and promote direct trade/relationships between farmers and buyers. Cotton farmers in the main producing countries, such as India, or in West African nations can benefit from knowing their options for selling their product formally and avoiding selling it to informal intermediaries that approach them in their villages. Structuring local value chains by supporting aggregators, ginneries, and other actors with formal registration and establishing relationships with individual cotton growers can help farmers expand their

market options and increase their capacity to negotiate prices.

One example of direct sourcing in the cotton sector that has helped to increase transparency and secure pricing and terms of trade is the integrated textile manufacturer Armstrong Knitting Mills, which works directly with Fairtrade farmers in India. They have developed a system that shares fibre pricing information along the value chain. Other brands, such as the British People Tree and Tchibo in Germany, have partnered with ginneries to buy the fibre directly and negotiate a percentage of the payment for the farmers as organic differentials (Kering & Textile Exchange, 2021).

Indeed, companies in the cotton sector can show their commitment by visiting the source farms to understand specific farmer needs or explore sourcing directly from farmers where possible. When working directly with farmers, it can be helpful to build partnerships with other buyers to aggregate demand or share buying plans with them (Truscott, 2020). Buyers can also help farmers transition to VSS-compliant cotton.

Building sustainable and resilient cotton production systems is essential. It requires industry actors, including VSSs, to coordinate and implement effective measures to support farmers adopting more sustainable practices and ensure they are rewarded fairly. Measures targeting price transparency, increasing financial rewards for farmers, and improving contract terms, combined with opening up direct trade relationships and regional markets, can make a difference to farmers' livelihoods.

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The Sustainable Commodities Marketplace Series provides a market performance overview and outlook for key agricultural commodities that comply with a number of voluntary sustainability standards (VSSs), focusing on global sustainable consumption and production. Each year, the series focuses on a different overarching theme, with individual reports for that year devoted to providing a market update for a chosen commodity. These reports are designed to be accessible and relevant for a range of audiences, including supply chain decision makers, procurement officers, policy-makers, and producers. The series builds on *The State of Sustainable Markets 2021*, a joint publication from IISD, the International Trade Center (ITC), and the Research Institute of Organic Agriculture (FiBL), which examines over a dozen sustainability standards for various commodities.

The *Global Market Report* analyzes trends in cotton production, consumption, trade flows, and other relevant areas. It uses 2019 data for cotton production that is VSS-compliant, given that this was the most current data available when we conducted the analysis. The report also examines prices and margins in the cotton sector, looking at how VSSs contribute to increasing farm prices. It also provides recommendations to VSSs and other actors to increase the price and income that farmers obtain for their cotton and build sustainable and resilient cotton systems.

IISD's State of Sustainability Initiatives (SSI) is an international research project that aims to advance sustainable and inclusive value chains. For over a decade, the SSI has been providing credible and solution-oriented analysis and dialogue on VSSs and their potential to contribute to sustainable development outcomes.

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