

Cotton value chain analysis in Tajikistan

Value chain analyses assist in informing policy dialogue and investment operations. They help the understanding of how agricultural, aquaculture and fisheries development fits within market dynamics. They permit an assessment of the value chains' impact on smallholders, businesses, society, and environment.

The European Commission has developed a standardised methodological framework for analysis (https://capacity4dev.europa.eu/projects/value-chain-analysis-for-development-vca4d_en). It aims to understand to what extent the value chain allows for inclusive economic growth and whether it is both socially and environmentally sustainable.

The value chain context

Tajikistan is among the top 20 cotton-producing countries in the world. The country experienced a decrease in seed-cotton yields (2.3 t/ha in conventional farms) compared to neighbouring countries, but have gradually recovered in the last decade. Most cotton fiber is exported, only 10-20% being processed in the country (Figure 1).

Since the break-up of the Soviet Union, agricultural reforms impacted on the value chain (VC) governance, in particular land tenure. In the 1990s, this negatively affected yields together with other interrelated factors such as: low seed quality, declining soil fertility and poor rural infrastructure

as well as farmers' limited investment in cotton farming. The governance of the VC has been reformed since then, with private actors replacing the role of the state.

The Soviet-era large-scale state and collective farms have evolved into commercial dehqon farms (of various scales/sizes) that are the primary cotton producers nowadays. The types and varieties of cotton produced have changed with medium staple cotton now dominating over the Soviet-era long staple cotton. Conventional cotton production is predominant, but organic cotton and cotton certified as Better Cotton Initiative (BCI) are also undertaking (together 12%).

One of the main goals for the cotton VC development is to move beyond the production and export of seed-cotton and expand activities to garments manufacture and export of intermediate cotton products.

The European Union intervention

The national strategy for the development of the cotton production and processing and of the textile industry in Tajikistan for 2024-2040 (NSDC 2040) was adopted in 2023. Its implementation through the Action Plan 2024-2026 is a topical agenda for the Ministry of Industry and New Technologies (MoI) and for the Ministry of Agriculture (MoA). Accordingly, in its 2021-2027 Multiannual Indicative Plan, the European Union prioritizes support for the Tajik agribusiness sector, with a specific focus on the cotton VC.

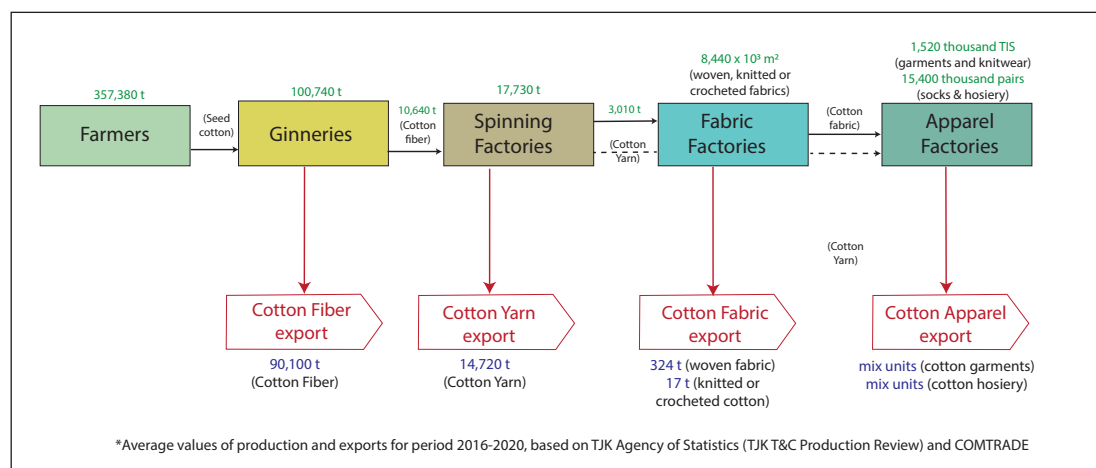


Figure 1: Flowchart of the cotton
VC in Tajikistan

Functional analysis

Being exclusively irrigated, cotton production in Tajikistan is confined to lowland areas and concentrated in the country's primary agricultural regions of Sughd and Khatlon. Most farms use gravity irrigation, although pumps are also used to extract ground water in specific localities in the north and southwest. Geographic differences in farmers' access to water are pronounced, between and within districts, and between and within smaller localities.

Cotton production and processing are labour and input intensive as they require large amounts of water and energy for irrigation and ginneries. The use of fertilizers in cotton cultivation is also high (>180kg/ha).

Sub-chains and typology of farmers

The cotton VC in Tajikistan is characterised by three main sub-chains (Figure 2): 1) **conventional sub-chain**, with three main types of producers: **small, medium and large conventional farmers** depending on the size of the cotton cultivation (respectively below 5ha, between 5-40ha, and more than 40ha); 2) the **Better Cotton Initiative (BCI) sub-chain**, whose farmers produce on an average farm area of 10ha; 3) the **organic cotton sub-chain**, with farmers producing on plots of 2ha and supplying ginneries that only process this type of cotton, destined for export. Conventional farms tend to intensively apply fertilizer and also use higher quantities of water for irrigation due to a more limited support from the extension services compared to BCI and organic farms. Organic cotton is produced without synthetic pesticides and genetically modified seed, with attention to soil health and biodiversity. BCI practices focus on both social and environmental aspects, by paying attention to water efficiency, limited use of chemical inputs, and labour conditions.

On average, the **total seed-cotton production amounts to ~360,000 t per year**, 88% of which is produced by conventional farmers, while BCI and organic cotton contribute by 10% and 2%, respectively. Yields are higher in BCI (2.8t/ha) and organic farms (2.7t/ha) compared to conventional farms (2.3t/ha).

There is an additional sub-chain which has emerged with the investment of a Chinese enterprise, characterised by strong vertical integration. Due to difficulties to investigate this sub-chain, it is not included in the present analysis. The production of the yarn from Chinese sub-chain is estimated at 7550 t/year.

Processing and marketing

From seed-cotton, both fiber and cotton seed are obtained. The conversion rate (% of cotton fiber obtained from a given weight of seed-cotton) is higher in BCI and organic sub-chains (35%) than in the conventional sub-chain (28%). 20% of cotton seed is used for replanting, while 80% is processed into oil.

88% of Tajik seed-cotton is processed by large, registered ginneries. The rest is processed by mini-ginneries, mainly concentrated in Khatlon region. This technology is reportedly imported from China. The cotton lint produced by these mini-ginneries is sold in the local markets and amongst other purposes mainly used by households for traditional mattresses and cushions.

The cotton fiber from the conventional and BCI sub-chains is mostly exported, and the remainder is spun into yarn in spinning mills. Cotton yarn is mostly exported, with a limited amount used to make cotton fabric in Tajikistan. Asian countries, particularly Turkey and Russia, account for over 75% of Tajik cotton exports. However, poor infrastructure and the country's landlocked position affect the transport and trade flows of the VC, while the network structure also needs to be improved.

Governance of the value chain

Several state authorities are involved in the governance of the cotton VC at various administrative levels. The MoA is primarily focused on upstream activities (cotton farming). It is not involved in monitoring or coordinating cotton processing any longer (ceased after the 1990s). The Mol is mostly oriented towards downstream activities (ginneries and spinning factories, textile factories, garment producing factories). According to the NSDC 2040, the Mol is assigned to play a central role in coordination of the cotton VC, collecting status information from the various institutions.

Farmers have limited negotiation power to influence the cotton farm gate prices, as the ginneries benefit from their monopsony situation. Farmers can access price information on the cotton harvesting season.

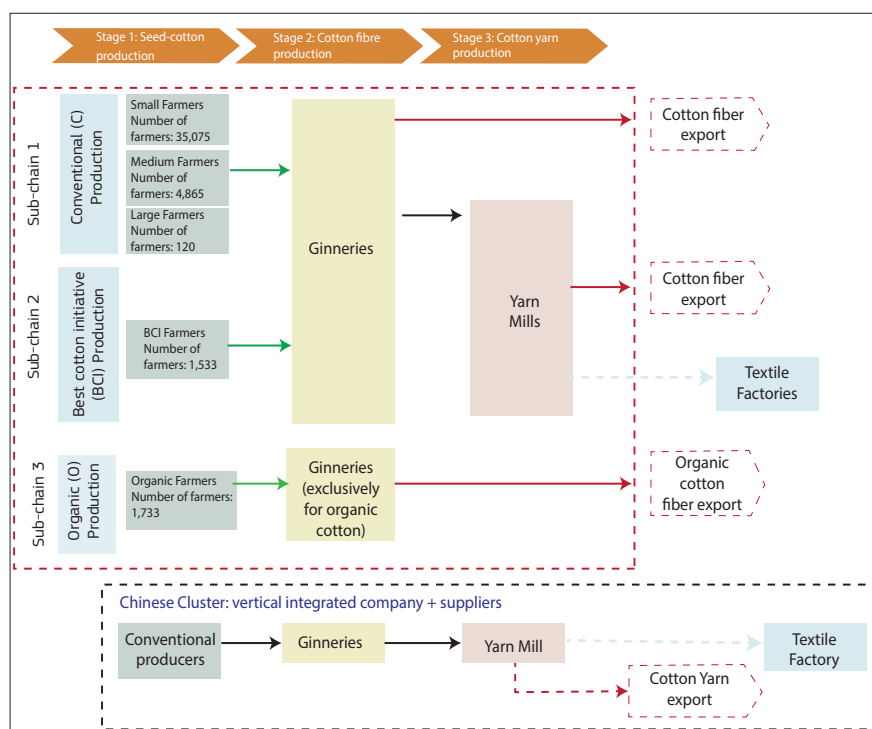


Figure 2: Typology of farmers and sub-chains

What is the contribution of the value chain to economic growth?

Financial viability for the actors

The operations in the cotton VC are profitable for the actors involved, except for yarn processors (Tabel 1). The return on turnover (ROT) is higher in BCI and organic farms due to higher yields compared to conventional farms. For conventional farms, the ROT ranges from 3% to 30%, the highest corresponding to small farmers, whose cost of input is lower, and the use of waged labour is limited.

At the processing stage, the ROT for the ginneries is 15% but for the yarn processors, the activity gives a negative operating result of with a ROT of minus 24% due to outdated equipment and higher costs, especially lint and energy, which represent important cost factors.

Actor	Net Operating Profit (NOP)	Return on turnover (ROT) (%)
Small conventional farmer	1500 TJS (€129)	30
Medium conventional farmer	50,000 TJS (€4,300)	18
Large conventional farmer	90,600 TJS (€7,800)	3
BCI farmer	79,000 TJS (€6,800)	43
Organic farmer	13,410 TJS (€1,153)	40
Ginnery	4,900,940 TJS (€421,400)	15
Yarn processor	-5,180,000 TJS (-€445,400)	-24

Net Operating Profit (NOP): Net income of the actor (excluding depreciation)
Return on turnover (ROT): Operating profit/value of production
Tabel 1: Profitability for the individual actors

Impacts on the national economy

The **total value added (VA)** generated by the cotton VC in 2022 (excluding the Chinese sub-chain) is estimated at **2,160 million TJS (€185.7 million)**. The contribution of the farmers and processors to this total VA accounts for 84%, whilst the remaining 16% represents the contribution from suppliers of goods and services (seeds, fertilizers, pesticides, fuel, electricity, water, transport, packaging, etc.) (Figure 3).

The contribution of the VC to the GDP is 2.6%. The **contribution of the cotton farmers to the agricultural GDP is as high as 5.8%**.

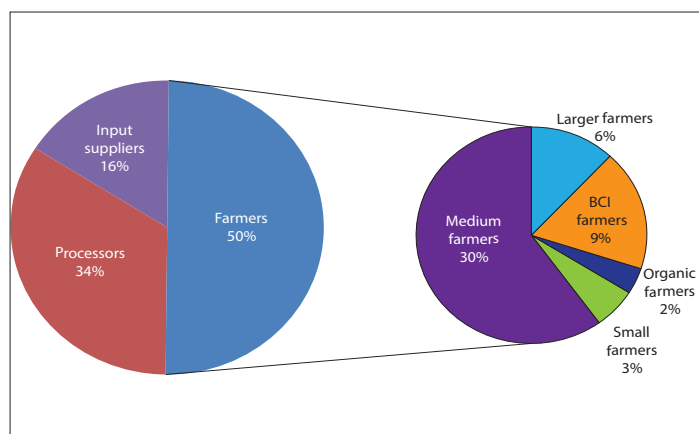


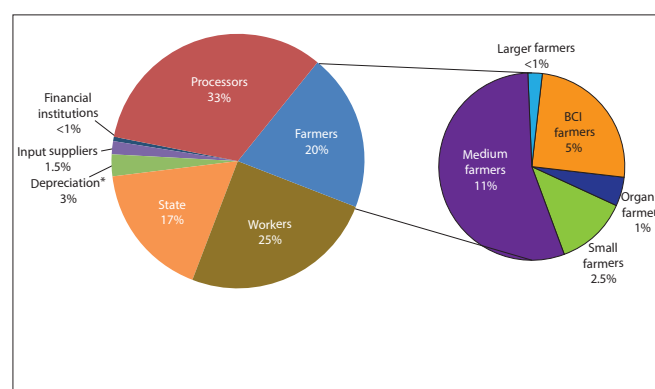
Figure 3: Creation of the income (total VA) by direct and indirect actors

The cotton VC generates important fiscal revenues through the export tax applied to the exported cotton lint and yarn (10%). To encourage local cotton processing, an additional export tax of 2% has been added in 2024 (supposed to reach 6% by 2026).

Land taxes are paid to local authorities. Although there is unified land tax, land under cotton is often taxed 50% lower than land under other crops. There are also water fees collected by Water User Associations that transfer a part of the collected fees to agencies at a higher level of the administration. There are no outlays of the government (subsidies, etc.) for the VC. The **contribution of the VC to public finances** is thus positive by **388 million TJS (€33 million)**. The **contribution to the balance of trade** is also **positive** (by €128 million) as the value of the VC's imported goods and services is lower than the value of exports. The **rate of integration** is **~70%**, meaning that 70% of the value of the production corresponds to VA for the national economy and 30% corresponds to the VC's imports of fuel, packaging and inputs (loss of foreign currency).

Viability in the international economy

The **Nominal Protection Coefficient (NPC)** is below 1 (0.93) meaning that Tajik cotton VC is not protected and the overall VC remuneration is lower than it would be if international prices were applied. The **Domestic Resource Cost (DRC)** ratio is below 1 (0.30) denoting a **comparative advantage** and **viability of the Tajik cotton VC in the international economy**. This means that the value that the VC creates for the national economy is obviously higher than the value of the domestic factors that are consumed.



* It is the part received by all entrepreneurs for the depreciation of the capital invested by the VC actors in their activities
Figure 4: Distribution of the income (total VA)

Cotton in Tajikistan contributes by almost 3% to the national GDP. The value chain provides income for most of the actors involved and is significantly contributing to the economic growth. The cost of lint and electricity affect the profitability of yarn processing units. The value chain heavily depends on imported inputs, equipment and machines but the value of its exports helps compensate this loss of foreign currency.

Is this economic growth inclusive?

Distribution of income among the actors

The total VA represents the income generated by the VC and is mainly composed of NOPs (55%) followed by wages (25%) and taxes (17%). This means that the VC direct actors (farmers and processors), workers and the State are the main beneficiaries of the income generated (Figure 4). However, farmers, who generate 50% of the total VA (Figure 3), receive only 20% of it and this share is mainly distributed to medium conventional farmers and BCI farmers (11% and 5% respectively) (Figure 4). Small conventional farmers receive 2.5% of the VC income.

Cotton farmers only receive income from cotton upon harvesting and sales to ginneries (September-December). Some farmers prefer to produce cotton under a contract with a ginnery to benefit from access to farm inputs and advances in cash (on credit), which is needed to pay wages. For 1 t of

cotton lint, the farm gate price corresponds to 50% of the final export price.

Job creation and employment

The VC generated in 2022 more than **45,000 waged jobs in Full Time Equivalent (FTE)** of which almost 90% are **temporary jobs** (women occupying 55% of these temporary jobs). Medium and large conventional farms, together with BCI farms, are the main sources of wages. 90% of wages (€46 million) generated by the cotton VC is spent on unskilled work.

Processors, medium conventional and BCI farmers are the main beneficiaries of the income generated by the value chain. Farmers contribute to 50% of the income generation and receive 20% of it as net operating profit. The value chain's contribution to job creation is important and women occupy 55% of them.

Is the value chain socially sustainable?

Figure 5 and the following table provide an image of the main social consequences of the VC activities in six strategic domains.

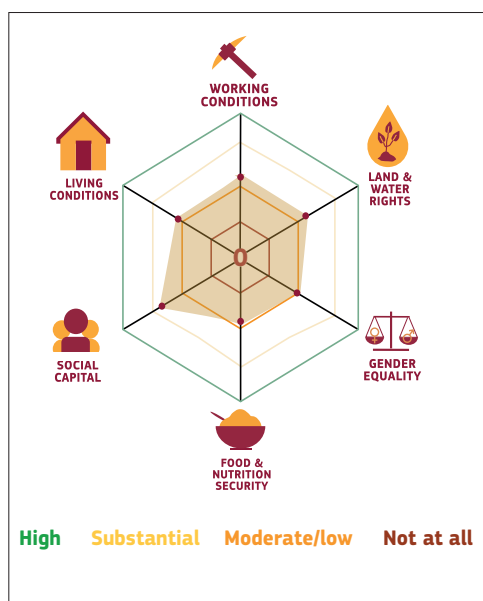


Figure 6: Social profile

Despite being an important source of rural employment (particularly given paucity of alternatives), the cotton value chain faces important obstacles. Working conditions, especially for women labourers, are tough. BCI and organic cotton could improve working conditions through less exposure to agro-chemicals and more stringent monitoring and provide higher cotton farm gate prices. Access to land and water may face risks, if conflicting private interests on these resources are not properly managed. Youth involvement in the value chain is generally limited.

Working Conditions	- Lack of regular monitoring/law enforcement for labour rights. Contracts are rarely concluded; informal agreements prevail - Exposure to health risks in case of high volumes of agro-chemicals' use, BCI initiatives and organic farming have the potential to minimise the risks - Low attractiveness in cotton cultivation and outbound migration due to lack of decent job opportunities in rural areas
Land and Water Rights	- Land and water rights transparently documented but face potential risks with the establishment of a new sub-chain through Chinese investors - Farmers' land access conditioned by cotton cropping in cotton producing areas - Households not consulted before investments, only informed at a late stage
Gender Equality	- High presence of women as low paid cotton farm labour - Lack of women's control on household budget and power in decision making - Low access of women to land, credit, and extension services - Exposure of women to a double burden of work (household and field), with the presence of severe health risks on the field
Food and Nutrition Security	- High availability of diverse food in local markets, but affordability related to the purchasing power depending on season and cotton price - Vulnerability of cotton farmers' income (due to high dependency on ginneries) affecting their purchasing of food products - Potential risks on food security in case of low wages and low farm gate prices in the cotton VC - Competition between cotton and food crops due to limited arable land increasing potential risks to food security
Social Capital	- Weak involvement of farmers in producers' organisations and cooperatives, especially in the conventional sub-chain (also reluctance to engage) - Lack of trust between VC actors (farmers-state, farmers-ginneries, farmers-input suppliers, farmers-women labourers in case of wage payment delay)
Living Conditions	- Erratic electricity supplies affecting health and education facilities in rural cotton producing areas, particularly in winter - Risks of water borne diseases in most rural areas - Shortage of teachers in rural cotton producing areas, generally low enrolment in tertiary education

Is the value chain environmentally sustainable?

The environmental impacts of the cotton VC are measured through a Life Cycle Assessment (LCA) considering damages on three areas of protection: **resource depletion**, **ecosystem quality** and **human health**. LCA results also show the VC's impact on climate change. Risks to biodiversity have been assessed through an exploratory analysis.

Total impact of the cotton VC on three areas of protection

According to the findings of the LCA, the main contributor to damages to **human health** within the VC are identified with the emissions associated with cotton cultivation (use of fertilizers and fuel for irrigation, etc.). Damages on **ecosystems** are determined mainly by the extension and yields on land use and by the water consumption for irrigation, while **resource depletion** is associated with water pumping, inorganic fertilizer production and fuel consumption in field operations (Figure 6).

Impact of farms and processing activities

The use of fertilizers, the irrigation of cotton crops as well as the energy used to pump the water are the main environmental aspects that differentiate conventional, BCI and organic cotton production systems. **Conventional farms have the higher environmental damages** per t of cotton in all three protection areas. **Organic farms** show the best performance but their impact on human health (through **zinc emissions into the soil and water resources** released by the use of organic fertilizers), although less harmful, also needs to be considered for a long-term environmental sustainability.

The **use of energy (electricity and heat) at the spinning factories** is the one of the most important factors contributing to the environmental damage, especially to resource depletion. In ginning units, **improving ginning efficiency** (conversion rate from seed-cotton to lint) through better machines and renewable energy sources may potentially lead to greater environmental gains.

The contribution of transport to the environmental burden is also important and arises from the country's mountainous terrain and landlocked location and an old network structure, not benefiting from close access to seaports or waterways.

Climate change and water footprint

The impact of the cotton VC on climate change (from cultivation to the sale of cotton yarn in the international and the national markets) corresponds to 0.3% of Tajikistan GHG emissions and 0.7% of the fossil GHG emissions accounted for by the country. **Organic seed-cotton production has the lowest GHG emissions** per t of cotton thanks to the use of less-impactful organic fertilisers.

Water issue is central to Tajikistan as many areas are affected by both poor water efficiency and high degrees of soil salinity that is caused by poor maintenance of the drainage networks and water pollution by industrial wastewater discharges. Conventional farms mark higher irrigation water consumption compared to BCI. The impact of climate change on the VC's water footprint will be felt directly at the production stage. Cotton's water requirement will increase in the future and the impact of climate change will increase the VC's water footprint, even under scenarios of higher annual precipitation.

Biodiversity

In Tajikistan, many protected areas are located at high altitudes not suitable for cotton cultivation, hence cotton fields are unlikely to encroach on pivotal areas for biodiversity. However, water resources in humid areas in the South (close to the border with Afghanistan) may be affected by the cotton VC due to the irrigation and pesticides contamination. The use of pesticides may also affect honeybees and other pollinating insects.

The environmental damages of the cotton value chain are important, and the greatest impacts come from the cotton cultivation stage through field emissions, exploitation of land and water, use of fertilizer and energy. Conventional farming proves more detrimental to human health, ecosystems, and resources primarily due to intensified fertilizer and irrigation. Organic farms display lower environmental damage, but although less harmful, particular attention should be paid to organic fertilizer composition to minimize zinc emissions into soil and water.

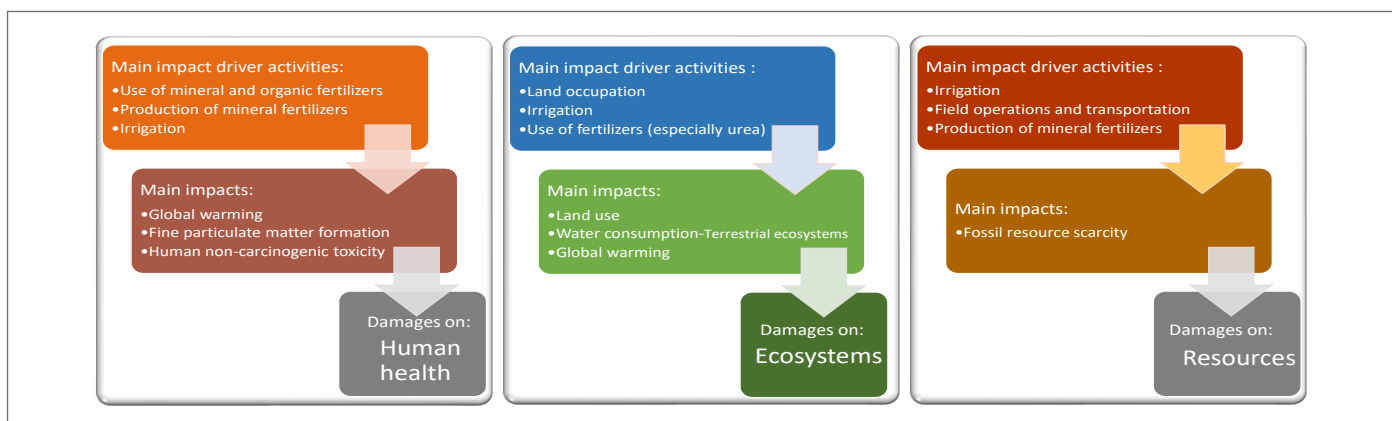


Figure 6: Main drivers and impacts on human health, ecosystems and resources

Main findings and recommendations

The cotton VC is an important component of the Tajik economy, creating incomes, jobs and revenues. Women are significantly present in all stages of the VC. However, low yield and lack of appropriate technical practices at farm level, outdated equipment at local processing units, absence of strong organizations and cooperatives, weak involvement of

youth need to be thoroughly addressed to sustain the VC activities. Moreover, poor water management together with the soil salinity are among serious environmental issues of cotton in a country with high exposure to climate change potential risks.

SWOT Matrix

STRENGTHS	WEAKNESSES
- Favourable climatic conditions (soil, water and weather) for seed-cotton production - Good quality cotton due to manual harvesting of seed-cotton - Cotton production as a pillar of Tajik economy with a long history and pride - Experience in implementing international sustainable standard: organic, better cotton - Cotton, being less perishable than other crop, is less affected by poor transportation infrastructure	- Low cotton yields due to poorly followed technological practices and low quality of planting seeds - Dominance of conventional farms with sometimes limited knowledge on crop and farm management practices, price and market trends, input procurement and supply trends - Outdated local manufacturing facilities that drive consumer preferences toward imported textile goods instead of locally produced goods - Low spinning and weaving capacity despite an abundant raw material base - Landlockedness of Tajikistan's inland status and poor transport structure increasing environmental impact and cost of the transport stage
OPPORTUNITIES	THREATS
- Government focus on development of the cotton and textile sector - Increased investments in textile manufacturing to enhance development of skills, boost incomes and jobs, and underpin a more sustainable industrialization strategy - Adoption of new improved practices in cotton production and processing (e.g. improve the breeding of better-quality cotton seeds, optimize fertilizer and water use, support integrated pest management and natural pests control practices) - Improvement of the quality of fabrics to meet the demand of local consumers for the textile products	- Global price fluctuations that can result in financial risks for many VC actors, especially farmers who have strong political incitation to grow cotton in spite of market uncertainty with limited ability to respond to market dynamics - Limited irrigated arable land fostering competition between cotton and food crops. Potential risks to food security - Soil erosion and salinity due to poor water management and the degradation of irrigation and drainage infrastructures - High exposure of Tajikistan to climate change and climate-related disasters. Risks to the stability of water supplies for agriculture, hydropower and human consumption.

Recommendations

- Improving seed quality and appropriate practices to increase yield and operating profits for a long-term sustainability
- Spreading BCI practices for an integrated and optimal use of agricultural input, especially in farm systems where the cotton production is the most appropriate with the socio-economic and environmental context
- Adopting a holistic approach for better water and soil management through proactive partnership of private-public institutions and developing a national Soil Sampling Program to foster sustainable practices across cotton farms and academia-practice partnerships
- Improving conversion rates at processing through better ginning technologies, machineries, and the cotton varieties
- Initiating an activity to explore the content of the EU Textile Strategy to better prepare for higher demands regarding the sourcing requirements for cotton
- Fostering organisations and information share for better governance, addressing lack of trust between certain VC actors (e.g ginneries and farmers, farmers and labourers...)

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