

Cotton value chain analysis in Ethiopia

Value chain analyses assist in informing policy dialogue and investment operations. They help the understanding of how agricultural 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://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d/wiki/1-vca4d-methodology>). It aims to understand to what extent the value chain allows for inclusive growth and whether it is both socially and environmentally sustainable.

produce around 30% of the national production. Traditional ones mainly provision handloom artisans, whereas most of the farms are oriented to the modern textile manufacturing. Ethiopia is the second largest consumer of cotton in Africa after Egypt and a net importer of cotton lint. Over the past ten years, the demand, especially from international brands, has risen, forcing textile factories to import, whereas just less than a decade ago, spinning mills were unable to absorb the cotton lint that was produced in the country.

The Ethiopian cotton value chain (VC) is the most diversified in Africa as it combines: irrigated and rainfed cultivation; small-scale and medium-large farms; conventional, genetically modified, Cotton made in Africa (standard for sustainable cotton) and organic cotton production; saw and roller ginning technologies; stand-alone (custom ginning) and integrated gineries.

The value chain context

Cotton is one of the oldest fibre crops in Ethiopia and cotton clothing is part of the Ethiopian tradition. The main production areas are the cotton-sesame belt (Tigray, Amhara, Benjangul-Gumuz, Gambela), the Southern Nations and Nationalities Peoples' Region (SNNPR) and the Afar. Small-scale farms

The European Union intervention

Recognising the unique economic and cultural relevance of the cotton and textile sector, the government of Ethiopia considers this VC as an important vector for growth, upon which many livelihoods depend. A National Cotton Development Strategy

and corresponding roadmap have been developed for the period 2017-2032 with the target of making Ethiopia one of the top producers of sustainable and quality cotton in the world.

In support of the government's strategy, the EU is planning in the programming 2021/2027 a possible cotton development support program, in line with the EU Commission Staff Working Document, 'Sustainable garment value chains through EU development action'.

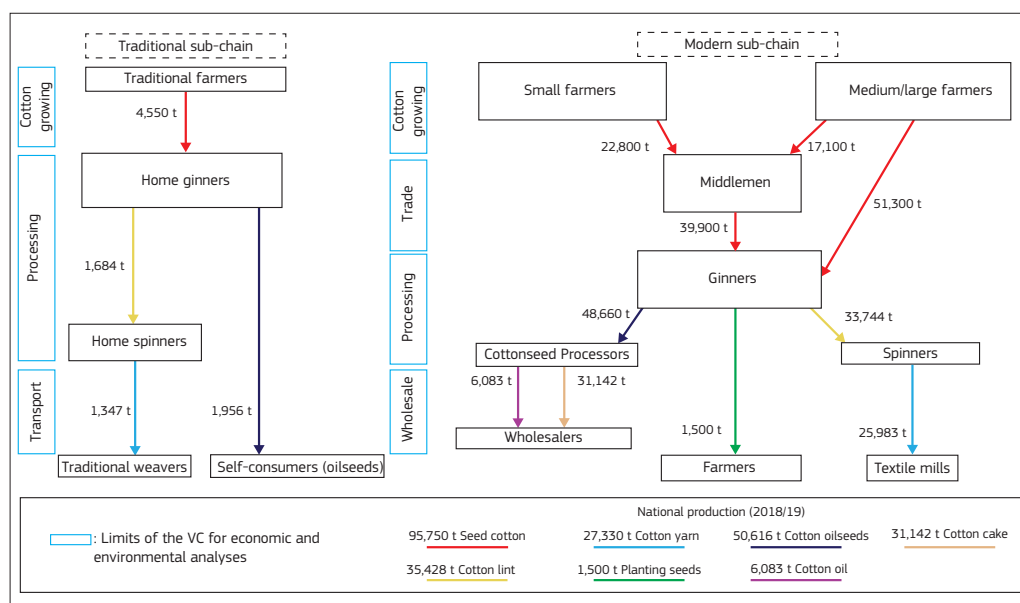


Figure 1: Mains flows of the cotton value chain in Ethiopia

Functional analysis

Production and products

Ethiopia is suitable for growing cotton thanks to favourable natural conditions (climate, fertile soils, water availability) and a millennial tradition in the production of cotton and textile fabrics. The country currently cultivates only 3% of the total 2.6 million ha potentially suitable for cotton production. Cotton is usually rotated with sesame, sunflower, sorghum and mung-beans.

In the 2018/2019 campaign, **the national production of seed cotton was estimated at 95,750 t**. From **seed cotton**, the following products are obtained: **lint** and then **yarn**; **cotton oilseeds**, from which **cotton oil** and **cake** are obtained; and **planting seeds** (Figure 1).

As in West Africa, the main variety of seed cotton cultivated in Ethiopia (DP90) provides medium lint. Beyond this technical aspect, **cotton produced in the country is generally of low quality** (heterogeneous, irregular, contaminated by foreign materials...).

Typology of farmers

Two main sub-chains exist within the VC: a traditional one, based on simple technologies, limited manufactured inputs and little extension services/advice; and a modern one, mainly controlled by large farms (20 medium farms and 70 large farms) that supply the foreign-dominated textile sector. **The production of seed cotton is distinguished according to the farm size and use of irrigation** (Figure 2). **99% of the cotton farms are small-scale** but account only for around 30% of the seed cotton production. A small number of large and medium farms cover the bulk of the seed cotton production. Most of them use irrigation and practice a reduced rotation of crops, which has negative impacts on soil fertility.

The separation of the small-scale farmers in “traditional” and “modern” is linked to the sub-chains they are involved in. The main indicator that a farmer is in the traditional sub-chain is their relation with handloom and traditional textile artisans. These relations are strong and allow the existence of farms dedicating around 0.5 ha to cotton production.

Textile and apparel

The cotton-textile and garment sectors are known, in Ethiopia and worldwide, for their complexity. **The modern textile industry coexists with the traditional textile sector** (manual ginning, spinning and handloom weaving). Ethiopia's textile industry is composed by both medium and large, public and private enterprises. Their activities include spinning, weaving, dyeing, finishing and sewing. Traditional outfits with Ethiopian designs and motifs hold an important place in the Ethiopian consumers' preferences. In any case, the sub-chains do not operate in isolation since a traditional weaver may obtain yarn from an industrial source.

The national production covers about 60% of the in-country needs and demand for textile and apparel. About 70,000 t of cotton yarn is imported, to satisfy the growing demand of the expanding textile and apparel sector and exports.

Cotton oil and cake

The by-product of the cotton lint flows into the cotton oilseed sector, for transformation into cotton oil and cotton cake (through delinting, hulling and oil extraction). Cotton oil is used for human consumption, while its co-product, cotton cake, is used as animal feed. Cotton oil often loses its visibility in the market as it is always blended with other available oils, despite being considered of higher quality compared to other imported oils (e.g. palm oil).

Trade and export

Large farmers sell most of their production **directly to the ginners** while **small farmers sell to middlemen**. Such intermediaries operate on an informal basis and cannot be found in all the production sites. Some offer loans to farmers to cover the initial cultivation costs and are paid back with part of the farmers' production after the harvest.

Some cotton lint is exported (between 2 t and 7 t according to the sources), mostly by the ginners to get foreign currency required to buy spare parts. The main cotton textile products exported are garments and apparels.

Governance

The Ethiopian cotton VC is insufficiently coordinated, which can be explained by the recent dynamics of the textile industry and the complexity to align the heterogeneous cotton production structure with the ambitious targets of both the government and the private textile industry. While the Ethiopian Textile Industry Development Institute is in charge of the whole VC, professional associations such as the Ethiopian Cotton Producers, Ginners and Exporters Association and the Ethiopian Textile and Garment Manufacturers Association are also active in the VC. The research, extension and regulatory bodies are under the Ministry of Agriculture and Livestock.

Sub-chains	Traditional sub-chain	Modern sub-chain	
Farmers	Traditional farmers	Small farmers	Large and medium farmers
Number of farms	7,000	19,000	90
Average size per (ha)	0.5	0.75	400
Productivity (kg/ha)	1,300	1,600	1,900
Total production of seed cotton (t)	4,550	22,800	68,400
Share of total production (%)	5%	24%	71%
Surface used (ha)	19,624		36,317
Irrigated surface (ha)	1,064		25,270

Figure 2: Typology of cotton farmers

Economic analysis

Financial viability for the actors

The cotton VC creates positive net operating profits (NOP) for all actors except the ginner (Figure 3) that register a negative NOP because of the under-use of the ginning capacity due to the low level of seed cotton supply, and the low ginning out-turn (% of lint in seed cotton) of the DP90 variety.

In spite of high return on turnover (NOP/value of production) and though the price of seed cotton is high for African standards, benchmarks for farmers' net incomes shows that **cotton is less attractive than other food crops** (sesame, bananas, sugarcane) but the NOP generated is much more constant compared to sesame. For a middleman, the return on turnover is only 4% but the absolute value of their marketing margin is significant.

	Net Operating Profit	Return on turnover
Traditional farmer	28,860 ETB (€635)	~100%
Small farmer	15,550 ETB (€340)	72%
Medium/large farmer	7,485,000 ETB (€165,000)	51%
Middleman	798,000 ETB (€17,550)	4%
Ginner	- 946,000 ETB (€-20,800)	-0.8%
Spinner	25,223,000 ETB (€555,000)	14%
Oilseed processor	170,450,000 ETB (€3,750,000)	31%

Figure 3: Profitability for the individual actors

Effects within the national economy

The **total value added (VA) of the VC** (up to yarn and crude oil stages) amounts to **3.4 billion ETB (€74 million)**: 3.2 billion ETB (€70 million) of direct VA and 0.2 billion ETB (€4 million) of indirect VA resulting from the use of intermediate goods and services supplied by actors outside of the VC. The total VA contributes by **0.18% to Ethiopia's GDP** and by **0.55% to the agricultural GDP**. The **VC rate of integration** into the national economy is high (**89%**), meaning that a high portion of the VC production value remains in the national economy and a low portion is imported.

Taxes paid to the State by the VC actors amount to 0.9 billion ETB (€20 million). With actors not benefitting from subsidies, the VC **contributes positively to the public finances**. Imports of goods and services (agricultural inputs, spare parts, fuel) amount to 0.3 billion ETB (€7 million). Thus, the VC balance of trade is negative since the country exports only a few volumes of lint. It would be positive by integrating the VC downstream level as most of the textile and clothing production is exported.

Viability in the international economy

The Domestic Resource Cost (DRC) is below 1 (0.3) meaning that **the VC is viable in the international economy**. The domestic factors value for cotton production (land, labour, capital) is lower than the economic value generated using international price for the calculation. This means that orienting these domestic factors in producing cotton is a good investment and a gain for the national economy.

Nevertheless, the Nominal Protection Coefficient (NPC) of 1.6 for the whole VC shows that **the local production is less competitive than the international one**. This is the case for seed cotton, lint, yarn (in particular the traditional one) and crude oil; and not the case for cottonseed and cake that are cheaper in Ethiopia than on the international market. The low competitiveness is due to the high price of seed cotton and the low out-turn of the DP90 variety. The seed cotton price in Ethiopia, by far the most important component in the cost of lint, was the second highest in Sub-Saharan Africa in 2019.

Growth inclusiveness and employment

NOP (55%) and taxes (27%) are the main components of the direct VA (Figure 4). Medium/large farms and spinners are the main beneficiaries of the NOPs (43% and 21% respectively).

The modern sub-chain provides about 35,500 and 5,320 jobs at the primary production and processing stages and employs 55,000 people from weaving to apparel. The traditional sub-chain provides 7,000 jobs at the farm level and 54,000 full-time jobs for ginning and spinning. The traditional weaving and tailoring sector employs an estimated 205,000 people.

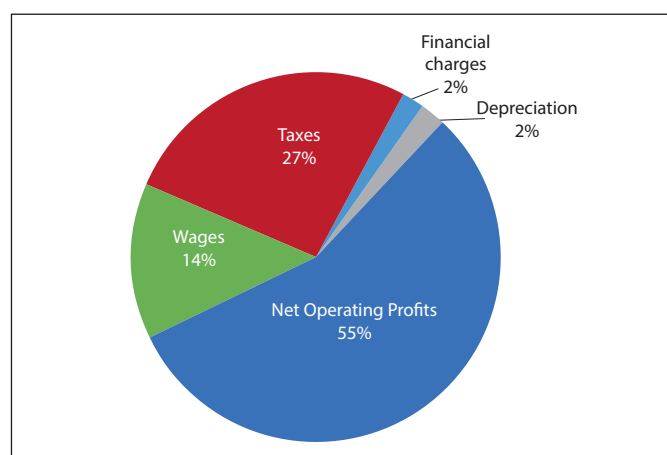


Figure 4: Income distribution (direct value added)

WHAT IS THE CONTRIBUTION OF THE VALUE CHAIN TO ECONOMIC GROWTH?

The VC activities are profitable and economically sustainable. However, the financial viability for ginner will depend on increased production and productivity. They operate negatively due to low ginning out-turn that results in a commensurate increase in the cost of lint production.

The contribution of the value chain to GDP is low but the rate of integration into the national economy is quite high. Nevertheless, the value chain (excluding the production of apparels) is poorly competitive internationally. Its long-term sustainability will depend on the competition with imports and consumers' recognition for quality. The lack of high-quality planting seed supply is the major bottleneck that hampers the sustainability and profitability of the Ethiopian cotton value chain.

Social analysis

The table and figure provide an image of the situation in the six strategic domains of the social analysis. The main critical areas are land and water rights and working conditions and to a lesser extent gender equality, where mitigating measures may improve the sustainability of the VC.

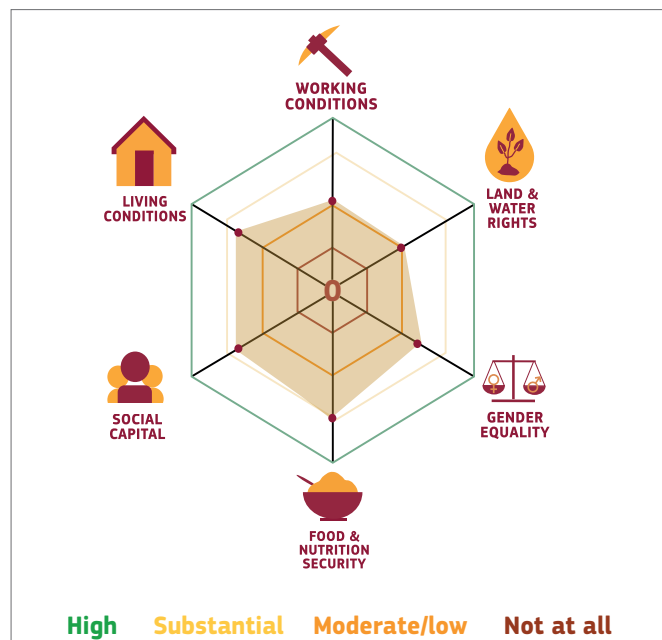


Figure 5: Social profile

IS THIS ECONOMIC GROWTH INCLUSIVE?

The value chain has a great potential to create jobs as it provides direct waged employment to many (14% of the direct VA), although most positions require low skills. Medium/large farms are the largest providers of employment, with 58% of the wages, while small farms and spinners account respectively for 16% and 19% of the wages. Traders (middlemen) benefit from rather comfortable margins but provide few jobs. Salaries in farms are significantly higher than in spinning mills. Nevertheless, the cotton value chain reflects the country's overall situation characterised by a markedly uneven income distribution due to the strong dualism between traditional and medium/large systems. The medium/large farms and the modern textile factories employing cheap workers (mainly young women) represent a fundamental weak point to be addressed. The medium/large farms, mostly set up in areas dominated by pastoralists or traditional farmers, exclude indigenous groups from economic growth. At the factory level, the low wages and poor career opportunities for women reduce the inclusiveness.

IS THIS VALUE CHAIN SOCIALLY SUSTAINABLE?

The cotton value chain contributes positively to food and nutrition security by improving the soil fertility as a rotation within food crops. Even if low, it also generates additional income to buy food for farmers, labourers, and female workers in the various businesses and factories.

Special attention must be given to working conditions, land and water rights, gender equality and living conditions. Workers' conditions at factories and medium/large farms are the most critical. Employment of child labor in the traditional weaving sector is also an issue. There are conflicts between indigenous people and the newly settled medium/large farms on land and water rights. The often-precarious conditions of women in the textile factories as well as the overall discriminatory practices against women rights (not directly linked to the value chain) make the gender dimension rather critical. Livings conditions should be improved in medium/large cotton farming areas as these are in a harsher condition (climate, diseases) and are rather neglected by the State.

Working conditions	- High exposure of workers to pesticides at farm level (frequent lack of personal protective equipment). - Hard conditions at garment factories (low wages, violation of the right to dignity, difficulties for unions to work and for workers to join unions). - Employment of children in the traditional weaving sector in rural areas.
Land and water rights	- Non-transparency of contracts (between investors and the State) regarding land expropriation and leases. - Land losses for indigenous pastoralists and subsequent social conflicts. - Disadvantageous position of small and traditional farms compared to commercial farms due to limited irrigation rights or lack of capital to invest in irrigation.
Gender equality	- Limited access to skills trainings, education, innovative agricultural inputs and finance. - Limited career opportunities and unsatisfactory working conditions and wages in the modern textile and garment sector for women. - Limited ownership and control of women over productive assets and technologies for production at farm level. - Less involvement of women in management decisions in factories owned by men. - Difficulties of implementation in practice of access to rural land and property inheritance.
Food and nutrition security	- Importance of cotton oilseed for human consumption and cake for animal feeding. - Risks of food shortage and instability of food prices in the areas of the export-oriented medium/large cotton farms. - Lack of food security for households losing access to land because of new medium/large farms.
Social capital	- Difficulties for cooperatives to access finance for lending to farmers. - Poor recognition of the indigenous rights. - Withdrawal of public bodies from extension services (and limited private offer). - Weak research (working only on varieties) and poorly shared information between the VC actors and institutions.
Living conditions	- Poor delivery of education, health and housing services in the lowland cotton areas. - Social conflicts between indigenous communities and new arrivals into some regions (Gambela and SNNPR).

Environmental analysis

Damages of seed cotton production on the areas of protection

Traditional farms provide a higher environmental impact per kg of seed cotton than those which utilise large amounts of energy and fertilisers contributing to higher yields. This is linked to land use, as the demand for land increases if yield is low, and organic fertilisers and soil pools are less efficient than chemical fertilisers in that respect. This should not be interpreted as a statement on organic fertilisers being less sustainable than chemical fertilisers, rather it reflects the burden that is placed on the locally available soil carbon pools and on the ecosystem and that needs to be mitigated (Figure 6).

In the modern sub-chain, **small farms** exhibit significant **lower damages to human health** at the field level (no particulate emissions, lower ammonia outputs as manure is not applied). In medium/large farms, most damages to health occur on the farm, reflective of emissions from on-field activities, especially particulates due to fuel combustion.

The **higher damage to ecosystem quality in traditional farms** is attributed to the land use associated with a lower yield and a higher fallow ratio. For **climate change and resource use, larger intensive farms create significantly higher damages** than small farms as they consume more energy through mechanisation-ploughing, etc. – as well as pumping for water irrigation.

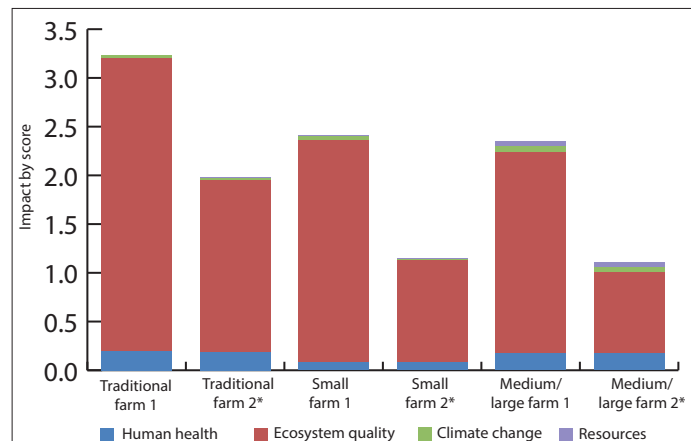
Damages of yarn production

Yarn produced from the traditional sub-chain has significantly smaller damages per kg of cotton yarn except on ecosystem quality. In terms of ecosystem quality (representing land occupation and ecotoxicity), the traditional yarn is less eco-efficient due to land occupation; and if large quantities of manure are applied as fertiliser, it has a higher damage also on human health due to the release of ammonia. Most of the damages appear concentrated at farm level, which can be attributed to the availability of low carbon hydropower derived electricity that reduces the environmental impact of electricity-intensive processing like ginning and spinning.

Damages of cotton oil production

Cotton oil produced from a small farmer produces a lower damage to human health and resource depletion compared to a commercial farm, and also reflects a lower damage to climate change due to a less intensive cultivation practice and less combustion of fossil fuels in electricity generation.

Concerning ecosystem quality, the damage linked to the production of cotton oil is mainly due to the cultivation on small farms because of land occupation for fallow land and nutrient intensity (i.e. fertiliser input per cotton output) at farm level.



* Impact of organic fertiliser on land use (soil carbon pool) is excluded

Figure 6: Environmental damages on the areas of protection per kg of seed cotton



IS THE VALUE CHAIN ENVIRONMENTALLY SUSTAINABLE?

The level of input intensification is the main factor of impact on resource depletion and climate change. This is associated with energy for pumping and tractor use at farm level. As for irrigated cotton production, it would not be sustainable in the absence of water management systems (water saving irrigation practices and rainwater harvesting).

The traditional sub-chain based on farming without irrigation, energy or chemical inputs has the capacity to be sustainable even though it shows the highest damage on ecosystem quality and human health due to the higher occupation of land for the same quantity of product. To reduce land use impact, yield should be increased through low impact locally sourced organic fertilisers or nutrient streams (i.e. existing surplus organic residues/wastes and composts) without recourse to irrigation. Despite the impact score on land use, traditional cotton with adequate fallow period and measures to prevent soil erosion can be sustainable where there is land availability and soil conservation.

For low impact yarn production, traditional rainfed cultivation and traditional hand ginning and spinning represent an opportunity. However, it is unlikely that the traditional sub-chain can respond to the needs of the mass market, but there are opportunities for expansion through the appropriate practices at farm level.

Conclusions

Strengths, weakness, opportunities, threats

STRENGTHS	WEAKNESS
• Availability of land, labour and electricity • Well established VC and sub-chains • Good yields for small-scale modern farmers (highest in Africa) • Low carbon intensity of the national grid • Strong integration with medium/large livestock farms	• Lack of market transparency • Unclear roles and low level of cooperation among the ministries involved • Limited implementation of strategies and of prioritisation of the cotton VC • Consideration of cotton as a non-strategic crop by national authorities • Low ginning out-turn and outdated ginning equipment • Low quality of seeds • Absence of a strong focus on the oil seed potential
OPPORTUNITIES	THREATS
• Increase in demand for high quality lint • Importance of cottonseed products (oil, cake) for food security • Role of farmers' organisations to increase attractivity for cotton • Increasing demand for traditional garments in global market and diaspora	• Cotton in competition with more attractive crops • Impacts of modern agriculture on ecosystems • Increasing difficulties in getting sufficient water and salinisation • Social conflicts between the groups linked to access to land • Declining soil fertility and risk of erosion on large mono-cropped cotton surfaces • Climate change impact (less rain) on cotton production

Main recommendations

Prioritise quality of seed cotton and textile amongst the objectives. The existing cotton development strategy should give particular attention to high quality and sustainable cotton production rather than targeting the expansion of the cotton area. Ethiopia may produce long lint (as Egyptian cotton) with better access to irrigation. The cotton VC should be ready to reply the growing global demand for sustainable cotton and fair fashion. Working conditions and workers' rights should also be reviewed with a special focus on the social protection of women in farms and factories. Particular attention should be paid to the rights of pastoralists in the perspective of conflicts on land use. There is a need to build a label for quality cotton and textile of Ethiopia, once the quality will be improved.

Improve communication, coordination between actors, transparency and cooperation amongst official bodies regarding good cultivation practices, availability of supporting schemes or standards, access to water. Stimulate a common understanding of the most relevant VC issues

and identification of the institutional bodies to involve.

Boost adaptation measures against climate change, raise policy incentives and research. Need to incorporate climate impact maps (temperature and rainfall patterns) into cotton development strategies and plans to identify regions and districts that are most at risk due to climate change. Current irrigation practices and their impact on soil quality should be examined. There should be policy incentives to limit unsustainable use of water on large medium/large farms, particularly for ground water use. The pressure on the demand side for cotton lint increases the risk for soil depleting practices. More investments by the public sector and research for agroecological practices and farming systems are needed for farmers' education, training and technical assistance to save the soil fertility. Household composting (including use of farm residues) or integrated pest management can be supported by showcasing examples of good practice relevant to the Ethiopian context.

Value Chain Analysis for Development (VCA4D) is a tool funded by the European Commission / INTPA and is implemented in partnership with Agrinatura.

Agrinatura (<http://agrinatura-eu.eu>) is the European Alliance of Universities and Research Centers involved in agricultural research and capacity building for development.

The information and knowledge produced through the value chain studies are intended to support **the Delegations of the European Union** and their partners in improving policy dialogue, investing in value chains and better understanding the changes linked to their actions. VCA4D uses a systematic methodological framework for analysing value chains in agriculture, livestock, fishery, aquaculture and agroforestry. More information including reports and communication material can be found at: <https://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d->

This document is based on the report "Cotton Value Chain Analysis in Ethiopia" 2020, by Gian Nicolay (FIBL), Gérald Estur, Conor Walsh (NRI) and Paulos Desalegn. Only the original report binds the authors.

