

Green beans value chain analysis in Kenya

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 and businesses.

The methodological framework for analysis has been developed by the European Commission. It aims to understand to what extent the value chain allows for inclusive growth and whether it is both socially and environmentally sustainable.

EC intervention

The 2014-2020 National Indicative Programme of the EU in Kenya is aligned to the Kenyan Agriculture Sector Development Strategy 2010-2020, focusing on transforming the agricultural model from a "subsistence approach" to a more "commercial/business" one.

The EU supports the Kenya Agriculture Value Chain Facility helping smallholders to benefit from better integration into

value chains (VCs) by partnering with agribusinesses facilitating market access.

In addition, the EU has supported programmes contributing to poverty eradication through: the promotion of exports of horticulture products (PIP I&II), the strengthening of food safety systems (EDES) and the improvement of VCs sustainability (Fit for Market). These programmes are implemented by [COLEACP](#) (Comité de liaison Europe-Afrique Caraïbes-Pacifique).

VC context

Kenya is the second largest exporter of green beans to Europe. Beans are a popular cash crop for farmers of all sizes. Kenya's success is based on climatic and geographic competitive advantages, market segmentation, investments in certification schemes, value adding through packaging, servicing niche markets and investments in marketing. However, Kenyan green beans are exported in a highly regulated and pesticide-residue sensitive market. Maintaining high quality standards is critical as exports face the risks of a ban if the current Sanitary and PhytoSanitary standards are not met.

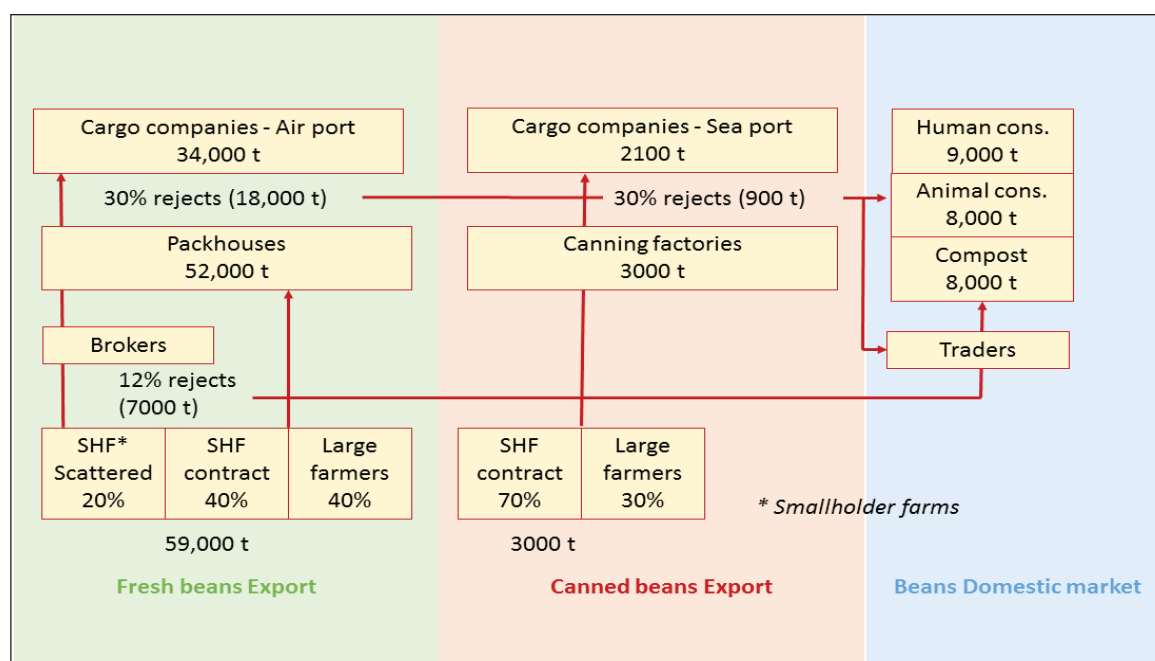


Figure 1 : The flow of the green beans value chain in Kenya in 2017

Functional analysis

Production

The total quantity of green beans (also called French beans) produced in 2017 is estimated at **62,000 t on an area of 7,500 ha**: grown by smallholders on 4,500 ha and large farmers on 3,000 ha. The yields vary from about 4,000 kg/ha to 12,500 kg/ha, depending on farming practices, varieties grown and general agricultural production conditions (especially water availability through rainfall or irrigation). Harvests occur several times per year and are dependent on the geographical position of farms.

A labour-intensive crop

Agricultural practices include soil management, relay planting, intercropping, crop rotation, nutrition and protection, harvesting and post-harvest handling.

Fertilisers, pesticides and fungicides are applied during the crop lifecycle, while herbicides are rarely used.

The production of green beans demands **substantial manual-labour inputs**, particularly for harvesting, but also for planting, irrigating, weeding, spraying of chemicals, and fertiliser application. Even mechanised farms, which use tractors for land preparation and irrigation pumps (together with pivot or drip irrigation systems), rely on large numbers of hired workers for manual tasks.

Types of farms and arrangements

Smallholder farms (SHF) of <2 ha along with **a few medium sized farms** of 2 to 10 ha account for around **60% of green beans produced**. SHF are usually engaged in multiple crop production, including green beans. There is anecdotal evidence that the number of SHF engaged within the chain has declined significantly over the last 5 years. **Large farms**, over 10 ha, account for around **40% of the production**.

The majority of SHF have contracts or other close ties with processors and export companies. They generally acquire farm inputs and sell their produce as self-help groups. However, some SHF depend on brokers, agents and middlemen to sell their green beans.

Processing and trading

There are two main types of post-harvest handling operations: **packing** (to export fresh green beans, by far the dominant form of export), and **processing** (mainly for exporting canned beans). Packhouses work with SHF that devote on average 0.1 ha to green beans whilst SHF that are involved in the canned bean channel are smaller at around 0.02 ha.

Trade relies on three types of agents: (i) **brokers or intermediary agents**, buying individually around 80 t of green beans per annum (p.a.) (e.g. 1000 kg/day on an average of 80 days p.a.), mostly from scattered smallholders who have not been contracted by exporters; (ii) **domestic wholesale traders**, buying small quantities (e.g. 200kg/day on an average of 120 days p.a.) of beans rejected for export by the packhouses or coming directly from farming areas; and (iii) **retail traders** (e.g. 10kg/day on an average of 300 days

p.a.), buying from wholesale traders (e.g. in the main horticultural market of Nairobi) and selling through various retail outlets to households, hotels, restaurants or schools.

A cash crop mainly exported

The bulk of the production is exported fresh. The quantity of fresh green beans exported was around **34,000 t in 2016** (more than 50% of the production), the main export markets being the United Kingdom, followed by the Netherlands and France.

The quantity of **processed (e.g. canned) beans exported** was close to 900 t in 2016. It is to be noted that a new processing company started production towards the end of 2016, with export quantities expected to amount to **2,100 t in 2017**. The main importing countries of processed beans are France, followed by Belgium and the United Kingdom.

Matching export market supply and demand has proved difficult for producers and exporters. Compliance with multiple quality, health and safety, environmental and social standards demanded by export markets is costly and technically challenging to SHF and small traders. As a result, such actors are gradually excluded from participation in international trade.

The export of green beans entails **substantial rejected beans**. The rejected beans are sold on the **domestic market**: (i) for a **total domestic consumption** by households, restaurant and hotel customers, or institutional buyers such as schools, **estimated at around 9,000 t**, (ii) as animal feed and (iii) as compost spread back into the fields (Figure 1).

Declining prices

Annual prices have remained relatively stable for nearly a decade. Thus they have been strongly declining in real terms over several years. Inter-annual prices of fresh green beans are fluctuating.



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Economic analysis

Profitability of the actors

For exported fresh beans, large-scale farms and SHF who have links to exporters (e.g. contracts), operate efficiently and can make a profit (respectively €12,784 and € 263 p.a.). Scattered SHF appear struggling to make a significant income on a continuous basis (€ 56 p.a). Due to the lack of collective organisation, they rely on brokers for the sale of their produce, which reduces their farm-gate price.

For canned beans, with high yields, the few large farms get high incomes (€ 67,620 p.a). SHF who produce for the canning industry make a smaller profit (€ 44 p.a) than in the fresh bean market and this is partly due to their small plot size (i.e. 200 sqm).

Value added in the value chain

The total (direct + indirect) value added is estimated at **€ 68 million in 2016**. The two main parts of the value added are: (i) the net profit of packhouses and (i) the wages to hired labour both in packhouses and farms. Even smallholder farmers employ hired workers for labour intensive activities

such as harvesting. It is large-scale producers and SHF with links to exporters that generate the highest value addition in the agricultural part of the VC.

Many packhouses and canning factories that have started their business relatively recently, are likely to be saddled with substantial financial charges.

Macroeconomic perspective

Green beans provide a **minor contribution (about 0.33%) to the agricultural GDP** of Kenya. Nevertheless, the VC provides a substantial net contribution to the balance of trade: € 62 million, corresponding to **1.5% of the total annual exports**. The contribution of the value chain to public finances is relatively modest (€ 3.96 million).

The value chain is well integrated into the domestic economy which is reflected by a rate of integration (total value added divided by the total production) of 0.83.

It is viable within the global economy (Domestic Resource Cost ratio is 0.36).

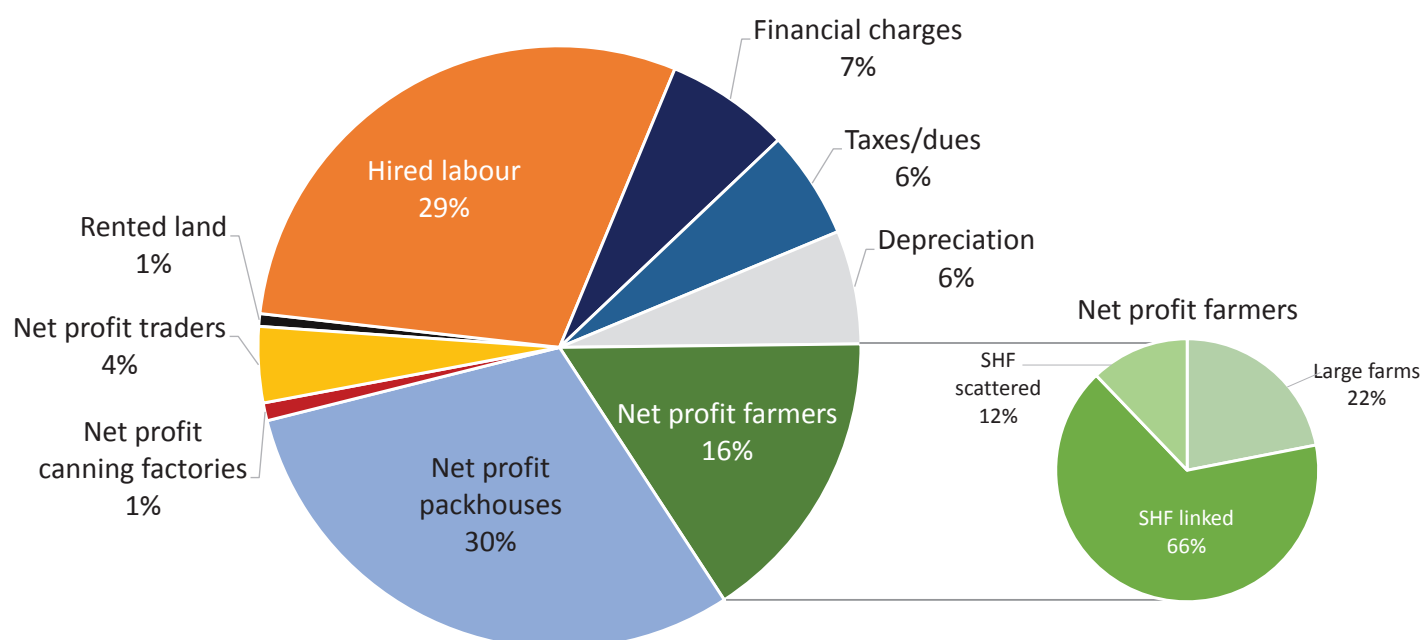


Figure 2 : Value added distribution

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

Engaging in green beans production generates income and cash flow for smallholder farmers despite the risks of variable demand, and inter-annual price instability and high input costs.

The total value added of the green beans value chain including wages, land rent, financial charges, taxes, depreciation and net operating profits, substantially amounted to € 68 million in 2016. In particular, the value chain is a significant foreign exchange earner for the country. It contributes to poverty reduction in that it supports the livelihoods of about 52,000 smallholder farmers and a large number of hired workers (40,000 to 70,000) in farms and factories. In addition, the domestic marketing employs about 150 brokers, 350 wholesale traders, and 2700 retailers.

Social Analysis

Working conditions	- Kenyan laws reflect international conventions and includes minimum wages, plus the terms and conditions of employment. - While wages are in line with national standards, casual and temporary employment is unlikely to provide enough job and income security to provide a living wage. This is especially true in areas where the cost of living is very high, such as Nairobi. Workers are free to join a union.
Land and water rights	- Land speculation is increasingly common. - Inheritance is reducing landholding size for SHF and increases the likelihood of selling or leasing land. - There is a low level of awareness amongst people of their rights regarding land tenure, limited access to complaint mechanisms and practical accountability amongst leaders and institutions. - No reference was found to VGGT.
Gender equality	- Women carry out the majority of production and processing tasks and represent around 80% of the workforce. The VC provides employment opportunities and a degree of financial independence. - Women are represented in positions of responsibility. - However, rights to land tenure and inheritance are currently unequal as new legislation is not yet being applied fully.
Food and nutrition security	- Green beans are not considered a food crop and there is limited consumption by Kenyans. - SHF who grow green beans report having more income to spend on food, investing in their farms, property, other businesses, their children's education and healthcare.
Social capital	- The level of communication between SHF and buyers, and flow of information, is very variable, which weakens the relationship and affects the degree of trust felt between both parties. - Self Help Groups are a key element of SHF engagement but the level of support for their formation is often very limited.
Living conditions	- Income from SHF production is often used to pay for school fees, healthcare and in improving housing. - Commercial farms and processing factories provide some welfare services for their workforce and nearby communities, such as education, health facilities, housing.

Figure 3 : Main observations by social domain

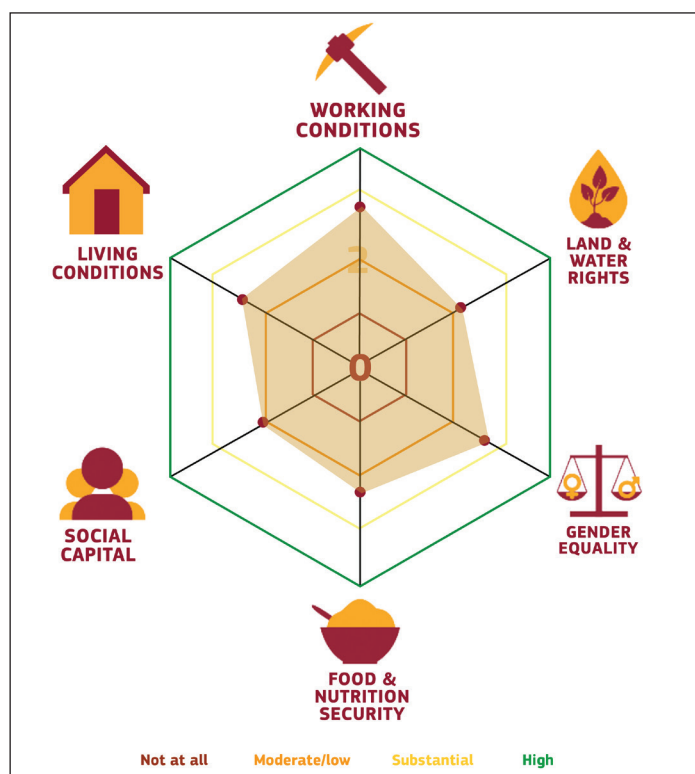


Figure 4: Social profile

IS THE VALUE CHAIN SOCIALLY SUSTAINABLE?

The value chain has the capacity to be socially sustainable. As a cash crop, the value chain offers opportunities for small-scale farming, small businesses and entrepreneurs.

Engagement with export markets, particularly Europe, has raised companies' awareness of social responsibilities. Kenyan legislation is evolving positively in key areas of labour and land tenure. However, the declining trend in the number of SHF engaged in the value chain could impact on social sustainability. Keeping young people involved in SHF would alleviate land tenure and inheritance impediments.

Moreover, the majority of the workforce are being employed on an informal, casual or temporary basis due to the variability of demand, this has implications for the terms of employment plus job and income security. There is a risk that the workforce struggles to earn a basic living wage, and living standards will decline over time.

IS THIS ECONOMIC GROWTH INCLUSIVE?

The value chain contributes to inclusive growth through the involvement of two groups of beneficiaries: small scale producers who produce relatively small quantities of good quality beans on small plots of land (accounting for almost 60% of total production) and an informal and casual workforce that supports the labour-intensive system of production and processing (providing around 60,000 days of paid work/year). Women in particular benefit from employment opportunities as they carry out most of the tasks associated with production and processing, and make up the majority of the workforce (approximately 80%). As a result, they gain a degree of financial independence from their involvement in the VC.

Returns from small-scale production benefit the local economy and are invested in children's education, health care, housing, small businesses and in the farm. However, it is to be noted that exporters express less enthusiasm for engaging with SHF, citing transaction costs and reliability issues.

Environmental analysis

Impacts at the different stages of the value chain

For the whole export chain of **fresh beans at UK-gate**, the **main contributor** to the different environmental impacts is **air-freight** accounting for 83-86% of environmental damages to Resources, 51-65% to Ecosystem quality, and 81-89% to Human health. The various systems (based on farm types) have similar impacts.

The VC stages occurring within Kenya (farms, packhouses, local transport), i.e. delivering **Free-On-Board (FOB)** produce, has a **limited contribution** to these impacts, with **farms and packhouses** being the **main contributors**: in the case of fresh beans, FOB stages constitute 14-17% of the overall damages to Resources, 35-49% to Ecosystem quality and 11-19% to Human Health.

Conversely, for **canned beans** the steps occurring in **Kenya (FOB)** caused **most of the overall damages** measured all along the chain until UK-gate (thus even including the sea-freight), 94% to Resources, 95-96% to Ecosystem quality and 88-89% to Human health. **The main stage responsible** for this result is primarily the **canning factory**, with contributions to the total impact at UK-gate of 67% to Resources, 30% to Ecosystem quality, and 48-50% to Human health, while the farm stage contributed 3% to Resources, 37-51% to Ecosystem quality and 10-14% to Human health.

Impacts at the farms level

For **fresh beans**, the **large-farms** and the **scattered SHF** brought about the **greatest impacts**, followed by the contracted SHF and lastly the medium-sized farms. This derives mostly from the yield and fertilizer use on plots. The medium-sized farms represent an interesting example with efficient features that could be further explored and validated.

For **canned beans**, impacts on Human health and Resources are closely aligned across the two studied systems but impacts on Ecosystem quality are greater for the **SHF-contracted system** than for the large farm system.

Main contributors to the impacts at farm-gate are the **fertilizer use** and associated field emissions, the **water and energy use** for irrigation and the **land use**. Pesticide applications have a relatively small impact.

Comparison of sub value-chains impact

The environmental impact of fresh and canned produce was compared per kg of raw bean processed. When expressed at UK-gate, results of the **fresh bean systems has an impact twice higher** than that of the canned beans, evidenced by the large effect of air-freight transport. However, for Resources and Human health the **Kenyan VC steps** for fresh beans have a **much smaller impact** than those for canned beans (Figure 5).

IS THE VALUE CHAIN ENVIRONMENTALLY SUSTAINABLE?

Air-freighted vegetables have large impacts on the environment. For fresh beans, the other steps of the value chain occurring in Kenya have relatively limited impacts. On the contrary canned beans are cooked, thus most of the impacts happen within the Kenyan boundaries. However, this canned beans sub-chain represents an interesting alternative to fresh beans from a global environmental point of view since the cooking is usually done more efficiently in a factory than with home cooking, and the product is stabilised for several years and does not need to be transported quickly nor refrigerated during transportation.

At farm level, yield, fertilizer use, water and energy use for irrigation and land use are key drivers of environmental impacts of the beans. Pesticide applications have little contribution to total impacts.



Figure 5 : Comparison of the fresh and canned bean systems

Conclusions

Risks

Reliability of supply from SHF to commercial companies is a key concern. When working with SHF, export companies express the need to improve control over inputs (e.g. pesticides use in this highly regulated export market) and lower costs associated with logistics and management of supply. Unless these issues are tackled, export companies could gradually **move towards large-scale commercial production**, despite the fact that SHF produce the best quality green beans.

An expansion or creation of new large commercial farms could **increase job opportunities**, whilst simultaneously bringing issues of **land tenure and land acquisition/consolidation** to the foreground.

The fresh vegetable labour market is sensitive to the **variability overtime in demand for labour** and the **need for a flexible workforce**. A balance needs to be found between availability of workers (for employers) and ensuring effective labour rights (for employees) in order to keep the sector competitive and attractive.



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Recommendations

The VC is a significant foreign exchange earner and employment generator for Kenya. Support to the sector should be continued.

In addition to improving quality and SHF production at the farm level, a decisive way to achieve more sustainable involvement is to improve the efficiency of the flow of **information and communication** with the SHF along the whole chain in order to reduce transaction costs. To comply with food safety regulations such as EC 669/2009, it is recommended that more **training and capacity building** is implemented at every stage of the VC.

Well-established processing companies should be encouraged to further **invest in out-grower schemes** involving smallholder farmers, including technical extensions and supply of inputs.

More investments should be set out in improving **water management** (e.g. drip irrigation), thereby reducing water wastes derived from the current irrigation systems. Some companies have undertaken efforts in this regard, whilst scaling-up is still essential.

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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->

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