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USAID-KAVES FRENCH BEAN VALUE CHAIN ANALYSIS



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FORWARD

The goal of the Kenya Agricultural Value Chain Enterprises (USAID-KAVES) project is to increase the productivity and incomes of smallholders and other actors along targeted agriculture value chains, thereby enhancing food security and improving nutrition.

This report is one of a series of detailed analyses covering five value chains (maize, dairy, mango, potato, and French bean) conducted by USAID-KAVES to identify critical constraints/gaps and prioritize high-return program interventions that will contribute to the program's core objectives of:

- *Increasing the competitiveness of selected agricultural value chains to mitigate food insecurity, improve nutrition, and increase the incomes of the rural poor;*
- *Fostering innovation and adaptive technologies and techniques that improve nutritional outcomes for rural households, sustainably reduce chronic under-nutrition, and increase household consumption of nutrition-dense foods; and*
- *Increasing the capacity of local organizations to sustainably undertake value chain work.*

While drawing upon the extensive body of existing research on targeted Kenyan valued chains, USAID-KAVES' analyses further builds on and updates those findings with primary data obtained through field surveys and interviews with value chain participants.

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EXECUTIVE SUMMARY

Given the consistent cash returns, and potential for three crops per year, French bean is a crop with growth potential for smallholder commercialization and income generation in Kenya, although margins are sometimes thin. French bean exports increased by 10 percent from 36,450 MT in 2008 to 39,952 in 2012. However, exports to the EU declined by 18 percent in the first quarter of 2013, compared to the same period in 2012, following the amendment of the EU regulation 669/2009 subjecting Kenyan fresh beans and peas to a 10 percent increase on physical checks at designated ports of entry. This was necessitated by persistent failures to comply with MLR requirements and the inability for Kenya to demonstrate systems and mechanisms to monitor and effect pesticide compliance in the supply chain. Both industry wide and individual export companies have begun to institute measures to address these concerns and mitigate the decline in exports. Our projections indicate a supply deficit, which will grow to 8 percent in 2022. To meet the deficit, Kenya will have to expand area under production and/or increase yields to meet demand. This scenario presents opportunities for USAID-KAVES (hereafter “KAVES”) to champion the establishment of French bean in new areas, spur productivity improvements, increase compliance with consumer market preferences and facilitate the development of a more efficient and EU-compliant marketing chain.

INTRODUCTION AND METHODOLOGY

French bean is by far the largest vegetable export crop from Kenya and accounts for 19 percent of the value and 25 percent of the volume of total fresh vegetable exports. The supply chain is estimated to engage 50,000 small-scale farmers and employ between 45,000 and 60,000 people depending on the season. Kenya’s original success in French bean exports is based on the country’s climatic and geographic competitive advantage, compliance with trade certification schemes, and value addition through sophisticated packaging. However, the future of the French bean value chain, particularly for smallholder farmers, remains uncertain following increasingly stringent regulations required of suppliers to the EU market. The Fresh Produce Exporters Association of Kenya (FPEAK, 2014) estimated the total decline in farmers growing export horticulture products at around 5,000 in 2013-2014, although 3,000 have re-entered the market following a July 2015 reduction in costly inspection procedures previously imposed by the EU on Kenyan exporters. Fresh bean exports to the EU could continue to increase beyond current and past levels if initiatives to increase traceability and compliance with market requirements are successful.

Methodology

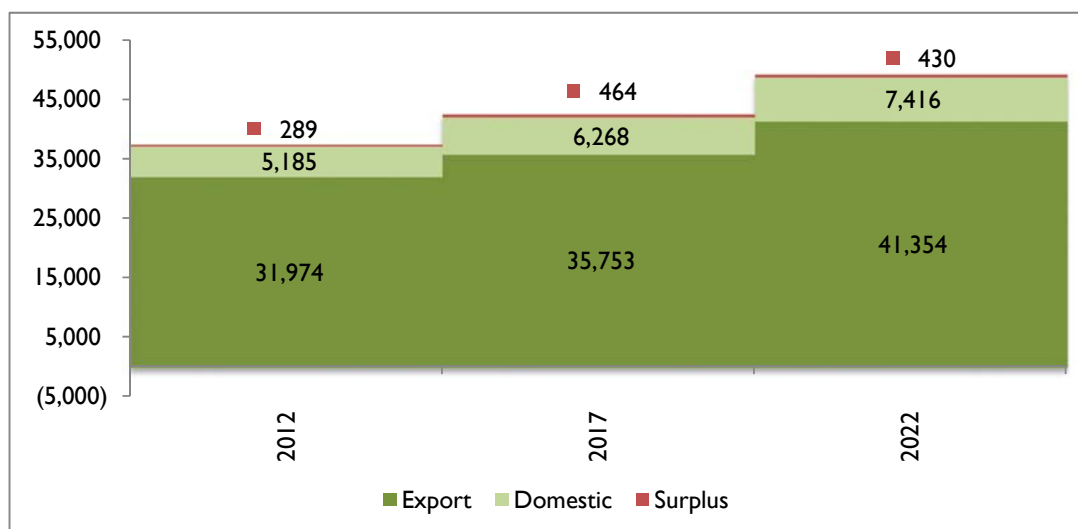
A preliminary SWOT analysis was carried out using previous studies and through consultation with all members of the KAVES technical team, KAVES’ subcontractors, and other French bean stakeholders to determine existing gaps in the literature and identify areas for further data collection and analysis. Based on this process, field surveys, focus group discussions (FGDs), and key informant interviews were carried out to update existing information, validate secondary sources, and provide primary data specific to the KAVES target areas. Relevant data and analysis were reviewed and are discussed in this report, with alternative analyses and interpretations carried out where data is conflicting. Data collected as part of the KAVES baseline survey of 1,800 farmers was analyzed and pooled with a second panel survey selected from the first 16,000 farmers receiving KAVES’ support. Finally, a smaller survey of traders was carried out to obtain specific information on cost and margins at different levels of the value chain.

SUMMARY OF KEY FINDINGS

Supply and Demand Analysis

Our projections suggest that demand for Kenyan French bean will increasingly exceed available supply in the near and medium terms. The gap between projected supply and demand will grow at 9 percent per year into 2022, with projected export demand constituting 98 percent of domestic supply. Kenya will have to find an additional 3,793 MT in 2017 and 6,482 MT in 2022 to meet the total demand, either by expanding the area under production and/or increasing yields. This scenario presents opportunities for KAVES to make significant, market driven and smallholder-focused interventions.

Projected French Bean Demand



Source: USAID-KAVES estimates

The French Bean Value Chain

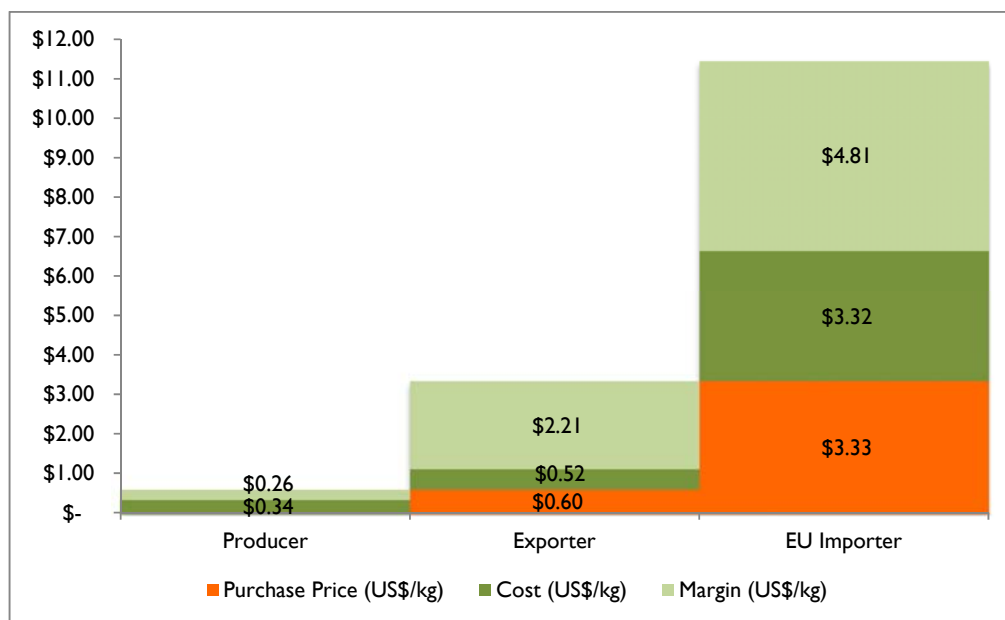
The French bean value chain is driven largely by major European retail outlets, who determine prices and quality standards. Export companies engage farmers on a contractual basis with pre-negotiated price terms, and provide other logistical support to get product to market. A key consideration in expanding and maintaining international trade is compliance with market standards and government regulations in importing countries. Up to 50,000 smallholder farmers with less than 2 acres of land are involved in French bean production, accounting for 77 percent of total national production (SNV, 2012). In addition to the high cost of production, most small-scale farmers do not possess the financial or technical capabilities to comply with on-farm and packing-facility standards demanded by EU retailers through the GLOBALGAP and British Retail Consortium (BRC) protocols.

A number of critical issues prevent further deepening and broadening of the value chain. Exporters have to contend with low technical and managerial capacity of producers, particularly in non-traditional bean producing areas, thereby raising costs of supervision and service provision. Contractual breach or side selling (e.g., produce poaching and broking) is common. Poor transport and transportation infrastructure in production areas is a major impediment to the quick collection and shipping of fresh produce. Furthermore, appropriate cold storage facilities are lacking in most collection centers and production in areas located a long distance from packing facilities force exporters to use refrigerated trucks, which are more expensive to run. Finally, Kenyan packaging is relatively more expensive per unit than competitors'.

Margins Analysis

In absolute terms, French bean producers earn \$1.34 for every dollar invested in production, exporters \$1.97 and importers \$0.72. In terms of volumes, foreign importers earn the highest gross margins along the value chain. For each kilo of French bean exported, they earn \$4.81, while exporters and farmers earn \$2.21 and \$0.26, respectively.

Value-added and Gross Margins per kilogram of French bean



Source: USAID-KAVES

margins analysis of each value chain actor per year. It is clear the French beans value chain benefits exporters and importers more than farmers because of the volumes they handle. Farm households earn an equivalent of \$126 per month, which translates to about \$25 per person per month (\$0.84 per person per day) and cover 69 percent of annual household consumption requirements. This study finds that French bean production can generate significant value to local rural economies, with an acre generating up to KSh2.48 million (\$28,505) in economic multipliers, and therefore can act as a potent economic base.

Margins along the French Bean Value Chain

Actors	Margin (KSh per kg)	Volumes	Months of operation	Total income	Income per month
Farmer	28.64	3,441 kg (acre)	9	KSh98550 (\$1,133)	\$126
Exporter	192	273 MT	12	KSh52.5 million (\$603,737)	\$50,311
EU Importer	418	273 MT	12	KSh114.1 million (\$1.31 million)	\$109,305

The Enabling Environment

Supporting Organizations & Institutional Actors: Government activity in the Kenyan horticulture sector has generally focused on infrastructure development, investment incentives, and the provision of support services in the context of letting the private sector develop the market. However, linkages to farmers groups and the capacity to engage with them is lacking for most of the smallholders in USAID-KAVES target counties.

Policy regime: In 2012, the National Horticulture Policy was established to promote the growth and competitiveness of the horticulture industry. The policy aims to solve some of the problems ailing the French bean value chain, including the need to improve infrastructure, promote value addition, and increase exports. The policy document also highlights the need to support formation and capacity building of farmers groups to enhance market efficiency. The existing preferential trade agreements have facilitated French bean export trade in EU.

Infrastructure: The poor state of storage facilities and roads contributes to high production costs, low sales prices, and high postharvest losses. Since French bean are highly perishable, transportation on poor roads increases costly delays and spoilage by lowering the value of the crop, while discouraging more competition amongst transporters.

UPGRADING INTERVENTIONS

Based on the information and analyses provided above, this section outlines interventions for the French beans sector that will increase on-farm productivity, streamline aggregation, and improve storage and postharvest systems. The interventions are organized into three strategic components supported by six major interventions that will achieve sixteen specific objectives. Interventions, activities and results have been selected that will contribute directly to the goals and objectives of KAVES, and are highly scalable through private sector partnerships, with varying levels of public sector support. The interventions all rely heavily on the mass adoption of new technologies, supported with specialist training and extension; new sources of investment and credit to unlock value chain constraints; and engagement of private sector partners for market development and sustainability.

Recommended intervention	Specific upgrading objectives	Challenges	Expected results
Strategic intervention I: Increase production for export			
1. Diversify production areas	<ol style="list-style-type: none"> 1. Production increased in western, rift valley and lower eastern counties 2. Number of outgrowers and employees in the industry increased 	<ul style="list-style-type: none"> • Inexperience of smallholders new to French bean production • Initial cost of setting up irrigation infrastructure • Initial low production volumes may restrain buyers/exporters 	<ul style="list-style-type: none"> • More farmers earning year-round income from export production • More consistent supply
2. Improve farmers access to extension services	<ol style="list-style-type: none"> 3. Commercial clusters of smallholder export growers established 4. Greater collaboration between exporters, input supply companies and county extension services 5. Greater use of e-production and market information services 	<ul style="list-style-type: none"> • Few trained extension workers available in target areas • High extension start-up cost for export companies 	<ul style="list-style-type: none"> • Increase in yields and productivity • Higher quality produce • Higher sales
3. Modernize smallholder production systems	<ol style="list-style-type: none"> 6. Higher proportion of farmers using irrigation 7. More efficient use of low residue pesticides 8. Labor-saving technologies adopted 	<ul style="list-style-type: none"> • Limited expertise of farmers • Relatively high cost of approved pesticides • Cost and availability of equipment 	<ul style="list-style-type: none"> • Increased yields • Improved Gross Margins • More production and income generated

Strategy II: Increase standards compliance and traceability of smallholders			
4. Raise level of compliance with statutory regulations and trade standards	9. More growers compliant with standards 10. National traceability system established 11. Greater collaboration between export companies and government regulatory agencies.	<ul style="list-style-type: none"> • Cost of certification • Weak regulatory systems • Competition for products between exporters 	<ul style="list-style-type: none"> • More competitive in export markets • Costs of export reduced • Greater returns to exporters and farmers
Strategy III: Reduce Postharvest losses			
5. Attract new investment in postharvest infrastructure handling	12. More cool and cold storage facilities established in production areas 13. More collection centres constructed for field grading	<ul style="list-style-type: none"> • Cost of facilities and equipment • Distance of new production areas from the airport 	<ul style="list-style-type: none"> • Better quality produce • Higher net returns • More competitive industry
6. Improve smallholder aggregation and collection systems	14. More smallholder groups operating commercially 15. Logistics costs reduced 16. Less wastage	<ul style="list-style-type: none"> • Low levels of group and institutional business experience • Initial small volumes and quality/price fluctuations 	<ul style="list-style-type: none"> • Increased export volumes and prices • Reduced fluctuation of market supplies

I. INTRODUCTION AND BACKGROUND

I.1 INTRODUCTION

French bean¹ is an important source of income for many smallholder farmers who generally produce the crop for export to Europe. The crop is attractive to farmers due to its short cycle (it matures within 45 days of planting) and can be harvested three times a week for 3-5 weeks. French bean provide a continuous income stream to producers and, with proper farm planning, can generate income year round. Due to the high returns per unit area, short production period, and regular income, export horticulture attracts higher youth participation compared to other farm level enterprises (DFID, 2010). People under 40, mostly male, dominate production of bean. Kimenyi (2002) estimated that 60 percent of French bean farmers in Maragwa are younger than 40.

The value chain engages about 50,000 small-scale farmers and employs between 45,000 and 60,000 people, depending on the season (SNV, 2012). The leading production counties are Kirinyaga, Meru, Embu, and Murang'a, which together account for over 77 percent of total annual production (Horticulture Validated Report, 2012). In traditional production regions, producers can earn an average of US\$1,000 per hectare, which is significantly higher than alternative farm enterprises. French bean is usually rotated with other high value crops, such as African Birds Eye chilies, baby corn and or brassica spp.

French bean is by far the most significant vegetable export from Kenya. In 2013, the crop accounted for 52 percent of the value and 61 percent of the volume of total vegetable exports; likewise, it accounted for 42 percent of the total value and 44 percent of total volume of fruit and vegetable exports (HCD 2013 Fresh Exports Statistics). Other than fresh bean, Kenya also exports processed beans that accounted for 32 percent of total French bean exports in 2013. Earnings from fresh and processed beans exports amounted to approximately KSh9.93 billion and KSh1.88 billion in 2013, respectively (HCD 2013 Fresh Exports Statistics). While earnings from horticultural exports have fallen for three consecutive years, the subsector has continued its recent recovery from the declines resulting from stringent import regulations by the European Union (EU).²

Kenya's original success in French Bean exports is based on its suitable climate and geography and, with the growth of tourism and international organizations based in Nairobi, the abundant south-north airfreight. Kenya has also succeeded based on its ability to add value while complying with certification schemes. Beans were initially grown exclusively for the export market, but domestic consumption is believed to be rising, with an estimated 9 percent of the annual total production, mostly rejects by

Justification for French Bean as a USAID-KAVES targeted Value Chain

- ◆ Important source of livelihood for many small-scale farmers who produce the crop mainly for export to Europe.
- ◆ Crop has short life cycle, maturing within 45 days of planting, and harvested three times a week for 3-5 weeks.
- ◆ Provides a continuous income stream to producing farm households.
- ◆ Engages about 50,000 small-scale farmers and employs between 45,000 and 60,000 people.
- ◆ Producers can earn an average of US\$1,000 per hectare.
- ◆ Largest vegetable export crop, accounting for 42 percent of the value and 44 percent of volume of total fruit and vegetable exports.
- ◆ Competitive and comparative advantages based on climate, geography, compliance with certification schemes, value addition through sophisticated packaging, and good access to south-north airfreight.

¹Also referred to as green beans or snap beans, hereafter beans

²Data released by the Kenya National Bureau of Statistics show the horticulture sector recorded another decline in 2013, grossing Sh83.4 billion, down from Sh89.3 billion in 2012 (Saturday Nation, February 8, 2014).

exporters, sold locally through high-end supermarkets, hotels and restaurants, local institutions, and retail markets.

The leading export destinations include the UK, France, Holland, Ireland, Germany, and Belgium. These six countries account for 97 percent of Kenya's total bean exports, with the UK occupying a dominant position (59 percent of total exports in 2012). Ireland is emerging as the fastest growing new market (25 percent compounded growth rate per year over the period 2003-2012) and is projected to overtake France and Holland as the second largest market by 2022 (see Figure 4).

1.2 METHODOLOGY

Since many studies in the past have analyzed various aspects of the French beans value chain, a preliminary SWOT analysis was carried out in consultation with all members of the KAVES technical team, subcontractor Farm Concern International (FCI) and other experts to determine existing gaps and identify areas for further data collection and analysis. Based on this SWOT analysis (see Table 1), field surveys, focus group discussions (FGDs) and key informant interviews were carried out to update information, validate secondary sources and provide primary information specific to the KAVES target areas.

Table 1: SWOT Analysis for French Bean Production and Marketing

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none"> Natural climatic and geographic comparative advantage Existing share of niche and value added markets including pre-packs Short/highly flexible production cycle, high returns per unit area, and regular income Relatively attractive sector for younger farmers Well adapted to diversified and integrated value chain strategy Ready export market and growing domestic market 	<ul style="list-style-type: none"> Compliance with regulations High postharvest losses due to spoilage and rejection Ineffective legal and regulatory framework, specifically contract enforcement, safe production/handling and traceability Ineffectiveness of competent authorities in enforcing compliance requirements and offering technical support to smallholders. 	<ul style="list-style-type: none"> Development of quality produce handling and storage technology for farmers to maintain freshness across the value chain Construction of cold storage within production and collection centers to maintain product quality and reduce rejection rates Effectively implement a smallholder out-grower food safety scheme that will ensure market access in key export markets. Local value addition centers for canning and other processing opportunities Provision of high quality certified seed to enhance productivity Credit facilities for investment in infrastructure and supply of inputs. 	<ul style="list-style-type: none"> High investment and production costs Increasingly stringent export market regulations (e.g., MRLs) Crop protection (i.e., disease/pest management) challenges Emerging competition with changing market access conditions Delayed preferential trade agreement between the EU and EAC

Source: USAID-KAVES, focus group discussions (FGDs) and key informant interviews (June 2013)

All relevant studies and data were reviewed and are discussed in this study, in some cases with alternative analyses carried out and interpretations made. These are referenced throughout the study and all sources are listed in Annex I. Primary validation data was collected by subcontractor FCI through a series of FGDs with farmers, brokers, exporters, and processors in selected target counties. Data collected as part of the USAID-KAVES baseline survey of 1,800 farmers was analyzed and pooled with a second panel survey of farmers selected from the first 16,000 USAID-KAVES farmers receiving support. Finally, a smaller survey of traders was carried out to obtain specific information on margins at different levels of aggregation.

2. SUPPLY AND DEMAND ANALYSIS

This section examines how much supply and demand is likely to increase in the next five to ten years. We build supply, consumption and demand scenarios to evaluate the future of the French bean industry in Kenya, including key supply drivers and how changing export market preferences will affect the national outlook for the industry. We use production and export statistics and domestic per capita consumption to forecast Kenya's French bean sector into 2022.

Research on consumption of French bean in Kenya is largely incomplete. The focus of existing research is exclusively on production and exports. Estimations and projections of national demand are therefore based on conjecture, with claims of increased domestic consumption. Most consumption calculations are based on the difference between the annual total production and total exports. To overcome these constraints, our analysis reviews existing secondary data and computes rough estimates for consumption based on total supply and demand.

2.1 PRODUCTION TRENDS AND PROJECTIONS

Two types of French bean are produced in Kenya, one for the fresh export market and the other for processing. Areas either produce both, or choose between the two, depending on their proximity to main markets. The crop is considered attractive to farmers because of its short life cycle (matures within 45-60 days of planting, depending on environment) and distributed harvesting (three times a week) for three weeks. Despite its importance, the value chain is performing below its potential due to limited foundation in Good Agricultural Practices (GAPS), and little or inappropriate use of quality seed, fertilizer (or other organic amendments), or crop protection chemicals. Additionally, due to the prevalence of side selling, exporters struggle to recoup investments, causing them to cease provision of inputs and technical advice.

2.1.1 Production Systems

Ideal conditions exist for French bean production, which is a major factor in Kenya becoming a market leader in export of "fine" grade bean to Europe. French bean grow best on well-drained, silty loam to heavy clay soils with a pH of 6.5-7.5, optimum temperature range of 20-25degrees (anything in the range of 12-34 degrees is conducive), an altitude of 1,000-2,100 meters (0-1800m is fine) to give a 10-15 degree day-night temperature change, and annual rainfall of 600-1500 mm, well distributed through the year. The bulk of beans (approximately 90 percent) are produced in Central and Eastern province (SNV, 2012).

However, a number of negative trends are motivating a move beyond the traditional growing areas, including: (i) declining soil fertility; (ii) hedge against the risk posed by erratic weather patterns; and, (iii) failure of farmers to abandon the use of black listed pesticides including dimethoate, which is the main cause of interception for Kenyan produce destined for the EU market. There is increasing interest among exporters to expand production to western and coastal Kenya, including Trans Nzoia, Bungoma, Kakamega, Vihiga, Homabay, Migori, Kisii, Kisumu, and Taita Taveta.

French beans production is highly intensive in labor and water due to strict management of operations to meet standards and quality requirements. Most farmers plant the crop under irrigation in relays on blocks of plots ranging from 0.15 to 1 acre. Relay planting of smaller plots facilitate better management, specifically of labor and irrigation systems. According to industry experts, harvesting generally consumes over 60 percent of the production time, while sorting/grading, weighing, and packing take 10 percent each. Production is year-round but most exporters time their production so that produce will be available from September to May, when production is offseason in Europe. Better prices are usually obtained between December and March, particularly in January and February when export prices can rise up to KSh250 per kg.

Newly introduced varieties include Amy, Teresa, Samantha, Julia, Pualista, Vernando, Tokai and Bakara. The varieties for fresh market include Amy, Serengeti, Vanilla, Star 2052/3, Pekara, Teresa, Paulista, Rexas, Samantha and Cupvert. Varieties for processing include Julia, Vernandon, and Sasa.

Crop Rotation: Growing of French bean is highly dependent on crop rotation, not only for soil health management but mostly to reduce the incidence of pests and diseases. Proper rotation of crops is thus critical – certain crops must not precede French bean because they share similar pests and diseases, while others are not particularly useful. Table 2 illustrates this point. Most of the recommended rotation candidates take at least 90 days to mature.

Table 2: Suitable Crops for Rotation with French Benas

Recommended as preceding crop	Crops that must not precede French bean	Crops that are harmless but have little beneficial effect on French bean
Cereals (maize, sorghum, millet, wheat); fodder grass; cabbage and kale; turnip; beetroot; cassava; sweet potato; strawberries	All legumes (peas, beans, etc); lettuce; Irish potato; eggplant; cucumber; melon; zucchini; and okra.	Groundnut; pepper; celery; carrot; onion; shallot; and garlic

Source: *Journal of Kenyan Horticulture*³

2.1.2 Production Trends

Statistics on French bean production are notoriously unreliable. They greatly vary depending on the source (primarily the HCD and FAO) and the year. The HCD publishes a Horticultural Validated Report (HVR) annually, purportedly validated by sector experts, but the data keeps changing from one report to another and most entries appear unrealistic. For example, while the HVR 2014 reports national French beans output at 38,398 MT in 2013, export data from the same agency reported a total of 47,190 MT (both fine and processed beans). Granted, some of these are re-exports from neighboring countries; these are not enough to explain the large discrepancy. Data validation was beyond the scope of this study. Without alternative sources of data, we rely on the official published data for purposes of illustration only and urge caution in interpreting the results.

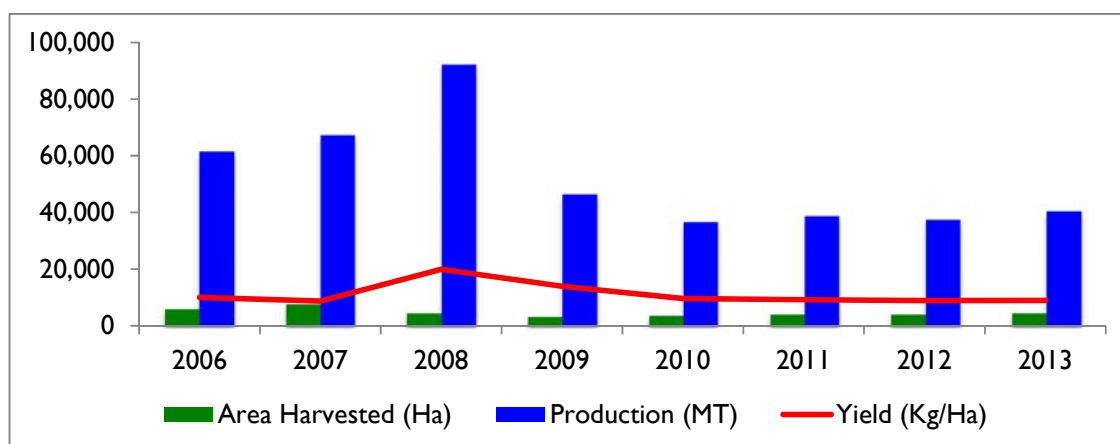
Official statistics from the HCD show the area under French bean production declined by 41 percent from 7,733 hectares in 2007 to 4,528 hectares in 2013, representing a compounded decline of 9 percent per year (HCD, 2014). The significant decline in area can be attributed to the stringent EU regulations on traceability and Maximum Residue Limits (MRLs), and the high cost of required certification. The change in public and private standards that resulted from these decisions led to sharp declines in the number of smallholders producing for export, as they were unable to meet the minimum requirements. The Fresh Produce Exporters Association (FPEAK, 2014) estimated that 5,000 farmers stopped growing horticulture products for export because of the increased rejections at the EU border.

The decline in area under cultivation led to a significant drops in production. Figure 1 uses FAOSTAT data for green beans to analyze national production trends, including average yields.⁴ It shows the average national production declined by approximately 40 percent, from 67,330 MT in 2007 to 40,544 MT in 2013, which translates to 8 percent decline per year. Production has however rebounded in recent years, with the area and output between 2011 and 2013 growing at 3 percent and 15 percent, respectively (Table 3).

³ <http://journalofkenyanhorticulture.blogspot.com/2011/04/kenyan-french-bean-production>

⁴ There exists significant discordance between the HCD and FAOSTAT data. We use FAOSTAT data because they appear more consistent across the years.

Figure 1: Kenya Green Bean Production Trends, 2006-2013



Source: FAOSTAT, August 25 2015 & HCD (2014)

The average national yield has remained relatively flat since 2009, averaging 8.95 MT/ha for the 2011-2013 period. Productivity varies greatly across production regions (counties). According to the HVR 2014, Taita Taveta recorded the highest yields per hectare (26 MT) and Machakos the lowest (Table 3). Among other factors responsible for the stagnant yields include declining soil fertility, pest/disease pressure in traditional production areas, and limited use of high quality seed among the majority of smallholder growers.

Table 3: Area Planted, Production and Yields of French Beans

County	2013		2011-2013		Yields (MT/ha)		CAGR (2011-2013)	
	Area (Ha)	Quantity (MT)	Area (Ha)	Quantity (MT)	2013	2011-2013	Area	Quantity
Kirinyaga	1,514	15,222	1,740	12,640	10.05	7.26	-11%	12%
Muranga	885	4,731	850	3,982	5.35	4.69	5%	19%
Machakos	522	2,415	366	1,600	4.63	4.38	46%	97%
Meru	367	3,328	345	4,383	9.07	12.72	4%	2%
Laikipia	185	1,380	177	1,320	7.46	7.47	-3%	-4%
Embu	176	2083	102	1,137	11.84	11.14	54%	93%
Taita Taveta	134	3514	78	2,079	26.22	26.54	64%	53%
Kenya	4,528	38,398	4,438	39,731	8.48	8.95	3%	15%

Source: HCD (2014)

2.1.3 Postharvest Handling and Losses

Fine and extra-fine beans are handpicked before seed visibility develops, and to the length specified by the customers (i.e. retail markets). Once picked, the beans should be collected in crates, protected from the sun and taken to field shade or placed in cold storage as soon as possible. This is critical as freshness and quality depend on pre-cooling and sustained cool temperatures. The maximum allowable period between picking and packing ready of shipping of beans is 12 hours; the beans are delivered to the market in Europe within 24 hours from picking, maintaining a cold chain temperature range of 6°C to 8°C (42.8°F to 46.4°F) for shelf life of up to seven days.

USAID-KAVES focus group discussions (FDGs) reported that all farmers sell French bean in kilograms, making weighing a mandatory activity conducted at designated collection points. Due to the export quality requirements, grading and sorting is done on-farm. Most losses occur at this level due to poor harvesting practices and high rejection rates. Packaging is mainly confined to packing the sorted and

graded fresh beans in plastic crates for delivery at the collection center for onward transportation to export agent pre-processing and distribution centers. Buyers perform further grading at their packhouses to determine the sales revenue due to farmers. The farmers do not have control over this off-farm process and therefore rely on the goodwill of the buyer.

Existing literature (such as Ndegwa et al., 2011) estimates farm-level postharvest losses in Kirinyaga and Machakos ranged widely from 1 percent to 20 percent. USAID-KAVES FGDs found farmers were retaining less than 1 percent of total produce for home consumption and reported no wastage. The sorting procedure at fresh pod collection points tends to discard a considerable (no estimates available) proportion of the produce, with producers collecting these for home consumption, local market sales or cattle fodder.

The USAID-Kenya Horticultural Competitiveness Project (USAID-KHCP) surveyed French bean farmers in 2013 and found farm-level recovery rates (percent difference between total production and total sales) ranged from 69 percent to 100 percent, with a mean of 93 percent and a median of 99 percent (these are USAID-KAVES calculations from KHCP data). USAID-KAVES data from the newly established French beans farms in Migori and Homa Bay show median recovery rates ranging from 34 percent to 84 percent. The relatively lower recovery rates are attributable to poor crop management, poor harvesting skills, and inefficient collection systems of major buyers.

At the export level, traders incur postharvest losses due to produce damage on transit, mechanical damage during loading and packing, attributed to packing of beans in gunny bags. An exporter surveyed by USAID-KHCP in 2013 reported postharvest losses related to mechanical damage and transportation at 8 percent for every consignment. Since exporters sell most of the produce 'rejects' to local traders, our rough estimate of the actual exporter-level postharvest losses is 5 percent.⁵ Calculations from Jones (2006) indicate the average exportable portion of the total beans produced in Kenya is 60 percent, and the pack-out rate is 80 percent; this implies that only 50 percent of total beans output is exported as fresh produce. The rest of the beans are processed and canned, sold in domestic markets, or lost. Our conservative estimate of actual national losses, at the farm and export levels, is 12 percent.

2.2 PRICE SEASONALITY TRENDS

Prices paid to farmers for fresh beans should ideally depend on the demand in major export markets. Prices are lower during June-August period, but start picking up in September, due largely to unfavorable weather for local production in Europe. Prices reach their peak in the December-February marketing period. These seasonal price variations are significant and has been cited as the major cause for farmers not honoring fixed price contracts with exporters and also responsible for side selling in the past.

With the current situation on MRL, exporters prefer contracting and supervising farmers. The contracts are to be witnessed by the regional HCD officers and prices are fixed while doing the contracts. This helps in reducing produce poaching/broking, and ensures adherence to Good Agricultural practices and reduces chances of wrong use of crop protection products. The system is very costly for the exporters, as the State Department of Agriculture does not have requisite enforcement capacity.

While farmers should ideally enjoy higher prices during peak demand for French beans, exporters' negotiate pre-season fixed price contracts that align with leading supermarkets in Europe. Exporters negotiate three fixed price regimes with farmers at the beginning of the production season. This price fluctuates within a band of KSh20, ranging from KSh40 to KSh60 per kg of beans, depending on the region and exporter. Farmers who honor contracts enjoy the negotiated prices throughout the year.

⁵The "rejects" are sold at prices well below the purchase price, so it is a loss to exporters. A significant percentage of it is either discarded or used as cattle feed

The difference between the lowest and highest prices in the band is however much lower than the seasonal price variations in export markets. In the past, before the tightening of production and marketing regulations, supply and exporting agents could offer up to KSh230 per kg (360 percent more) in the January/February peak season. While FOB export prices could increase by 2 to 3 times during the December-March marketing period, the producer prices fluctuate within the negotiated band (by about 20-50 percent). The pre-season fixed price contracts therefore deny farmers the benefits of significantly higher prices during peak markets in the EU.

Domestically, the main driver of price variation is the region of production, the distance from Nairobi, the buyer, and the type of farmer. Regions far removed from the main production and transportation hubs receive lower prices to compensate for lower volumes (higher assembly cost), higher cost of transport and higher risk of spoilage. Besides, different buyers (exporters or their agents) offer farmers different prices. Nonetheless, well-established medium to large farmers with supply contracts are able to sell beans at relatively higher prices (an average KSh10 more per kg).

The USAID-KHCP surveyed horticulture exporters in 2013 and found the price trends as presented in Table 4. It not only shows a strong element of coordination in pricing among exporters but also low variation in average prices across the years. During the period 2008-2012, the median producer price grew by 5 percent per annum from an average of KSh42 per kg in 2008 to KSh52 in 2012. This was in stark contrast to the period before 2008, when average prices varied significantly due to intense competition from brokers, supply agents, and informal (briefcase) exporters. The new export regime in the advent of stringent MRL and certification requirements has virtually eliminated these players, thus creating an environment for largely sticky producer prices.

Among the export firms sampled by USAID-KHCP, producer prices rose faster during the 2010-2012 period, growing at 8 percent per year. This reflects the recovery of Kenya's fine beans in the international markets, where the average import values rose 4 percent per year after the sharp declines in 2009 and 2010. When corrected for inflation however the unit producer prices declined at about 4 percent per year between 2008 and 2012. The modal price today is Sh50 per kg, rising to an average of Sh55-60 depending on region and quality of bean. A survey of farmers by USAID-KHCP in 2013 in eastern Kenya and parts of the Rift Valley found an average producer price of Sh54 per kg (median of Sh51), with wide variations ranging from Sh24 to Sh154. Prices in 2014 have stayed within a tight band from KSh40 to KSh60.

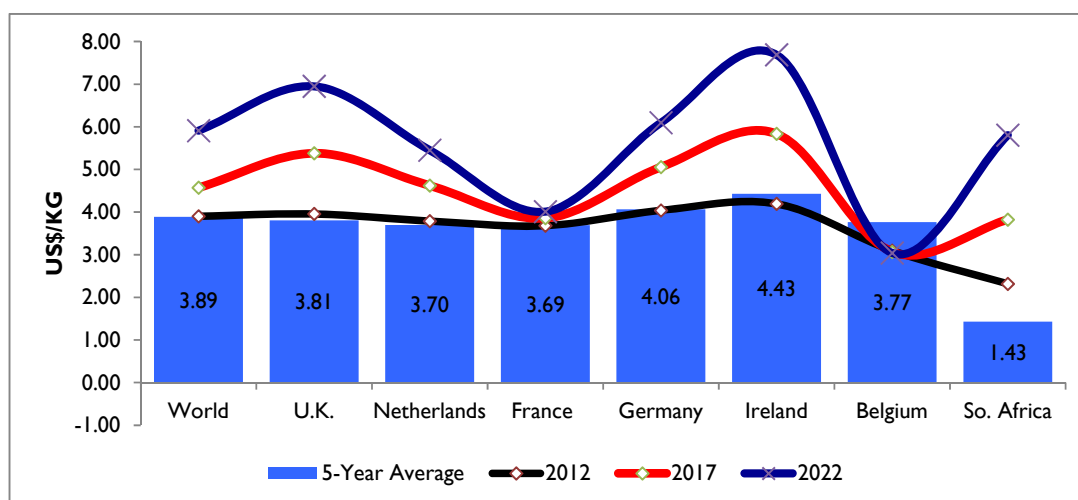
Table 4: Producer Prices (per kg) paid by exporters

Year	2008	2009	2010	2011	2012	5-YR CAGR	3-YR CAGR
Firm 1	30	30	40	50	50	14%	12%
Firm 2	45	45	45	50	50	3%	5%
Firm 3	45	45	45	60	60	7%	15%
Firm 4	45	45	45	50	50	3%	5%
Firm 5	40	45	50	55	55	8%	5%
Firm 6	40	40	40	50	60	11%	22%
Mean	41	42	44	52	54	7%	11%
Median	42	45	45	50	52	5%	8%
CPI (2009=100)	92.36	102.09	106.26	121.17	132.53	9%	12%
Real Median Price	46	44	42	41	40	-4%	-3%

Source: KHCP Exporter Surveys 2013

Due to lack of published import market prices in the various export markets, we calculate the unit import market prices by dividing the reported value of imports by export volumes. The result is summarized in Figure 2 and Table 5. The average price of Kenya's fine beans exports increased at 4 percent per year over the 10-year period, 2003-2012, but then declined by 5 percent per year between 2008 and 2010. As Table 5 shows, prices have been recovering since 2010, with increases recorded at 4 percent per year.

Figure 2: Estimated/Projected Average Import Prices for Kenya's Fine Beans at Major Export Markets



Source: USAID-KAVES estimates from ITC Trade Map & COMTRADE

The destination markets that recorded the fastest increases in import prices over the period 2003-2012 include South Africa (52 percent), Switzerland (19 percent), Ireland (16 percent), Russia (12 percent), and Germany (8 percent). South Africa and Russia are exceptions because of their relatively lower base import prices. It is possible Kenya is targeting these countries as alternative outlets with less stringent market requirements.

Table 5: Average Prices (US\$/kg) of Kenya's Fine Beans at Major Destination Markets

Year/Growth	2003	2010	2012	CAGR (2008-2012)	CAGR (2003-2012)	2017	2022	CAGR (2012-2022)
World	2.76	3.59	3.90	-5%	4%	4.57	5.91	4.1%
U.K.	2.49	3.53	3.96	-1%	5%	5.38	6.95	5.8%
Netherlands	2.75	3.94	3.79	-2%	4%	4.62	5.45	3.7%
France	3.43	3.57	3.68	-2%	1%	3.86	4.01	0.9%
Germany	2.09	2.93	4.04	-9%	8%	5.06	6.09	4.2%
Ireland	1.11	4.96	4.19	-2%	16%	5.84	7.69	6.3%
Belgium	3.14	3.84	3.10	-10%	0%	3.06	3.04	-0.2%
South Africa	0.05	1.02	2.32	29%	52%	3.82	5.80	9.6%
Switzerland	1.25	4.52	5.79	8%	19%	9.55	14.47	3.5%
Norway	9.27	6.37	6.90	-7%	-3%	5.67	4.81	7.2%
Russia	0.36	0.94	1.01	14%	12%	1.31	1.62	4.8%

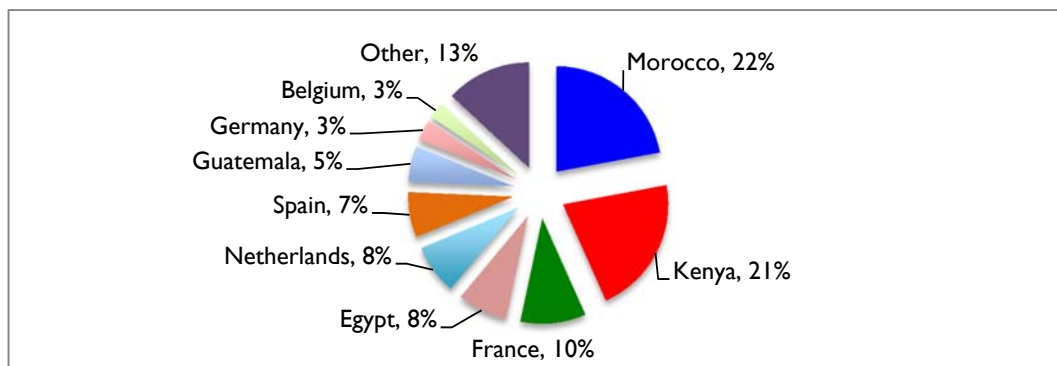
Source: USAID-KAVES estimates from ITC Trade Map & COMTRADE

2.3 TRADE PATTERNS

Kenya is the second largest exporter of all fresh/chilled bean categories to the EU, but is market leader for fine beans (Figure 3). The main importing countries are the UK, France, Germany, Holland, Belgium, and South Africa. Other emerging export markets are the USA and Asia. The U.S. allowed Kenya to

enter its market effective December 2011, after satisfying the U.S. Department of Agriculture (USDA) pre-export conditions following improvements in washing, packaging and processing of beans.⁶

Figure 3: Leading Exporters of Fresh/Chilled Beans to the EU (27) in 2012, by Value



Source: ITC Trade Map

Exports to the EU declined following the activation of the EU regulation 669/2009.⁷ The EU Directive affected the competitiveness of Kenyan exports in three ways: (i) delays in produce reaching EU supermarket shelves; (ii) increased cost of MRL testing; and (iii) potential loss of consumers' confidence in Fine beans from Kenya. It was reported that in January 2013 alone more than 25 percent of Kenya's vegetable exports to the European market were rejected after being found to contain traces of dimethoate (CTA, 2013). The same year, in February, FPEAK reported that intensified EU controls of Kenyan beans exports had led to delivery delays (of up to 72 hours), with a significant impact on the shelf life of products delivered to retailers. Intensified controls have reduced the shelf life and commercial value of Kenya's exports, resulting in the destruction of some consignments as they had passed their expiry date (CTA, 2014).

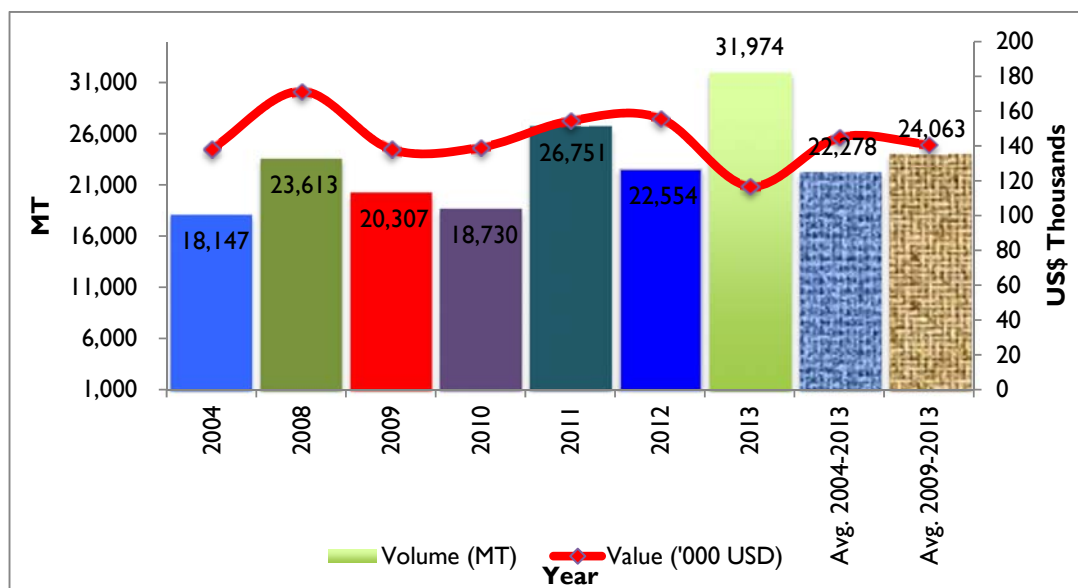
Recent export trends are presented in Figure 4. It shows that, after significant declines in 2009 and 2010, Kenya's exports rebounded strongly in 2011 and 2013, despite the amendment of EU regulation 669/2009 subjecting Kenyan fresh pod beans and peas to 10 percent increase in physical checks at designated ports of entry. The annual average export volumes of fine beans increased from 22,278 MT between 2004 and 2013 to 24,063 MT from 2009 to 2013. Recent export statistics released by HCD for the 2013 marketing period show that Kenya exported 31,974 MT of fine beans in 2013, representing 42 percent increase over the 2012 volumes (HCD 2014 Fresh Exports Statistics). Another 15,217 MT was exported as processed beans, bringing the total exports to 47,191 MT.

Perhaps reflecting the effect of the increased EU controls, Kenyan exports fetched significantly lower value in 2013, registering a 33 percent decrease in the total value to an estimated KSh9.9 billion (US\$116.9 million), compared to KSh13.2 billion (US\$155.9 million) in 2012. Together with processed beans, the total export value was KSh11.8 billion. From 2009 to 2013, the annual value of fine beans exports averaged at approximately US\$140.9 million, slightly lower than the US\$144.9 million per year recorded between 2004 and 2013. Furthermore, an increase in the costs of control measures undermines the competitiveness of Kenyan exporters, as these costs are fully borne by EU importers. Kenyan exporters margins are reported to have declined and the industry is estimated to have lost about KSh500 million in revenue (HCD, 2014).

⁶See <http://www.hortinews.co.ke/article.php?id=357#sthash.rMMiNhKs.dpuf>

⁷This came about after persistent failures to comply with MRL requirements and the inability for Kenya to demonstrate systems and mechanisms to monitor and effect pesticide compliance in the supply chain.

Figure 4: Kenyan Export Volume of Fine (Fresh or Chilled) Beans, in MT (2004-2013)



Source: HCD 2014

Additional French bean export trends are presented in Table 6, which shows estimates and projections of export volumes, growth rates, and market shares in leading markets. Over the period 2003-2012, Kenya’s total exports of fresh/chilled beans grew at 4 percent per year, but at a decreasing rate. Export growth slowed to 2 percent in 2008-2012 and 1 percent in 2010-2012. The export markets driving the growth over the 10-year period included Ireland (25 percent), Russia (29 percent), Germany and Norway (10 percent), and the Netherlands (7 percent). Kenya’s fresh beans commanded 8 percent of the world market in 2012, with the U.K. a leading destination at 59 percent, the Netherlands (14 percent), and France (13 percent).

If recent growth trends are sustained, our analysis show exports will grow to 50,487 MT in 2017 and 61,354 MT by 2022, and Kenya’s market share will increase to 9.5 percent in 2017 and 11.2 percent in 2022, respectively. The leading growth markets will be Ireland, Germany, the Netherlands, and Russia, which will account for 53 percent of Kenya’s fresh beans exports by 2022. The Ireland market is particularly interesting; if recent growth rates are sustained, it will account for 10 percent of Kenya’s total bean exports by 2017 and 25 percent in 2022 (from 3 percent in 2012). The country will overtake Germany to become the fourth largest market by 2017, and overtake France and the Netherlands to go second to the U.K. by 2022. Factors behind this rapid growth are worth investigating, but beyond the scope of this report.

Furthermore, new markets are opening in the US and Asia that offer tremendous opportunities for French bean producers. Larger horticultural producers are also developing biological pest management systems (BPMS) and becoming less dependent on chemical treatments as a result. Training and assisting smallholder farmers to adopt the BPMS has significant potential.

Table 6: Kenyan Exports of Fresh/Chilled Beans (MT)

	Year	Total Quantity	Leading Importers									
			U.K.	Netherlands	France	Germany	Ireland	Belgium	S.Africa	Switzerland	Norway	Russia
Reported/Projected Exports	2003	28,131	17,928	3,115	4,507	951	174	904	240	212	89	11
	2009	41,728	21,504	10,032	4,887	2,637	37	1,950	125	220	120	44
	2010	38,832	22,220	6,173	4,902	2,851	46	1,872	105	220	192	52
	2012	39,956	23,468	5,587	5,063	2,238	1,311	1,264	240	237	202	110
	2017	50,487	28,083	8,248	5,471	3,960	5,039	1,581	240	255	349	511
	2022	61,354	32,614	11,410	5,837	6,370	15,472	1,904	240	272	550	1,835
Growth (CAGR)	2010-2012	1%	3%	-5%	2%	-11%	434%	-18%	51%	4%	3%	45%
	2008-2012	2%	0%	-5%	0%	-5%	118%	-12%	20%	2%	10%	18%
	2003-2012	4%	3%	7%	1%	10%	25%	4%	0%	1%	10%	29%
Market Share	2012	8%	59%	14%	13%	6%	3%	3%	0.6%	0.6%	0.5%	0.3%
	2017	9.5%	56%	16%	11%	8%	10%	3%	0.5%	0.5%	0.7%	1%
	2022	11.2%	53%	19%	10%	10%	25%	3%	0.4%	0.4%	1%	3%

Source: ITC TradeMap (2014)

Increasing competition from Egypt, Morocco, Senegal, Ghana, Peru, and Israel has led to declining demand for Kenyan vegetables (Horticulture Market Study Kenya, 2012). Table 7 illustrates this trend by computing the average CAGR for the leading exporters to the EU over five years. It shows Kenya's export value has declined at 6.7 percent per year over the five years, and at 1 percent per year since 2010. This represents a steeper decline than Kenya's main competitor for the EU market, Morocco, which declined at 2 percent per year over five years but recorded a more rapid decline since 2010.

Table 7: Leading Sources and Growth of EU Imports of Fresh/Chilled Leguminous Vegetables ('000 US\$)

Exporters	2008	2009	2010	2011	2012	CAGR (2008-2012)	CAGR (2010-2012)
Morocco	202,637	204,332	210,820	241,596	186,688	-2.0%	-5.9%
Kenya	237,260	190,103	182,975	187,393	179,466	-6.7%	-1.0%
France	87,747	94,419	64,263	75,144	85,047	-0.8%	15.0%
Egypt	55,063	60,660	66,568	66,251	65,171	4.3%	-1.1%
Netherlands	71,839	63,792	58,768	68,140	64,936	-2.5%	5.1%
Spain	65,215	55,493	54,925	67,214	58,833	-2.5%	3.5%
Guatemala	21,408	23,668	22,263	37,133	46,422	21.3%	44.4%
Germany	16,747	17,611	11,843	20,818	26,953	12.6%	50.9%
Belgium	9,679	11,597	13,764	16,315	21,361	21.9%	24.6%
Senegal	13,306	15,048	13,008	17,680	13,829	1.0%	3.1%
Italy	13,904	10,896	12,258	16,537	12,971	-1.7%	2.9%
Peru	7,354	6,013	5,682	10,493	12,142	13.4%	46.2%
Zimbabwe	5,109	5,737	5,843	9,120	11,862	23.4%	42.5%
Ethiopia	7,442	10,915	9,231	12,470	11,716	12.0%	12.7%
World Total	867,273	815,300	770,566	893,348	845,663	-0.6%	4.8%

Source: ITC Trade Map

Emerging competitors eating into Kenya's and Morocco's market share include leading EU producers, such as France, Holland, Spain, Germany and Belgium, and other fast rising developing countries, like Egypt, Guatemala, Peru, Zimbabwe, Ethiopia, and Senegal. Guatemala and Peru pose the greatest threat to Kenya as their access to EU markets improves with the scaling back or withdrawal of the preferential treatment hitherto enjoyed by Kenya. Ethiopia, Zimbabwe and Senegal will continue benefiting from the Everything But Arms (EBA) regime for low-income countries (LICs). With negotiations over the prospective EU-Africa, Caribbean, Pacific (ACP) Economic Partnership Agreement making only modest progress, Kenyan horticultural products attracted an 8.5 percent EU tax from October 2014. The decision was however reversed after Kenya signed the EPA with the EU in December 2014.

This report however contends that Kenya has enough competitive edge to adapt to the changing market access environment.⁸ To do this, the country needs to improve compliance with SPS standards and reduce the unit cost of trade. Moreover, French bean processing offers a large market for local producers. Whereas production for the fresh export market has declined substantially in the last five years, as a result of stricter MRLs regulations and the breakdown of farming contracts between farmers and exporters, that of processing French bean has increased. In addition, local demand for French bean is rising with growth in population and urban middle class.

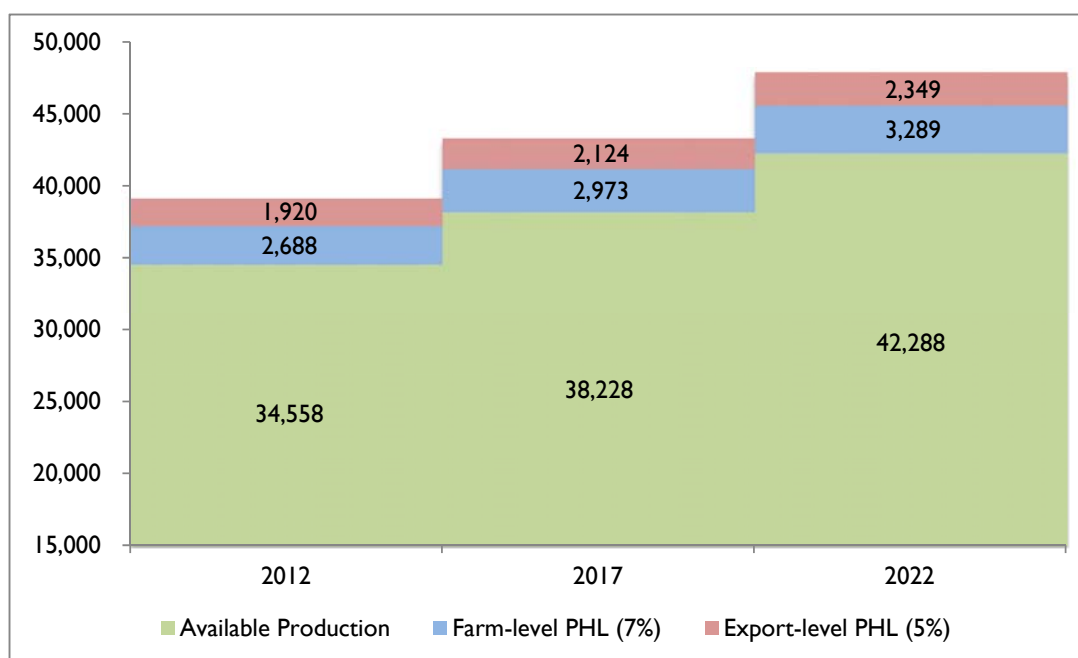
⁸ However, Kenya's competitiveness will be challenged if the preferential trade agreements fail, and the EU imposed a 8.5 percent tax on all imports from Kenya from October 2014

2.4 SUPPLY AND DEMAND ESTIMATION AND PROJECTIONS

Kenya initially grew fresh beans exclusively for the export market but domestic consumption has been rising in recent years, with an estimated 10 percent of the total production sold locally through high-end supermarkets, hotels and restaurants, local institutions, and retail markets. The increasing demand for French bean is linked to changes in urban consumption habits and growing ranks of expatriates and tourists. This section reviews secondary data and computes rough estimates of the total supply and demand. For ease of analysis, only two broad consumption segments, export and domestic, are identified. Estimates of national consumption are derived from the net of production, imports, exports, and the total population.

Applying trend analysis to the data, we have made supply projections for the next five and ten years. We use average yields, beans losses, and trade to estimate future supply. The year 2012 is treated as the base, and our key assumptions include constant yields, output growth of 3.8 percent, import growth of 10.2 percent, export growth of 5 percent, and normal climatic conditions. Our supply estimates and projections are summarized in Figure 5. Total domestic production is projected to increase to 43,325 MT and 47,927 MT in 2017 and 2022, respectively. If the national average postharvest losses remain at about 12 percent, **French beans availability from domestic production is projected at 38,228 MT and 42,288 MT in 2017 and 2022, respectively.**⁹

Figure 5: Domestic Supply Projections (MT), 2012-2022



Source: USAID-KAVES calculations

We estimated the domestic demand at about 9 percent of total available supplies in 2012. Exporters themselves supply most beans consumed domestically, either from ‘rejects’ (poor quality beans and those below export standards) or surplus supplies. Due to the marketing arrangements around stringent contracts, the extent, structure and size of the domestic market remains unclear. In 2010, the HCD reported that 66 percent of an estimated 55,841 MT of beans produced were consumed

⁹ Postharvest loss estimates vary widely. Actual losses are more probably in the region of 7-10 percent at the farm-level, and 5-10% for exporters (USAID-KHCP 2013; USAID-KAVES estimates; Per. Comm. with Carolina Ltd). Others have reported farm-level losses as high as 20 percent (Ndegwa et al.).

domestically (SNV, 2012). However, we believe this high estimate resulted from the high rejection rates in the export markets after the EU tightened import regulations for Kenyan fresh fruits and vegetables.

Our supply and demand projections are summarized in Table 8. Using 2013 as the start year, they show Kenya is already running deficits – not producing enough to meet export and domestic demand. This supply gap will widen with each year to 2022. The growth of French bean available from domestic production will lag that of total demand, thereby increasing the deficit by 7.8 percent and 9.6 percent per year in 2013-2017 and 2013-2022 periods, respectively. Projected exports will constitute 98 percent of the total supply from domestic production in 2022. Imports from neighboring countries, such as Tanzania, have been filling the supply gap in the past, and are projected to accelerate at 9 percent per year for the next ten years. Combined, the interplay between production and imports will supply approximately 42,485 MT and 49,200 MT for export in 2017 and 2022, respectively.

Table 8: Projected Supply and Demand for French Bean, 2013-2022

	2013	2017	2022	CAGR (2013-2017)	CAGR (2013-2022)
Domestic per capita (est. kg)	0.123	0.127	0.129	0.6%	0.5%
Population ('000)	42,184	49,496	57,401	3.2%	3.1%
Domestic demand (est. MT)	5,185	6,268	7,416	3.9%	3.6%
Exports (MT)	31,974	35,753	41,354	2.3%	2.6%
Total demand (MT)	37,158	42,022	48,770	2.5%	2.8%
Availability from production (MT)	34,558	38,228	42,288	2.0%	2.0%
Production surplus (deficit) (MT)	(2,600)	(3,793)	(6,482)	7.8%	9.6%
Imports (MT) ¹⁰	2,889	4,257	6,912	8.1%	9.1%
Imports (as % of total demand)	7.8%	10.1%	14.2%		
Available surplus/(deficit) (MT)	289	464	430	9.9%	4.1%
Export potential (MT)	37,447	42,485	49,200	2.6%	2.8%
Exports (as % of production)	92.5%	93.5%	97.8%		
Exports (as % total demand)	86%	85%	85%		

Source: USAID-KAVES calculations

Overall, Kenya will have to find an additional 3,793 MT in 2017 and 6,482 MT in 2022 to meet the total demand for French beans. The conclusion from the analysis is that Kenya will have to expand area under French bean, increase yields, or reduce average postharvest losses to meet demand. These scenarios present opportunities for USAID-KAVES to make significant market driven and smallholder focused interventions.

2.5 SUPPLY CONSTRAINTS AND THREATS

French bean production is an important enterprise for a section of farmers participating in USAID-KAVES interventions, largely as an income source. Our conclusion from the supply and demand analysis is that smallholders have great market opportunities, as export demand increases with sustained growth in export markets. The main challenge lies in ensuring fresh beans production is profitable and that the cost of production relative to the average household income is reduced. This section highlights

¹⁰ The majority of French bean that enter the country as brought by Kenyan firms that have farmers in Uganda or Tanzania, which are usually exported.

a few constraints and threats the French bean sector must contend with to remain competitive in the global markets.

Constraints for French bean production: Farmer FGDs conducted by USAID-KAVES in 2013 ranked high cost of inputs as one of the major barriers to entry into French bean production, followed by pests and diseases, and unpredictable weather and related water stress.

Technological and management gaps to comply with safety standards: Most small-scale farmers rely on exporters for technical support in complying with market requirement for French bean production. Government extension agents are not adequately trained or experienced to provide effective services to meet the needs of French bean farmers. There is critical need for technical support to farmers by other development agencies promoting French bean production in areas where limited or no export companies operate. Since government extension services are either inadequate or do not reach French bean farmers in project target counties, USAID-KAVES can facilitate the provision of these services in its areas of operation.

Major pests and diseases: French bean production is an extremely intensive farming exercise, with constant monitoring needed for the crop, largely due to the myriad pests and diseases that affect it. The most common disease is leaf rust, caused by the fungus *Uromyces appendiculatus*. Fungicides such as Dithane M45, Ortiva, Anvil and copper based fungicides provide effective protection. A natural method of control is to avoid irrigation methods that wet leaves and splash water, like sprinkler irrigation, because they provide a conducive environment for the fungus. Also, the use of rust tolerant varieties, such as Serengeti and Teresa is another way to manage the disease. Another disease is wilting caused by the fungus *Fusarium oxysporum*, and prevalent in furrow irrigation systems.

Nematodes are the leading pests affecting French bean, with a negative effect on root nodulation and N-fixing capabilities. The same is largely responsible for declining yields in the historical bean growing areas. They are also prevalent in furrow irrigation systems. Drip irrigation is therefore considered optimal for healthier French beans but the challenge is affordability especially for smallholder farmers. The high incidence of pests and diseases make the cost of crop protection chemicals a substantial share of production costs. Continuous use of restricted pesticides such as dimethoate is partly the result of ineffective traceability systems that can't pinpoint growers who fail to comply with guidelines on the use of restricted products.

Soil fertility (acidity): Soil acidity and low plant available phosphorus have been identified as major contributors to low soil fertility in many cropped soils of Kenya, particularly in western Kenya (Okalebo 2009). Among the factors contributing to soil acidity in this region are inherent nature of acidic parent material, nutrient leaching, excessive weathering and use of soil acidifying fertilizers such as DAP among others. Uasin Gishu district falls within the region where soils are inherently acidic with a pH range of 4.5-5.0 (Kisinyo et al 2009 and Nekesa, 2007, cited in Barasa et al., 2013). In this region and areas of Western Kenya, farmers maintain continuous mono cropping systems consisting mainly of maize and wheat, with minimal or no nutrient inputs (Barasa et al., 2013). The excessive mono cropping depletes the soil to unproductive levels. KALRO-Kakamega samples from Western Kenya indicate pH levels from 4.3 to 5.5, well below the 5.5 to 6.0 required for most horticulture crops (Harrison Agundo, farmbizafrica.com).

Soil fertility management, specifically the application of soil amendments, to raise the pH to optimal levels is therefore paramount for successful production of French beans. Barasa et al (2013) report results of experiments on the effect of liming on yields of French beans in Uasin Gishu.¹¹ They found the application of lime and P (TSP) increased the average fresh pod yields by between 5.3 and 6.9 times above the control, for the Samantha variety, and between 2.4 and 3.2 times, for the Amy variety. Most

¹¹ The experiment was designed as follows: (i) Control (no amendments); (ii) lime at 2 t/ha; (iii) 20 kg/ha P (TSP); (iv) 40kg/ha P; (v) 2t/h lime +20kg/ha P; and, (vi) 2t/ha lime +40kg/ha P

importantly, the studies show the residual effects of the soil amendments – fresh pod yields were 2.1 times and 1.7 times higher than normal in the two subsequent seasons after application.

Since USAID-KAVES French beans strategy focuses on expansion of production to the Western and Eastern regions, soil amendments to address the acidity problem will be a key component of the intervention toolkit. In addition to liming and P application, fertilizer blending to supply both lime and most of the micronutrients required for French beans is a critical success factor. Producers must have access to appropriate fertilizers for their enterprises to be profitable. Collaboration with MEA Kenya Ltd, for example, is necessary to facilitate and drive such initiatives.

2.6 SUMMARY OF FINDINGS

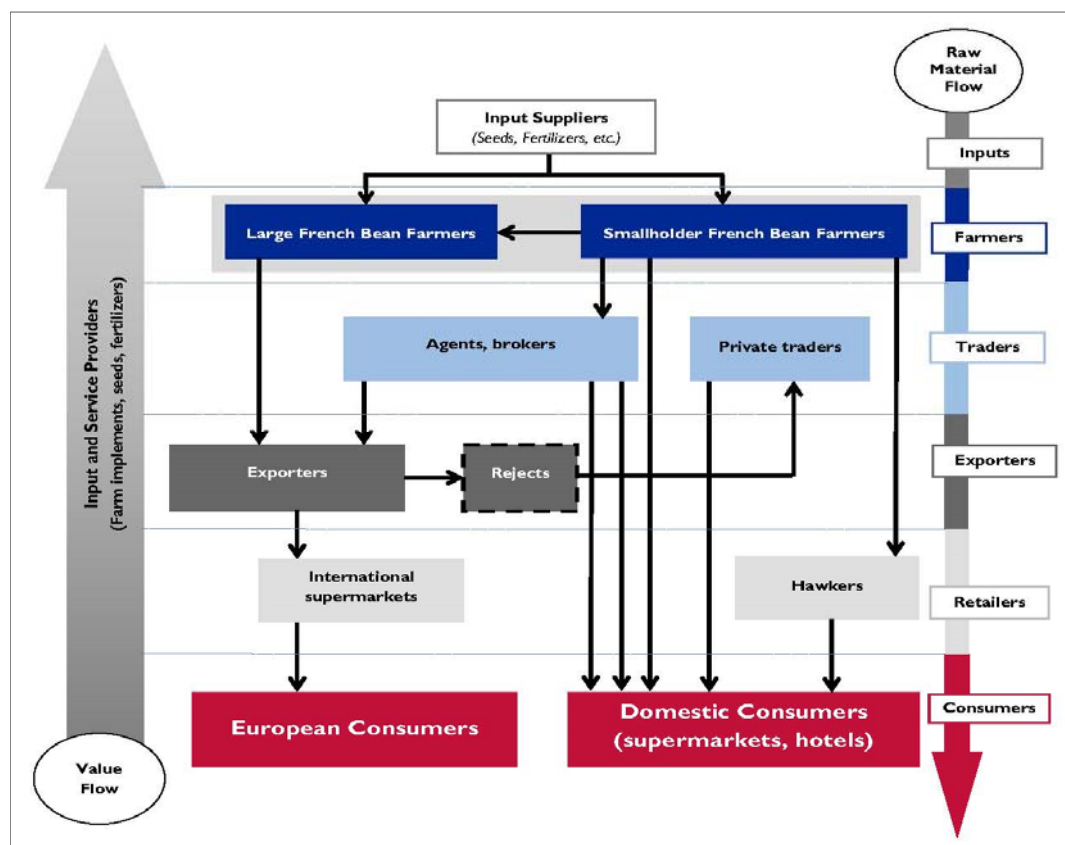
The future of the French beans industry in Kenya remains uncertain following increasingly stringent blanket standards regulations on conformity testing for MRLs in the EU. However, fresh bean exports to the EU could increase beyond current levels with increased compliance to the market's requirements. Small-scale farmers are particularly struggling to comply with the stringent standards. Their fortunes lay with technical and financial assistance to meet the minimum standards in existing markets or discover new markets. Our supply and demand projections show Kenya running increasingly large French bean supply deficits each year to 2022. The supply deficit will grow at 9 percent per year between 2013 and 2022, with projected exports constituting 98 percent of domestic supply by 2022. Imports are projected to accelerate at 9 percent per year for the next ten years to make up for some of the production shortfalls. Overall, Kenya will have to find an additional 3,793 MT in 2017 and 6,482 MT in 2022 to meet the total demand for French beans. The conclusion from the analysis is that Kenya will have to expand area under French beans, increase yields, or reduce average postharvest losses to meet demand. This scenario presents opportunities for USAID-KAVES to make significant market driven and smallholder friendly interventions.

3 THE FRENCH BEAN VALUE CHAIN

In this section, we look at the French bean value chain in detail, highlighting key actors, their interactions and critical constraints and gaps, as well as opportunities for USAID-KAVES interventions. For ease of reference, Figure 6 provides a simplified diagram of the value chain, showing the basic flow from farmers through exporters and processors to the consumer, as well input and service supplies to the farmer.

Requirements for successful French bean production include adequate supply of water, drip lines, irrigation pumps, fertilizers, pesticides, and technical information; transportation infrastructure, etc. French beans must be on the foreign supermarket shelves within 48 hours after harvesting to for maximum shelf life. Proximity to good roads and an airport is therefore critical to the value chain’s efficiency. Also critical is the availability of appropriate transportation.

Figure 6: French Beans Value Chain Map



Source: Adapted from SNV, 2012, USAID 2007

A relatively small number of actors play the various roles through the value chain, from input supply, production to exporting (see Table 9). The French bean value chain is export-oriented with low participation of local traders. It is relatively short and simple, comprising local input suppliers, large and small-scale farmers, export agencies and to a small extent local retailers. The main functions in the value chain are input supply, growing/production, brokering, exporting, transporting, and importing.

Table 9: Key French beans value chain actors and their roles

Key Actors	Role
Farmers	Producers of French beans, also involved in provision of labor for harvesting and transportation of the freshly harvested beans to collection centers.
KALRO	Provision of research services
Kenya Plant Health Inspection Services (KEPHIS)	Ensuring plant health through seed certification
Water Resources Management Authority (WARMA)	Water use permits
National Environmental Management Authority (NEMA)	Environmental regulation, water extraction regulations
Pesticide Control and Protection Board (PCPB)	Regulation of pesticide use and safe use standards
Kenya Bureau of Standards (KEBS)	Product standardization and certification
Traders (retailers, wholesalers, exporters)	These are formal and informal market players involved in the purchase of French beans from farmers and supply of other inputs like Agrochemicals and fertilizers.
Processors/value addition	The processors are also exporters who pack fresh beans as per market requirements
Transporters/distributors	Transporters play a key role in transporting beans to collection or shipment centers
Consumers	End users of the beans
Business services providers	Packaging, financial, extension, pack-housing, and cooling

Source: USAID Kenya Agricultural Value Chain Enterprises (KAVES), 2013

3.1 INPUT SUPPLIERS

Private sector players, who offer various types of extension and training to farmers, mainly dominate the inputs sector. French beans are susceptible to a number of pests and diseases. There are a number of recommended crop protection chemicals for use in the production French beans. However, the high cost of pesticides has forced farmers into using cheap unsafe products that either are counterfeits or not recommended for use in French bean production. The use of pesticides containing dimethoate has been particularly problematic (see text box).

Production of French beans is highly intensive in terms of labor, fertilizers and agrochemicals. Input credit in-kind and cash to cover production costs are therefore critical for the majority of resource-poor smallholder farmers. Due to stringent food safety standards, exporters procure and distribute most of the inputs to farmers, in accordance with agreed cropping plans. Exporters enter into contracts with input suppliers to provide enough stock for their production requirements. This arrangement restricts farmers' access to inputs to those supplied by exporters or their preferred suppliers, and it is not clear how exporters price the inputs procured and whether they gain financially from price

Lower MRL for Dimethoate by the EU

The chemical ingredient dimethoate was restricted in the EU in 2009 and the allowed maximum residue limit (MRL) revised to levels that constituted a technical ban.¹ European supermarkets followed up this action with a direct ban on any use of dimethoate on vegetables marketed in the EU. Although a self-imposed ban or restricted use was imposed by the horticulture industry in Kenya in 2012, its use in fruits and vegetables among small-scale farmers persists. The Ministry of Agriculture and FPEAK have continued to advise farmers not to use dimethoate in fruit and vegetables with little success because the pesticide is considered cheap and regarded as highly effective by most small-scale farmers.

differentials. Seed availability, in particular, remains a problem, and farmers rely on seeds supplied by exporting companies, which have exclusive contracts with major seed producers, such as Syngenta and Monsanto.

3.2 FARMERS

It is estimated that up to 50,000 farmers with an average farm size of less than 2 acres are involved in French bean production and account for 77 percent of total production (SNV, 2012). Most farmers are organized into groups and production is regulated through contractual arrangements with exporters under the HCD Order of 2011. The initial success of French beans was due to its short growing period, which facilitated consistent cash income to growers. Smallholders typically plant as much as they can sell, and those with contracts or commitments from exporters may devote 100 percent of their land to the cultivation of French beans (DFID, 2010; Edewa et al., 2013).

Stringent and expensive quality standards have driven many small farmers out of the sector. In Kenya the number of small outgrowers (less than 2 acres) supplying exporters directly steadily declined between 2000 and 2007 (PIP, 2009). Smallholder farmers either sell French beans directly to exporters or their intermediaries (usually large-scale farmers with large contracts with exporters). Exporters sell rejected beans (those that do not meet export standards) to local markets.

Participants in USAID-KAVES FGDs identified significant opportunities for export, with exporters keenly promoting French bean production to meet their growing export demand. Despite successful implementation of different certification schemes, there is limited knowledge on Good Agricultural Practices (GAPs) among new smallholders venturing in export farming. There is an opportunity to create more awareness on market requirements and standards, and to conduct training on their implementation. This will ensure that value chain operations are efficient and effective, enhance accessibility to markets, and increase productivity.

3.3 MARKETING ACTORS

There are different market segments: 1) local fresh beans; 2) export fresh beans; and, 3) processed exports. These source French beans through various intermediaries. Most of it is traded through exporters dealing in both fresh and processed beans. The marketing chain is therefore relatively short, with exporters dominating and supply agents playing an ever-diminishing role. This section briefly discusses the major marketing actors.

3.3.1 Exporters

Exporters are the primary market for French beans. They rely on their own production, large- and small-scale farmers, and, to a limited extent, supply agents to procure fresh beans for export. Whereas production is regulated by the HCD Order of 2011, there has been a significant decline in the number of sponsored production schemes because exporters are unable to recoup advanced input credit due to side selling of produce by farmers. This has resulted into opportunistic trading between farmers and exporters, which coupled with ineffective national produce traceability system has hampered pesticides use control and compliance with MRL regulations by the EU.

Exporters are integrated backwards into the production chain, for at least some of their product sourcing. Increasing cost and quality constraints make it uneconomical for them to deal with individual/small-scale growers, so they must work with either larger outgrower schemes or larger individual farmers. Large-scale exporters have integrated their operations both forwards and backwards. There are only about eight to ten firms that fall into this category, with varying degrees of integration. These large exporters have very strong market links and generally provide a fairly consistent amount of product over the course of the year.

A key consideration in expanding and maintaining international trade in beans is compliance with market standards and government regulations in importing countries. According to Canken

International Ltd, exporters are required by law to acquire an export license from HCD, as well as phytosanitary certificate from KEPHIS for every consignment exported. A certificate of produce conformity to quality and safety aspects is also required. Exporters are further required to implement food safety management systems in their operations and observe hygiene at all times while handling produce in the value chain.

Investment needed to install the infrastructure required for private voluntary standards (PVS), such as the European Retail Group Good Agricultural Practices (EurepGAP/GlobalGAP) and to maintain the certification are substantial. Certification of outgrowers is the most expensive. These requirements significantly reduce the profits of exporters and exert pressure on them to cut out smallholder farmers (PIP, 2009). Exporters who still engage with smallholders provide significant support towards Global Gap certification of smallholder production systems to ensure compliance and minimum food safety standards.

3.3.2 Supply Agents (Brokers)

Marketing agents, commonly referred to as brokers, are registered by the HCD as dealers in the value chains. A dealer is defined as a person involved in buying and selling of horticultural produce (HCD Order, 2011). Marketing agents play a significant role of consolidating, initial sorting and grading, and delivering produce to the exporters. In addition, marketing agents also supply French beans to local markets, processors, wholesalers, retailers and institutions. They often transport French beans in inappropriate vehicles, which compromises product quality, and hence often cited as the main cause for failures in produce traceability (PIP, 2009).

With the advent of more stringent EU regulations, most exporters have severed formal links with brokers and with it thousands of smallholder farmers who depended on them (PIP, 2009). While some degree of brokering still takes place, responses from companies interviewed as part of this assessment suggest they are now buying less from outgrowers via intermediaries, and producing more on company farms and using large-scale farmers to aggregate from smallholders (PIP, 2009; Okello, 2011; USAID-KAVES, 2013).

3.3.3 Processors

As the market for fresh beans becomes more challenging, processing for export and domestic markets remains a promising option for Kenyan farmers. The export rules and standards for processed beans are less stringent than for fresh beans. Processing firms used to buy beans under contractual arrangements with smallholders, where they provided input credit and a guaranteed market. In contrast, most fresh-produce exporters do not extend similar services and their collection and price is rarely guaranteed.

The leading processors include Njoro Cannery Ltd, Frigoken Ltd, and Kokoto Factory Ltd. Njoro Cannery is the oldest French beans processor in Kenya. It used to obtain most of its beans from contract growers in Vihiga County and Kericho County, primarily because of the availability of water for irrigation in these regions (Kimenye, 2002). The factory had its own nucleus farm in Vihiga, and bought only about 5 percent of its beans from farmers in Njoro. These production arrangements collapsed due to several factors, both internal and external, that greatly curtailed the operations of the processor.

To manage supplies, most processors designed contractual arrangements that specify the area to be planted per season, planting dates, dates and number of times to spray against pests and diseases, the date to start and finish harvest, and the price. The contracts prohibit farmers from unilaterally expanding cultivated area. The payments for produce are made at the end of each season. These stringent contractual arrangements are largely responsible for the problem of side selling that is common in production regions targeted by processing companies. As a result, the three major local processors noted that they operate at less than 50 percent their installed capacity due to inadequate supply of quality French beans.

3.3.4 Packaging Suppliers

Packaging companies servicing the sector include Dodhia Packaging Ltd, Megvel Cartons Ltd, Thermopak Ltd, Dofran Trade Labels, Kenya Flexo, Market Centre, Signode, and Carton Manufacturers. Kenya imports the raw materials used in the manufacture of boxes, which makes costs higher than competitors. Vegetable packaging prices reported for Egypt, for example, are significantly lower than Kenya, due to availability of boxes and raw materials from Europe and elsewhere; in 2012, it was estimated at only \$0.04 per box in Egypt, compared to Kenya's US\$0.12 (USAID-KHCP 2012).

The packaging consumables sector in Kenya is constantly updating processes and modernizing equipment to reduce cost and produce quality products. Kenya has reached a level of sophistication in packaging at par with Egypt. European retailers have noticed these technological advances and are now promoting the industry to produce packaging that allow fully-packed-at-source product (USAID-KHCP, 2012). Products packed at source reduce costs and time delays and lengthens the product life guarantee to the final consumer. Among the latest developments in Kenya is the Modified Atmosphere Packaging (MAP), which is produced locally for use in packing both high and low care products. Other innovations include outer boxes that are lighter in weight and more durable.

Modified Atmosphere Containers (MAC), present new possibilities of shipping fresh produce by sea over longer distances and longer transit times. According to Jones (2006), French beans, for example, can stay fresh for the entire duration of shipment between Mombasa and Southampton (11 to 21 days). This would significantly lower the cost of shipment and make Kenyan beans more competitive. It however requires the upgrading of port facilities and ground logistics to be effective.

3.4 SUMMARY OF FINDINGS

Up to 50,000 smallholder farmers, with less than 2 acres of land, are involved in French beans production, accounting for 77 percent of the total production (SNV, 2012). Export agents engage farmers on a contractual basis with pre-negotiated prices and provide other logistical support, although the contracts are sometimes broken during product gluts through side selling. As standards in the export markets have become more stringent, exporters now supply most of the inputs and provide extension services for contracted farmers. Generally, the French beans value chain is controlled by major European retail outlets, which determine prices, logistics and quality control, and provide regulatory oversight. A key consideration in expanding and maintaining international trade in beans is compliance with market standards and government regulations in importing countries.

Constraints facing producers: Investments needed for infrastructure required for private voluntary standards (PVS), such as GLOBALGAP and British Retail Consortium (BRC), are substantial. The protocols significantly reduce margins and exert pressure on them to cut out smallholder farmers. Most small-scale farmers do not possess the financial and technical capabilities to comply with the food and safety standards. Moreover, the cost of production is relatively high. These two constraints combine to tempt farmers into cutting corners or exiting the sector altogether. Further constraints include inadequate access to financing, lack of centralized input supply and distribution centers, inadequate access to data management systems for traceability, and lack of cold chain facilities.

Constraints facing exporters: Exporting operations depend on recruitment of producers, collection of produce, transportation, storage, packaging, and shipping. Exporters have to contend with low technical and managerial capacity of producers, thereby raising costs of supervision and service provision. Contractual breaches (e.g. side selling and produce poaching) are also common. Poor transport and transportation infrastructure, especially in producing areas, is a major impediment to the quick collection and shipping of fresh produce. Moreover, exporters must contend with poor quality beans and low productivity because of insufficient awareness and poor management practices among farmers. Furthermore, appropriate cold storage facilities are lacking in most collection centers and thus force exporters to use refrigerated trucks, which are more expensive to run. Finally, packaging is the single largest component of the cost of exporting, because Kenyan packaging is relatively more expensive per unit than competitors.

4 MARGINS ANALYSIS

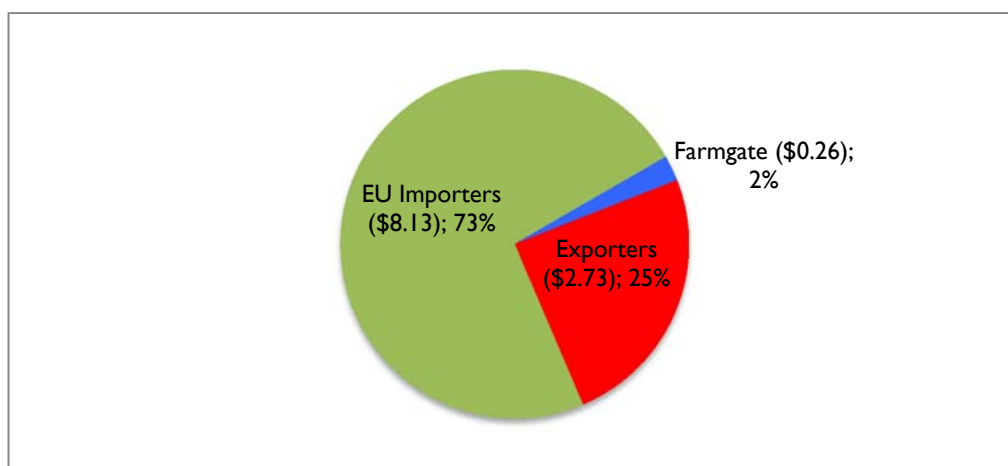
In this section we look at gross margins along the value chain. The data used in calculating producer value-added and margins are extracted from the USAID-KHCP Farmer Surveys and Farm Trial data collected in 2013. For exporters, rough estimates of cost and prices are tabulated from six questionnaires returned for the USAID-KHCP Exporters Survey conducted in 2013. Other information on cost is derived from secondary sources. The surveys considered a number of variables in calculating cost of production, including inputs, labor, and transport.

4.1 FRENCH BEAN VALUE ACCUMULATION

In this section we compute the value added and margins at major steps of the value chain. Our analysis is limited to the three major actors along the value chain, namely producers, exporters and foreign buyers. For exporters, rough estimates of cost and prices are tabulated from six questionnaires returned for the USAID-KHCP Exporters Survey conducted in 2013. Other information on cost is derived from secondary sources. There are no published reports or data on French bean importer costs or margins through which we could triangulate our data. Data used for importer margins are imputed from secondary sources in foreign importer markets. The value accumulation from grower through exporter to final consumer is shown in Figure 7.

Figure 7 shows the value addition along the value chain is unevenly distributed, with foreign importers contributing the largest proportion of the total value added to the produce (73 percent), compared to 2 percent and 25 percent for farmers and exporters, respectively. The bulk of value added by importers is a result of high freight costs (about \$1.80 per kg), which constitutes about 27 percent of the landed cost per kg.

Figure 7: Share of French Bean Value Accumulation



Source: Calculations from USAID Kenya Horticulture Competitiveness Project (KHCP), 2013 data

4.2 FARMERS GROSS MARGINS

At the farm level, French beans production requires several mandatory fixed investments and operational expenses that impose substantial costs on farmers. To establish a farm unit, before commencement of production, food safety protocols for export require new producers to invest in appropriate farm structures, irrigation infrastructure, and record keeping. Exporters enforce the requirements through close monitoring. The farm structures must conform to the requirements of

Global Gap, and include storage units for seed, fertilizer and chemicals, cleaning, handling and sorting sheds, hygiene and sanitation units, packaging crates, and protective clothing and safe handling equipment. Irrigation infrastructure includes water pumps and piping system, in-field piping, and in-field fixtures. The cost for these requirements is currently estimated between KSh120000 (\$1,410) and KSh350000 (\$4,120) per farm or group (KHCP exporter survey 2013).

Variable production costs include seed/seedlings, fertilizers, pesticides, soil/water testing, labor (land preparation, planting, weeding, fertilizer and spraying application, harvesting and sorting), chemical residue analysis, and transportation to collection points. To establish these cost items, this section first presents the crop budget for what would be an ideal farmer adhering to all the recommended practices. Table 10 summarizes a crop budget for a grower operating on one acre. With efficient use of inputs and access to supplementary irrigation, growers can achieve a yield of 3.7 MT per acre. Because of losses arising from sorting, storage and field/transportation damage, we assume the farmer recovers about 93 percent of the produce (3,441 kg). The farmer needs 12 kg seed costing KSh16000 (US\$188), fertilizers (80kg DAP; 40kg CAN; 40kg NPK 17:17:17; 400g foliar feed) totaling to KSh12000 (\$141), and agrochemicals worth KSh3000 (\$35). Land preparation and planting cost totals to Sh6000 (\$71) and two weeding cycles take another KSh5000 (\$59).

Table 10: French Beans Production Budget (per acre) for an Ideal (Efficient) Farmer

Item	Cost/Value (KSh)	Percent	Note
Sales volume (kg)	3,441		Assumes an efficient producer at 3,700 kg per acre and recovery rate of 93 percent
Activity/input cost (Sh):			
Seed	16,000	22%	Assumes new seed each crop
Fertilizer	12,000	16%	
Agrochemicals	3,000	4%	
Plow/plant	6,000	8%	
Weeding	5,000	7%	
Spray/fertilizer application	2,000	3%	
Harvest/sorting labor	26,000	35%	Main cost is picking and sorting. The total depends on yield
Other	3,500	5%	Contingency & misc. expenses
Total direct costs	73,500	100%	Dependent on the yield
Production cost per kg	21.36		
Price per kg	50		Assumes high quality beans. Paid in three regimes (Sh40-65)
Total sales revenue	172,050		
Gross Margin	98,550	57%	
Breakeven yield (kg)	1,470		
Net returns per shilling	1.34		

Source: USAID-KAVES estimates from production recommendations

The largest cost item is harvesting and sorting, which ranges from KSh20000 to KSh32000 depending on labor supply and cost in an area (estimated here at KSh26000). Some farmers pay labor per day, others per kilo of beans harvested. The cost per day averages about Sh250 per person, or Sh5-10 per kg (Pers. Comm. with Key Informants in Mwea, Migori and Homa Bay). Other production cost items include labor for fertilizer application and spraying, water charges or cost of pumping, and transportation. The total cost of producing an acre of beans is KSh73500 (\$865), at yields of 3,441 kg translates to KSh21.36 (\$0.25) per kg.

By proportions, harvesting/sorting constitute 35 percent of the total cost of production, seed (22 percent), fertilizers (16 percent), and land preparation and planting (8 percent), and weeding (7 percent).

Combined, labor-related expenditures amount to 43 percent of the total cost of production, and therefore confirm French beans production as highly labor intensive. An acre of beans needs approximately 170 man-days to produce. In areas with labor shortages and/or competitive alternative economic activities, labor constraints could undermine the promotion of French beans.

Assuming the farmer obtained high quality beans, she should expect KSh50 (\$0.59) per kg and earn KSh172050 (\$2,024) in revenues and gross margins of KSh98550 (\$1,159), equivalent to 57 percent. The breakeven yield at these cost and prices is 1,470 kg. A majority of growers aim to double this by producing at least two crops per year. This farmer would earn KSh1.34 for every shilling invested. With a rural poverty line of \$23 per person per month, the minimum annual consumption expenditure of an average rural household amounts to \$1,395; it implies income from beans production can cover about 69 percent of consumption requirements. The most efficient farmers planting at least an acre of beans could earn up to \$957 per year.

4.3 ECONOMIC VIABILITY OF FRENCH BEAN PRODUCTION

The ideal efficient farmer presented above is rare in most producing regions. Instead, our field surveys and data analysis find the average farmer producing at less than 70 percent her full potential. In this section, we examine the economic viability of French beans production on smallholder farms. We outline the production regime followed in most areas to determine the feasible land size and potential returns. These estimates use information gathered from various key informants (seasoned medium-large scale farmers and exporting companies) and field discussions with smallholder farmer groups in Homa Bay and Migori.

We perform the analysis by first making several assumptions from practice. The first assumption is related to the planting regime on an acre of land, which sheds light on production feasibility. Using this planting regime, we outline a planting, harvesting and rotation schedule for an average farmer starting February 2015. The assumptions are as follows:

- 0.15 acres planted every 21 days (approximately 7 Plots over 5 months)
- Maturity period (50 Days)
- Harvesting period (35 Days)
- Rotation period (120 Days – assumes short-maturing cereals/fodder/vegetables, from land prep to final harvesting)
- 14 plantings in one fiscal year – 12 months (assumes 2 cycles per an eighth of a plot)
- 44 days without harvest (between 1st & 2nd cycle)

The results of this scheduling are contained in Table 11. With continuous planting, the farmer could realize 2 acres of French beans over two cycles in one fiscal year. After the 2nd cycle, the land must be put on crop rotation for the recommended 2-3 years to manage diseases, such as rust. While experiments are ongoing to develop a production system and technology that can reduce the rotation period to 1 year, current French beans production require long crop rotations. The farmer must therefore find alternative use for this parcel of land for at least two years.

Table 11: French beans planting regime and production cycle on an acre of land

Plot #	Planting	Start Harvest	End Harvest	Crop Cycle (days)	End of Rotation
1	2/2/15	3/24/15	4/28/15	85	8/26/15
2	2/23/15	4/14/15	5/19/15	85	9/16/15
3	3/16/15	5/5/15	6/9/15	85	10/7/15
4	4/6/15	5/26/15	6/30/15	85	10/28/15
5	4/27/15	6/16/15	7/21/15	85	11/18/15
6	5/18/15	7/7/15	8/11/15	85	12/9/15
7	6/8/15	7/28/15	9/1/15	85	12/30/15

CYCLE 2 {44 days after last planting in Cycle 1}					
1	8/26/15	10/15/15	11/19/15	85	3/18/16
2	9/16/15	11/5/15	12/10/15	85	4/8/16
3	10/7/15	11/26/15	12/31/15	85	4/29/16
4	10/28/15	12/17/15	1/21/16	85	5/20/16
5	11/18/15	1/7/16	2/11/16	85	6/10/16
6	12/9/15	1/28/16	3/3/16	85	7/1/16
7	12/30/15	2/18/16	3/24/16	85	7/22/16

Source: USAID-KAVES calculations

Our calculations show it is impractical for a farmer with only an acre of land to produce French beans continuously; due to crop rotation requirements, she would be producing only one full cycle every three years. For effective intervention in French beans, USAID-KAVES must redefine the concept of a smallholder farmer – the minimum size of land necessary to be considered ‘small-scale’ farmer. For continuous production using an acre per year, at least 2 more acres are required to cover the crop rotation period. If we follow the strict rotation regime of only one planting per plot, the average smallholder farmer would need at least 5 acres of land. The sequencing is illustrated in Table 12.

Table 12: Crop rotation schedule for two cycles per year on an acre of land

Parcel Number	Year 1	Year 2	Year 3	Year 4
1	Production	Rotation	Rotation	Production
2	Rotation	Production	Rotation	Rotation
3	Rotation	Rotation	Production	Rotation

Source: USAID-KAVES estimates

The French bean farmer following the above regime would need to raise own capital for the first three plantings. With good returns, subsequent plantings could be funded by proceeds from bean harvests. To evaluate the economic effect of French beans production system, we use data from Migori and Homa Bay farmers. We perform gross margins analysis to illustrate the benefit to farmers and an employment and income multiplier analysis to demonstrate the potential benefits to local economies. The data is drawn from quarterly reports from USAID-KAVES French beans Implementing Partners for the 2014 production season. The results of gross (and net) margins analysis for the mean and median farmer are contained in Table 13.

Table 13 shows the median French beans farmer in Homa Bay and Migori invested about KSh48000 on an acre, obtained 1967 kg of beans, and earned KSh98333. At a recovery rate of 75 percent, the farmer earned KSh25534 in net sales. Due to lower recovery rate, the net margin for the median farmer is about 50 percent lower than it would be at higher rates of recovery. The net returns are much lower in Homa Bay (lowest yields and recovery rates) than Migori (much higher yields and recovery rates).¹² If French beans production is the only enterprise, the median farmer in this general region therefore requires about 2.3 acres to be economically viable; this does not account for earnings from rotation crops/enterprises. The Table presents scenarios for net margins at different cost, price, and recovery levels. The net margins range from KSh20734 to KSh47594.

¹² The Migori sample is however too small to lend credence to these observed differences.

Parameters	Homa Bay & Migori (N=51)		Homa Bay (N=46)			Migori (N=5)		
	Average	Median	Average	Median	(Min, Max)	Average	Median	(Min, Max)
Cost/Acre	57,945	48,000	57,156	45,800	(37200, 117100)	63,784	64,650	(56750, 69000)
Yield/Acre	2,288	1,967	2,073	1,836	(1067, 4867)	4,270	4,440	(3456, 4867)
Recovery Rate	74%	75%	72%	68%	(64%, 93%)	84%	85%	(76%, 93%)
Price/Kg	48	50	49	50	(40, 50)	40	40	40
Total Revenue	109,480	98,333	100,941	91,804		170,806	177,600	
Gross Margin	51,535	50,333	43,785	46,004		107,023	112,950	
Net Sales Margin	23,128	25,534	15,660	16,751		80,374	86,056	
Viable Size	2.2	2.3	2.6	2.5		1.1	1.0	
Sensitivity Analysis - Net Margins								
10% Higher Cost	17,334	20,734	9,944	12,171		73,996	79,591	
10% Higher Price	31,236	32,887	22,942	23,006		94,790	101,127	
20% Higher Price	39,343	40,241	30,223	29,261		109,205	116,198	
10% Higher Yield	31,236	32,887	22,942	23,006		94,790	101,127	
20% Higher Yield	39,343	40,241	30,223	29,261		109,205	116,198	
30% Higher Yield	47,450	47,594	37,505	35,516		123,621	131,268	
10% Higher Recovery Rate	31,236	32,887	22,942	23,006		94,790	101,127	
20% Higher Recovery Rate	39,343	40,241	30,223	29,261				

Source: USAID-KAVES calculations

Labor employment: the average earnings by farmers from French beans are only modest. Since it takes about 8 months to plant an acre, the earnings are relatively low for a year's worth of investment and work. It is however misleading to evaluate the economic viability of French beans production exclusively from the smallholder farmers perspective. By its nature, French bean system brings other benefits to the local economies. The multiplier effect includes labor employment and income, farmers' revenues, earnings by service providers, and business for agrodealers. For example, each acre of French beans employs about 170 man-days of labor, earning them approximately KSh40000, and can generate up to KSh32000 in business for agrodealers in the form of seed, fertilizers and agrochemicals.

We apply the basic macroeconomic multiplier formula, where each Shilling earned multiplies in value as it moves from one owner to the next in series of financial transactions. It is the amount of income divided by the savings rate (the marginal propensity to save). The following assumptions apply for Kenya:

1. Marginal Propensity to Consume (MPC) – the proportion consumed for every shilling earned, is 95% (0.95). The average Kenyan consumes 95% of her income.
2. Marginal Propensity to Save (MPS) = 1-MPC
3. Multiplier = $1 \div (1 - MPC) = 20$

The economic value of French beans to local economies is summarized in Table 14. We do not include investments in infrastructure, irrigation services, and other amenities. The results show an acre of French beans can generate approximately KSh2.48 million in economic value to the local economy. Rural economies in Taita Taveta, for example, could have generated up to KSh818 million from the 330 acres of French beans planted in 2013. For rural economies with narrow economic bases, this is a significant economic benefit. If the substantial infrastructure investments required for efficient operations are included, the total economic value could rise significantly. Importantly, with markets that are external to the local economy, French beans can form a powerful economic base for the production areas.

Table 14: Economic multiplier effect from an acre of French beans

Activity	Earnings (KSh)	Multiplier	Total value (KSh)
Labor employment*	42,000	20	840,000
Business creation**	32,000	20	640,000
Farming*	50,000	20	1,000,000
Total value	124,000		2,480,000

Notes: * Assumes all labor is hired (and land preparation is manual). ** Assumes all inputs are bought from local agrodealers. *** Assumes gross margins of the median farmer at the highest recovery rates.

Source: USAID-KAVES calculations

Whereas the benefits to individual smallholder farmers are only modest, French beans as an economic system presents rural economies with significant opportunities to generate economic value and development. Interventions in the subsector should therefore look beyond the smallholder farm household and focus on the broader rural economies.

4.4 EXPORTERS MARGINS

Exporting French beans incurs various costs, from farm management and supervision, to transportation, pack housing, packaging, labor, and statutory levies. In this section, the value of the various cost items are estimated to arrive at a rough number for export trader gross margins. A majority of Kenya's exporting companies runs their own fleet of transport vehicles to enable flexibility and smoother logistics. Others use their own transport to ferry produce to their pack-houses and then out-source the transportation of packed produce to haulage companies. Due to poor quality infrastructure, road transportation from the main production areas to the closest airport remains less

efficient. Exporting firms also complain of numerous police roadblocks and security checks that delay deliveries unduly and extract informal corrupt payments. The in-house transportation arrangement however makes transportation a small factor in fresh beans exports. We estimate the cost of transport constitutes no more than 6 percent of the total cost of exporting a kilo of beans.

A breakdown of the operational budget per kg of beans for an average exporter is contained in Table 15. It shows that from the farm gate price of beans, exporters add another KSh237.50 (\$2.70) for an FOB price of \$3.33 per kg, which translates to 452 percent above the producer value. It costs an additional \$0.52 to get a kg of beans ready for export. The exporter cost per kg of beans totals to \$1.12, with the purchase price (54 percent), packaging (15 percent), labor (8 percent), and statutory export levies (7 percent) constituting the largest proportions. Other significant cost is postharvest losses amounting to approximately 6 percent of the total value of beans procured. A majority of exporters sell on FOB basis, and therefore does not incur freight and insurance charges, which are borne by importers. The average exporter thus earned gross margins of \$2.21, equivalent to 66 percent. For every dollar invested in exporting French beans, the exporter earned \$1.97. Since exporters have the advantage of volumes, this gross margin rate generates lucrative payoffs.

Table 15: Exporters Gross Margins, per kg, 2013

Item	Median (KSh)	Median (US\$)	Share
<i>Cost per kg:</i>			
Purchase price	52.50	0.60	54%
Transport	5.87	0.07	6%
Packaging	14.67	0.17	15%
Statutory export levies	6.85	0.08	7%
Labor	7.82	0.09	8%
Electricity	1.56	0.02	2%
Postharvest losses	5.87	0.07	6%
Discount to importers	2.93	0.03	3%
Total cost	98	1.12	100%
<i>Revenue per kg:</i>			
F.O.B. sales price (revenue)	290	3.33	
Gross margin	192	2.21	
Net return		1.97	
<i>Exporter earnings per year:</i>			
Sales volume (MT)	273.12		
Total cost of sales (millions)	26.71	0.314	
Total revenue (millions)	79.20	0.932	
Exporter GM (millions)	52.49	0.618	

Source: USAID-KAVES estimates from USAID-KHCP Exporter Surveys 2013 & various secondary sources

4.5 MARGINS FOR EU IMPORTERS

The most challenging exercise in the analysis of French beans value chain is computing EU importer margins. We do not have access to any documentation of the cost structure in the export markets and also encounter lack of information on the market share of distributors and retailers. Our assumption is that the observed retail price of beans in the EU market includes marketing and distribution cost, including airfreight from Kenya to Europe, cost of repackaging the beans to smaller units, inland ground transportation, conformity checks at entry points, and handling/marketing taxes and levies. However, the additional processing, preserving, and packaging costs are insignificant. Only marketing and distribution costs are significant.

The cost and availability of airfreight cargo space for export crops is a major determinant of Kenya's competitiveness. Quantity and price are the key factors but obtaining quantitative data on these is difficult. Airfreight pricing varies with volumes, as well as agents and carriers being used. Larger exporters (importers) negotiate Blocked Space Agreements (BSA), whose rates are cheaper and space guaranteed. If space is not fully utilized BSAs lead to dead freight charges imposed on the exporter by the agent. Low season runs from May to September and attracts lower rates due to lower volumes. Exporters in the KHCP surveys reported rates of \$1.50-2.00 per kilo in 2012. In addition to the freight charges, other mandatory fees are charged per consignment including airline pricing, agent documentation and transport costs, phytosanitary fees and local taxes.

This report estimates the CIF (Cost, Insurance, and Freight) price per kilo of beans at \$5.13, which constitutes 77 percent of the import price (Table 16). The additional marketing cost total to about \$0.77 per kg. In addition to the FOB (Free on Board) price, the importer incurs another \$3.32 per kg to get the fresh beans onto the supermarket/retail shelves. The landed price for a kilo of beans imports at the EU retail store is therefore \$6.65.

Table 16: Gross Margins for French Beans Importers, per kg, 2013

Item	Value (KSh)	Value (US\$)	Share
Cost:			
FOB price	290	3.33	50%
Freight	157	1.80	27%
c.i.f. price	447	5.13	
Marketing	67	0.77	12%
Inland Transport	6	0.07	1%
Handling/marketing taxes and levies	1	0.01	0.1%
Conformity checks	36	0.41	6%
Other costs	22	0.26	4%
Total import cost	132	1.52	
Landed import price	578	6.65	100%
Revenue:			
Average UK retail price	997	11.46	
Gross margin	418	4.81	42%
Net return		0.72	
Lower retail price	599	6.89	
GM at lower price	21	0.24	4%
Median retail price	784	9.01	
GM at median retail price	205	2.36	26%
Highest retail price	1161	13.35	
GM at highest retail price	583	6.70	50%

Source: USAID-KAVES estimates from various secondary sources

To estimate importer margins, retail prices are required. Due to unavailability of data, our preferred source is the Internet retail price quotes at *my Supermarket* for UK retail stores. Since the UK market takes 60 percent of Kenya's fresh beans, its retail prices should closely approximate the rest of EU market. On February 15, 2014, *my Supermarket* quoted the price per kg of fine beans at US\$10.61-\$15.02 at Tesco, \$6.89-\$13.35 at ASDA, and \$9.53-\$13.35 at Sainsbury's.¹³

Taking the average, the retail price for a kilo of fine beans comes to \$11.46. The EU importer earns \$4.81 for each kilo of French beans sold at the retail stores, for a gross margin of 42 percent. Due to

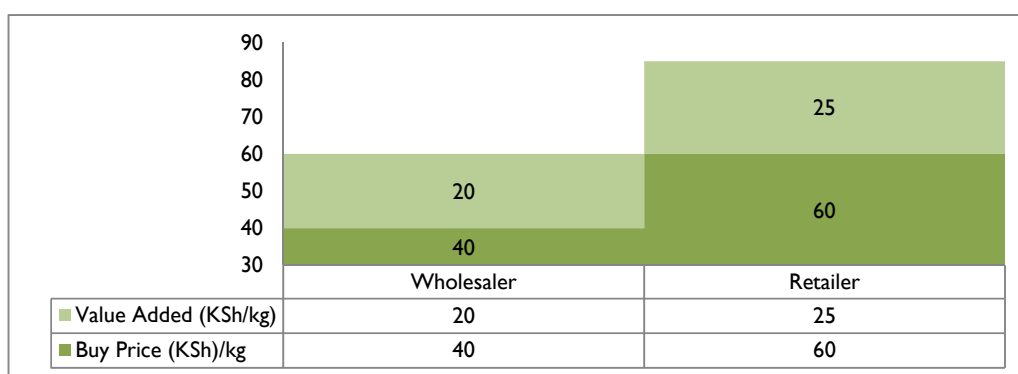
¹³"Beans Price Comparison in Tesco at." *mySupermarket*. Accessed February 15, 2014. http://www.mysupermarket.co.uk/grocery-categories/beans_in_tesco.html.

price variations, this margin ranges from \$0.24 (4 percent) at the lowest retail price to \$6.70 (50 percent) at the highest retail price. **Each dollar invested by EU importers therefore returns 72 cents.**

4.6 DOMESTIC MARKET TRADERS MARGINS

Most French beans sold in the domestic market originate from rejected produce by exporters. Direct purchase from farmers is therefore minimal. Exporters normally sell bean “rejects” at prices much lower than what it cost them to procure (Pers. Comm. with one of the KAVES LIPs, February/March 2014). Focus group discussions conducted for USAID-KAVES in 2013 found the value added in the local French beans wholesale and retail markets almost equal, with wholesalers and retailers increasing the value of produce by approximately 50 percent and 42 percent, respectively (Fig. 8). Among the counties surveyed, traders in Bungoma and Nairobi counties reported higher value added, 50 percent, largely attributed to lower transportation and other marketing costs incurred when delivering to buyers. Specifically, the counties have traders with higher capacity to purchase larger volumes destined for urban retail outlets in Nairobi, Bungoma, and Kisumu. These markets also have lower brokerage fees, as traders prefer sourcing directly from the farm gate. Kisumu market generated lower value added, about 16 percent, because of higher transportation costs, since most areas of production are distant from it.

Figure 8: Value Accumulation in the Domestic French Beans Market



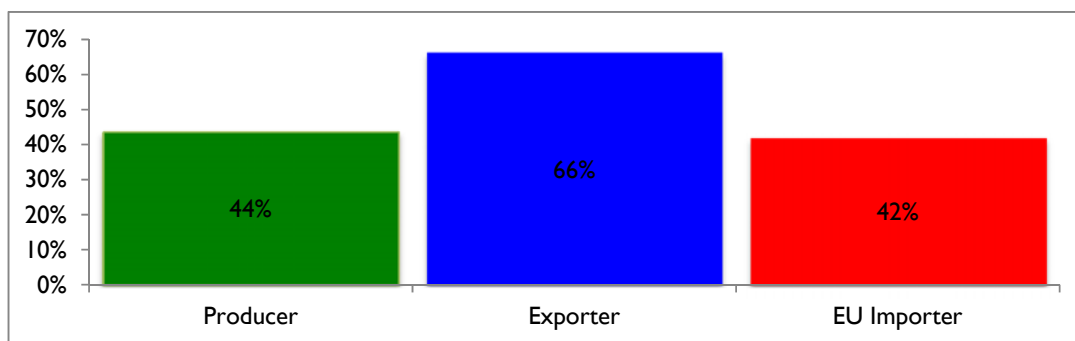
Source: USAID Kenya Agricultural Value Chain Enterprises (KAVES), 2013

Despite higher prices paid at the retail market, traders reported difficulties in supplying French beans because of the rain-fed nature of production leading to price volatility. Unlike the export market structure, there are no functional partnership arrangements between farmers and domestic buyers. Moreover, new contract farming arrangements by exporters preclude direct sales to domestic market players. There is an opportunity to cultivate and develop the domestic French beans market to provide an alternative outlet to farmers who might not meet the stringent export requirements. This will require innovative contract designs that provide farmers with more choices without disadvantaging exporters through side selling. The main challenge is to ensure beans entering the domestic market are not diverted back onto the export market chain.

4.7 SUMMARY OF FINDINGS

From the above analysis, the French bean value chain presents mixed fortunes for actors along the chain. It is generally profitable for all the players, but relative returns vary at each step of the chain. At current costs and prices, the EU importer and French bean producers earn the lowest margins at 42 and 44 percent, respectively, while exporters earn the highest at 66 percent (Figure 9). In absolute terms, the efficient producer earns \$1.34 for every dollar invested, while exporters and importers respectively earn \$1.97 and \$0.72.

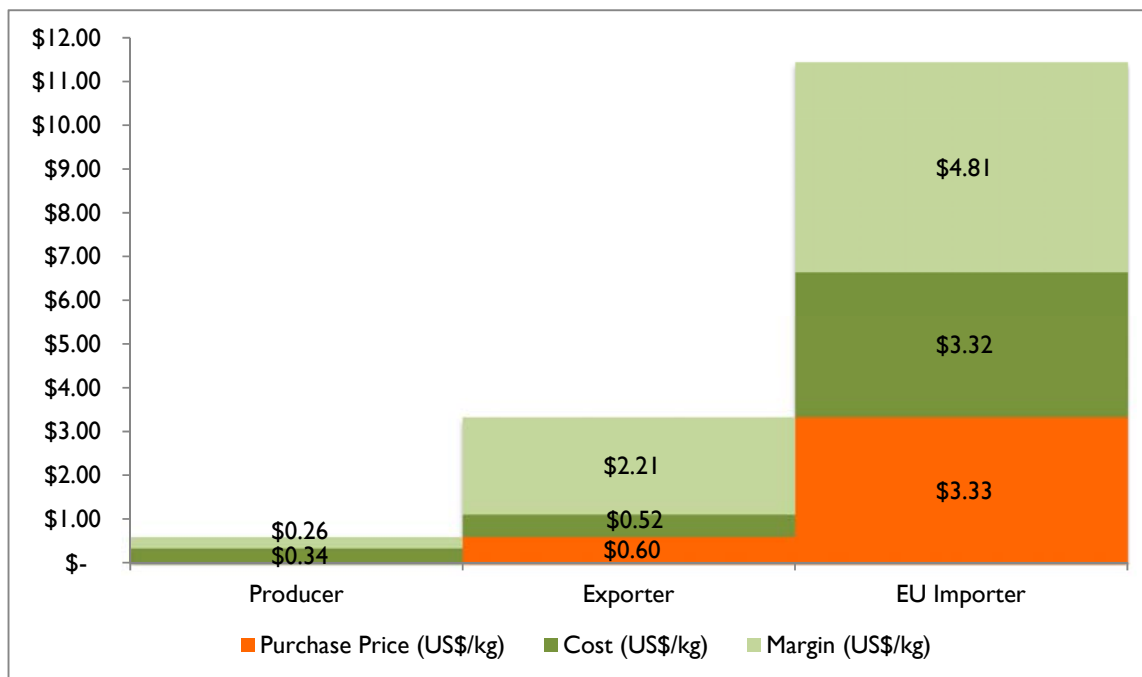
Figure 9: Gross Margins (percent) among the Major French Bean Value Chain Actors



Source: USAID-KAVES Estimates from Baseline Survey, 2013 and Markets RRA, 2014

In terms of volumes, Figure 10 shows foreign importers earned the highest gross margins along the value chain; they got \$4.81 for each kilo of French beans, compared to \$2.21 for exporters and \$0.26 for farmers. The nearly 40,000 MT kg of fine beans exported in 2013 therefore generated \$10.4 million for producers, approximately \$88.4 million for exporters, and about \$192 million for importers. Since some of the exporters also double up as large-scale French bean producers, the total proceeds accruing to small-scale farmers could be much smaller.

Figure 10: French Beans Value and Margins



Source: USAID-KAVES estimates

From the margins analysis results, Table 17 summarizes the earnings of each value chain actor over the crop cycle. It is clear the French beans value chain benefits exporters and importers more than farmers because of the volumes they handle. Farm households earn an equivalent of US\$ 126 per month, which translates to about \$25 per person per month (\$0.84 per person per day). Therefore, proposed interventions must focus on attaining higher productivity, higher recovery rates, and better prices for producers.

Table 17: Estimated Earnings from French Beans Enterprises

Actors	Margin (KSh per kg)	Volumes	Months of operation	Total income	Income per month
Farmer	28.64	3,441 kg (acre)	9	KSh98550 (\$1,133)	\$126
Exporter	192	273 MT	12	KSh52.5 million (\$603,737)	\$50,311
EU Importer	418	273 MT	12	KSh114.1 million (\$1.31 million)	\$109,305

Source: USAID-KAVES estimates

The potential to increase productivity is pegged on the adoption of integrated soil fertility management, use of integrated pest management, proper post-harvest management, and the adoption of GAPs. The key areas to intervene to improve farmer returns include the reduction of costs of seed and labor, significant increases in productivity, reduction of postharvest losses, and assisting farmers negotiate better production contracts. Efforts should be made to support improvements of production and storage technologies, especially cold storage facilities near collection centers to preserve produce freshness and reduce losses.

5 BUSINESS ENABLING ENVIRONMENT

5.1 SUPPORTING ORGANIZATIONS AND INSTITUTIONAL ACTORS

Kenya has several ministries handling agriculture-related issues, including departments in these ministries for Agriculture, Livestock, Lands, Environment and Mineral Resources, and Devolution and National Planning, among others. The Agricultural Sector Coordination Unit (ASCU) and the National Stakeholder Forum play a crucial inter-ministerial role in formulating agricultural policies in consultation with various stakeholders. The Ministry of Agriculture provides extension services and leadership in formulating policy, legal and regulatory framework. It also generates market information through the market information branch in the agribusiness department, which is then disseminated through the Agricultural Information Resource Center (AIRC).

5.1.1 Implementing Institutions

Government intervention in the Kenyan horticulture sub-sector has been minimal, mainly facilitating sectoral growth through infrastructure development, incentives and support services (HCD strategic plan 2009-2013) and letting the private sector steer the industry. The result has been unprecedented growth in the sector. Providers of finance, accounting and business development skills, insurance, quality testing/certification, and research and extension play a critical role in the development of the French beans value chain. Linkages to these providers and the capacity to engage with them is lacking for most of the smallholders in USAID-KAVES target counties.

Horticultural Crops Development Authority (HCD)¹⁴ is a Parastatal (State Corporation) established under the Agricultural Act Cap 318 and Legal Notice No. 229 of 1967. HCD regulates the French bean industry through licensing of exporters, registration of marketing agents, and issuing of export certificate. In addition, the Authority is mandated to enforce contracting farming for export crops and provide market information. Inadequate staffing numbers has hampered the ability of HCD to effectively fulfil its mandate.

Kenya Plant Health Inspectorate Services (KEPHIS) was established through the Legal Notice No. 305 of 18th October 1996 pursuant to the State Corporations Act Cap 446 to undertake quality control services of agricultural inputs, plant variety protection and plant health. KEPHIS regulates seed quality and inspect produce quality conformity of French bean destined for export market. In addition, KEPHIS is mandated to undertake pesticides monitoring. Inadequate staffing numbers has hampered the ability of KEPHIS to effectively fulfil its mandate.

Pest Control Products Board (PCPB) was established in 1985 under the Pest Control Products Act (Cap 346). Its functions are to regulate the importation, exportation, manufacturing, distribution and usage of pesticides. Broadly, the Board derives its strength from internal resources and capabilities that enable it to accomplish its mandate and achieve the strategic objectives.

Horticulture Competent Authority Coordinating Committee: The Ministry of Agriculture established the Horticulture Competent Authority Coordinating Committee in November 2011.¹⁵ The Committee is a mechanism for streamlining enforcement of sanitary and phytosanitary measures that were adversely affecting the horticulture industry, especially the concerns with rejection of Kenyan produce in the international market. The committee meets on an as needed basis and as frequently as

¹⁴Further information on the HCD, KEPHIS and PCPB can be found in the USAID-KAVES Potato Value Chain Study (2014).

¹⁵ The committee comprises KEPHIS (to serve as the central notification point and chair of the technical committee in addition to core competence on all matters phytosanitary and residue testing); PCPB (responsible for testing, registration and regulation of plant protection products); HCD (to undertake registration and development of the horticulture sub-sector); KALRO (to undertake all research issues in horticulture); FPEAK (dealing with fruits and vegetable exports); and KFC (dealing with export of flowers).

once a month when tackling urgent issues. The Committee was recently audited by FVO, which assessed, among other things: the structure of the Committee and roles of the constituent institutions; nature of training horticulture producers receive and whether some of them still use prohibited chemicals (such as dimethoate); the capacity of the KEPHIS labs to detect residues at prescribed levels; mechanisms for institutionalizing traceability in the industry; and, whether or not the proposed reforms under AFFA will compromise the functions of the Committee. The final audit report has not been released but discussions with KALRO indicate that the Committee is moving in the right direction.

National Food Safety Coordination Committee (NFSCC) is a multi-sectoral committee initiated by various government agencies/institutions. It is responsible for coordinating all food safety activities in the country.¹⁶ It was established in response to stiffer penalties/regulations on food specifications and codes set by importing countries such as the European Union (e.g. EuroGap and EU directive 91/493/EEC). It seeks to increase awareness about the impact of food safety and quality, and to initiate the revision and harmonization of all the relevant Acts of Parliament. It is aimed at ensuring that food produced, distributed, marketed and consumed meets the standards of food safety.

6.1.2 Private Sector Associations

Fresh Produce Exporters of Kenya (FPEAK) was established in 1975 as a limited company. The association is a recognized partner in all the leading agricultural legislation consultation, certification and research bodies, and development partners in Kenya. This makes it possible to influence innovation and policy to the benefit of its members and the industry at large. It has a mission “to develop, unite and promote the Kenyan horticultural industry in the global market with due regard to safety, good agricultural practices, social, ethical and environmental responsibilities” (FPEAK, 2014). Its strategic goals are to: update and implement Kenya Gap to recognized international standards; influence enactment of a facilitative environment for the horticulture industry; create awareness in the horticulture industry on market requirements, changes and regulations; and, undertake continuous identification of market opportunities. Other activities include: provision of timely information on technical issues, trade, official regulations, and market requirements; undertaking trade enquiries from overseas buyers; conducting training programs in conjunction with specialized trainers; undertaking pre-certification appraisals; supporting small scale farmers through training programs targeted at good agricultural practices; market development through coordinating the participation in trade events of its members; and, undertaking advocacy and lobbying through continuous monitoring of domestic and international policy.

Horticulture Council of Africa (HCA) is a network established by major horticulture exporting countries in the Eastern, Central and Southern Africa (ECSA) region.¹⁷ HCA aims to bring greater bargaining power to address common challenges and constraints, such as competition and compliance with safety and standards that these countries face, especially in the European markets. It is also active in organizing sharing of information and technical skills, as well as providing a common platform for negotiations on economic partnership agreements (EPAs) and at the WTO.

The HCA aims at complementing rather than competing with national horticulture associations, such as FPEAK and KFC in Kenya, Rwanda Flower Producers and Exporters Federation, Horticultural Exporters Association of Uganda, and Horticultural Promotion Organization of Uganda (HPOU). This,

¹⁶The Members are the Department of Veterinary Services, Department of Livestock Production, Department of Fisheries, Kenya Bureau of Standards, Kenya Plant Health Inspectorate Services (KEPHIS), National Public Health Laboratory Services (NPHLS), Government Chemist, Kenya Medical Research Institute (KEMRI), University of Nairobi, Tea Board of Kenya, Coffee Board of Kenya, Kenya Agricultural Research Institute (KALRO), Kenya Dairy Board, Pest Control Products Board, Ministry of Local Government, and the National Biosafety Authority (NBA). Co-opted members include World Health Organization (WHO), Food and Agricultural Organization of the United Nations (FAO), and UNIDO.

¹⁷ Member countries include Kenya, Uganda, Zambia, Tanzania, Zimbabwe, South Africa, Burundi, Rwanda, and Ethiopia.

however, is easier said than done as in practice, the member countries must compete in the emerging regional markets. The fact that Kenya, for example, is concerned about increasing horticulture imports from neighboring countries like Tanzania and Uganda, means that HCA would have to play more proactive and regulatory roles for which it is ill suited, especially considering its limited human capacity.

Other key industry players that have synergies with the horticulture value chains and/or promote horticultural products commercialization, marketing and technology support include The Kenya National Chamber of Commerce and Industry; The Kenya Association of Manufacturers (KAM); and, East African Business Council (EABC)

5.1.2 Research, Extension, and Information Institutions

Kenya has several public and donor-funded national and multinational research programs, including:

- *Kenya Agriculture Research Institute (KALRO) – Thika.* Responsible for horticulture research and development
- *Local universities, especially Egerton University, the University of Nairobi, and JKUAT* – research on breeding and crop protection, agronomic practices, socioeconomic studies, and training in farm management.
- *Private agribusiness companies, including regional centers for multinationals.*

Kenya boasts an educated, competent and productive workforce that has been easy to train on specific skills needed from production to marketing of export horticulture produce. Education has also helped the smallholder farmer to understand and manage farm operations in more efficient and competitive ways. While there is no shortage of resources available for research, technology transfer to smallholders has been slow particularly in the customization, promotion, and adoption of appropriate technologies for different ecological conditions. The linkages between research, extension and farmers are generally weak. The government extension services are not targeted at French beans farmers. Private exporters and input suppliers provide most of, if not all, the extension and education services to farmers.

5.2 REGULATORY AND POLICY ENVIRONMENT

5.2.1 Legal and Regulatory Framework

The Agriculture, Fisheries and Food Authority (AFFA) Act of 2013 is intended to give effect to the 4th Schedule of the Constitution of Kenya (the distribution of functions between the national government and the county governments) and the creation of a central authority, AFFA, to consolidate all laws regulating and promoting agriculture. The functions of the Horticulture Crops Development Authority (HCD) will be discharged within AFFA; a proposal that has elicited major concerns among industry players. They are concerned that delinking the highly complementary functions of the HCD, the Pest Control Products Board (PCPB) and the Kenya Plant Health Inspectorate Services (KEPHIS) could lead to bureaucracies that would stifle horticulture development. The structures of these institutions will be determined by the nature of their functions: commercial functions are expected to be undertaken by a company registered under the Companies Act, while the non-commercial functions shall be performed by the Authority. The Act also provides for creation of Directorates within the Authority for each produce to undertake any specialized activities with respect to promotion and management of the commodity.

The Crops Act of 2013 has been enacted to consolidate and repeal various statutes in order to facilitate the growth and development of agricultural crops. The Act provides for the role of national and county governments in the development of crops. It also provides for incentives to farmers, guiding principles in the management and administration of agricultural land, registration requirements for scheduled crops, licensing and taxation provisions, among others. The Act eliminates outdated legislations.

Operationalizing the Act under a devolved system faces numerous challenges, chief among them being resistance over the restructuring of institutions and human capacity constraints.

5.2.2 Policy Regime

The policy regime in Kenya consists of support functions for the national government and the regulatory and facilitating functions of the new county governments. At the national level, policy reforms and interventions relevant to horticulture industry and French beans sector include the following: Agricultural Sector Development Strategy (ASDS), 2010-2020; National Agricultural Sector Extension Policy (NASEP), 2012, National Horticulture Policy, 2012; National Agricultural Research System Policy, 2012; National Agribusiness Strategy, 2012; and the National Seed Policy, 2011. A review of these policies is covered in more details in the USAID-KAVES Maize Value Chain report (2014).

In 2012, the National Horticulture Policy was established to promote the growth and competitiveness of the horticulture industry, including the French beans subsector. The policy documents captures some of the factors ailing the French beans industry including intentions to improve infrastructure, promote value addition, and increase exports. The policy document also highlights the need to support formation and capacity building of common interest groups to enhance market efficiency and provision of extension services.

5.2.3 Devolution of Agricultural Policies

Emerging county agriculture policies and regulations will significantly reshape Kenya's agricultural policy regime.¹⁸ The emergence of these devolved units will change the organization of local agricultural sectors, particularly in the areas of extension and education, inputs marketing policies, and production support strategies. County government policies/strategies, institutions, levies and taxes, priority value chains and facilitation of value chain actors must be understood within the broad legal framework established to support county governments.

Of specific importance will be production and marketing levies already being proposed across the country. There is a growing concern among traders and agricultural officers that the charges are higher than the margins generated from commodity sales. The following items will be particularly important for USAID-KAVES interventions in the French beans value chain: 1) Storage/rental fees and charges; 2) Transportation charges; 3) production and trade cess; 4) Roadblocks and weighbridges.

Concerns have also been raised about the potential influence of devolution on the horticulture industry with respect to County government policies/strategies, regulations, and institutions, and concurrence of county priorities and goals with those of the central government. A number of functions formerly in the domain of the Ministries or state corporations have now been devolved per the constitution. In practice, however, confusion reigns about the impact of some policy reforms (such as Agriculture, Fisheries and Food Authority - AFFA), and their implementation and coordination arrangements.¹⁹

¹⁸ Five Acts and Bills on devolution related to agriculture are pending before Parliament. They include: (a) Agriculture, Fisheries and Food Authority (AFFA) Act (No. 13 of 2013) that commenced on 25th January 2013; (b) Kenya Agricultural and Livestock Research Act (No 17 of 2013); (c) Pyrethrum Act (No. 22 of 2012); (d) Crops Act (No. 16 of 2013); and, (e) The Kenya Plant Health Inspectorate Service Bill, 2011. All these laws remain contentious and currently under review.

¹⁹ Information on the implementation and coordination arrangements under the devolution policy, based on rapid appraisal surveys, is included in the USAID-KAVES Maize Value Chain report (2014)

5.2.4 Grades and Standards²⁰

Global GAP: The majority of EU food retailers require Global GAP certification, a private voluntary standards (PVS) system for the certification of agricultural products around the globe. The Global GAP standard addresses retailer and consumer concerns over environmental impact, food safety, and worker welfare. The United Kingdom's top supermarket chains, including Tesco, Morrisons, Sainsbury's and ASDA, for example, all require Global GAP certification. Typically, a farm must pass a QMS (Quality Management System) audit, field inspections and follow-up inspections in order to receive and maintain certification. Irrespective of Global GAP, UK retailers may also demand that fresh bean imports meet the requirements of the British Retail Consortium (BRC) standards. Another voluntary trade standard is the Ethical Trading Initiative (ETI)

Maximum Residue Limits (MRLs): The future of the French beans industry in Kenya remains uncertain following new EU regulations on testing for MRLs. Exports to EU declined by 18 percent in the first quarter of 2013, compared to the same period in 2012, following the amendment of EU regulation 669/2009 subjecting Kenyan fresh pod beans and peas to 10 percent increase on physical checks at designated ports of entry. This was necessitated by persistent failures to comply with MRL requirements and the inability for Kenya to demonstrate systems and mechanism to monitor and effect pesticide compliance in the supply chain. Under Article 81 of the EAC Treaty, the Partner States recognized the importance of standardization, quality assurance, metrology and testing for the promotion of trade and investment and consumer protection. The EAC partner states enacted the East African Standardization, Quality Assurance, Metrology and Test Act 2006 (EAC SQMT Act 2006) to harmonize requirements on quality of products and services and reduce trade barriers. The SQMT Act regulates trade in products produced or originating in a third country to facilitate industrial development and trade as well as promote health and safety and environmental protection.

5.2.5 Price Control and Taxation

Kenyan export horticulture companies are concerned about multiple taxes and levies imposed on the sector. To fund the heavy cost of devolution, National and County Governments are targeting horticulture for additional revenue through a wide range of taxes, levies, cess, and fees. The Fresh Produce and Exporters Association of Kenya (FPEAK) developed a list of the taxes and levies that apply to the horticultural sector in Kenya. With the emergence of devolved Governments, there is a danger unchecked taxation could impact negatively on Kenya's competitive advantage. Of greatest significance however is the new Value Added Tax (VAT) Act.

Under the Act, the supply or importation of fresh/frozen vegetables, seed, and agricultural services are classified as exempt from tax. Reclassifying agricultural services and inputs as exempt makes them more expensive overall. Maina (2013) analyzes the differences between exempt and zero-rated status, and concludes that the difference in the price of exempted supplies are no different from those charged 16 percent VAT. This is a result of the fact that businesses supplying exempted goods/services have no mechanism to claim back input VAT, which then must be converted into a cost, while those under the 16 percent VAT category do.

The single most important threat to the French beans value chain is increased cost of other services, such as packaging, power supply, and transportation and distribution, which are not exempt from VAT. The 16 percent VAT on distribution will increase the cost of production inputs, transportation costs, and ultimately unit prices of landed fresh beans. The fresh beans industry is heavily dependent on

²⁰The Commonwealth Secretariat's "Guidelines for Exporters of Fruit and Vegetables to the European Markets" provides quality specifications for fresh beans. Fine beans are 6.5-9mm in diameter and 10-13 cm long. Extra-fine beans are 6 to 7.5mm in diameter and 8-12 cm long. Bobby beans are 8-12mm in diameter and 12-16cm long. The beans should be stringless, with no dehydration evident, appearing fresh, bright and uniform in size. The color ranges from light to dark green depending on variety, with straight pods, free from scarring, rots, bruises and blemishes.

transportation and distribution services, which will most likely suffer higher costs of operation and shift the burden to producers by depressing prices. Since the cost of packaging and transport currently constitutes about 20 percent of the total cost of landing fresh beans at exit ports, marketing costs are bound to rise.

5.2.6 Trade Policy

According to TARIC, the EU's online customs tariff database, all Kenyan exports are eligible for tariff preferences under Economic Partnership Agreements (EPAs) initiated in 2007. As a member of the East African Community, Kenyan beans have a 0 percent tariff preference. In the event that EPA negotiations fail, the EU will impose a 8.5 percent tax on imports from Kenya from October 2014. Kenya will most likely transfer to the GSP regime under the WTO, which offers relatively favorable trade terms for developing countries.

Tariff Reduction: The East African Community Customs Union (EAC/CU) was officially launched in July 2009 to increase competition, expand markets, ease cross border trade through harmonization of national trade policies, and enhance trade by removal of tariff and non-tariff barriers (NTBs). Imports from the East African Community (EAC) are free of duty and subject only to regulatory fees and levies according to the respective trade protocols. The impact of the EAC/CU on trade in horticulture and French beans may be negligible because regional trade in most agricultural products was already zero-rated under EAC and COMESA protocols.

The following regulations govern regional cross border trade (MOA, 2012):

- *Import duty:* goods from EAC member states are exempted from import duties. However, non-EAC produce is charged common external tariffs (CET) at 0 percent for capital and raw materials; 10 percent for intermediate goods; and 25 percent for finished products.
- *Import Declaration Form (IDF):* is pegged at 2.75 percent of the value of all imported products.
- *Certificate of Origin* to show the commodity is from the EAC to qualify for tax exemption.
- *Certificate of Conformity (CoC):* applicable for commodities from outside the EAC.
- *Export permit issued by HCD after inspection:* KSh2 per kg of commodity being exported.
- *Import Permit and Phytosanitary Certificate* issued by KEPHIS after inspection of commodity and verification of inspection documents from country of origin. This certificate costs KSh1000.
- *Packing list* to identify the commodity and actual quantity being imported or exported.
- *Plant import permit* for plant products costs KSh600 per consignment.

Technical Barriers to Trade (TBT): With the steady elimination of tariffs, technical requirements are increasingly becoming the biggest impediment to trade in agricultural products. This includes sanitary and phytosanitary measures (SPS) and standards. To address these emerging concerns, under Article 81 of the EAC Treaty, the Partner States recognized the importance of standardization, quality assurance, metrology and testing for the promotion of trade and investment and consumer protection. The EAC partner states enacted the East African Standardization, Quality Assurance, Metrology and Test Act 2006 (EAC SQMT Act 2006) to harmonize requirements on quality of products and services and reduce trade barriers. The SQMT Act regulates trade in products produced or originating in a third country to facilitate industrial development and trade as well as promote health and safety and environmental protection.

Non-Tariff Barriers (NTBs): However, despite numerous efforts by the EAC and COMESA to free regional trade, non-tariff barriers (NTBs) and other administrative charges continue to hinder formal trade among the member countries. Whereas the above constitute mandatory transparent trade facilitating measures, their administration often lead to costly delays, duplication of effort, lack of inclusiveness in their enforcement, low capacity in the mandated institutions, and lack of transparency and accountability that tends to promote corruption and partiality. The NTBs also comprise a wide range of trade policy practices applied by governments, whose main aim is usually to restrict trade flows in order to achieve specific objectives, such as the protection of infant industry, reduction in domestic supply of a staple foodstuff such as maize, or consumer protection. NTBs can arise from unofficial actions of public officials (due to inefficiency or corruption in administration of customs duties), from the state of technology (e.g. inability to innovate in terms of telecommunication and management and information systems), or simply due to poor roads and marketing infrastructure.

5.3 INFRASTRUCTURE

The infrastructure needed for French beans value addition includes energy, transport, irrigation water, storage facilities, communications, and physical cooling plants. By virtue of its high perishability, storage and transport infrastructure, including cooling (refrigeration), roads, and rail facilities, are major price and quality determinants in the fresh beans industry. Most smallholders are inadequately served by such facilities. There is need to lobby HCD and donors to construct such facilities in bean growing regions.

5.3.1 Transport Infrastructure

For its high perishability, French beans production and marketing is heavily dependent on transport infrastructure, from the distribution of bulky inputs to swiftly moving produce to markets. The condition of roads and the availability of transportation is a key determinant of the structure and performance of the French beans value chain, and are among the leading factors depressing producer prices. Poor roads, for example, hinder vehicle movement and thus lower accessibility, increase produce losses and transportation costs, lead to higher input and service prices, and thus lower producer returns. Exporters cannot access most rural farmers during wet periods, which significantly increases the risk of produce being lost and thus diminishes producer margins. Most major roads have been repaired; however rural access roads in production areas remain poor. Easy access to production areas will reduce transaction costs and open up sourcing from new areas.

5.3.2 Electricity

Kenya does not generate enough electricity to meet demand, neither is the distribution of the available electricity efficient. Most rural areas are hardly covered and, where available, frequent power shortages and outages is the norm. Electricity is generally too expensive for most rural households and businesses. Without adequate and reliable electric power, investment opportunities in French beans cooling and storage will remain unexploited. In addition, unreliable electricity supply makes the storage and preservation of fresh beans more expensive and risky to exporters. Reliability of electricity supply generally informs the location of packhouses to ensure constant power for chilling fresh beans.

5.3.3 Rural Market Facilities

Advanced storage (refrigerated) facilities are largely nonexistent in most areas, thus fresh beans must be transported to packhouses in Nairobi immediately to avoid losses through quality deterioration and spoilage. The effect of remoteness is felt most by producers and traders when produce loses value because of delays in transportation. Cold storage facilities are particularly critical for French beans system. Availability of cold storage depots for hire near production zones was facilitated by HCD through construction of cold stores in various regions bringing chill chain services closer to the

produce source.²¹ Scaling up the capacity of the cargo terminal at the JKIA as well as adequate and efficient cold storage systems on site have significantly helped export horticulture. The cold chain has grown to several handling facilities, with private sector taking the lead in infrastructure development. Cold storage areas at Nairobi's Jomo Kenyatta International Airport can be used at Sh0.061 per kg per hour (i.e. US\$0.65 per MT per hour) or Sh1.45 per kg per day (i.e. US\$15.48 per MT per day).²²

²¹ Although some of these depots have been converted to other uses. Machakos Country government is occupying one such facility

²² KHCP Market Survey 2011, available at http://www.fintrac.com/cpanelx_pu/kenya%20khcp/13_01_4494_Market%20Survey%20Green%20Bean%2004.pdf

6 UPGRADING INTERVENTIONS

Based on the information and analyses provided above, this section outlines interventions for the French beans sector that will increase on-farm productivity, streamline aggregation, and improve storage and postharvest systems. The interventions are organized into three strategic components supported by six major interventions that will achieve sixteen specific objectives. Interventions, activities and results have been selected that will contribute directly to the goals and objectives of KAVES, and are highly scalable through private sector partnerships, with varying levels of public sector support. The interventions all rely heavily on the mass adoption of new technologies, supported with specialist training and extension; new sources of investment and credit to unlock value chain constraints; and engagement of private sector partners for market development and sustainability.

Recommended intervention	Specific upgrading objectives	Challenges	Expected results
Strategic intervention I: Increase production for export			
1. Diversify production areas	1. Production increased in western, rift valley and lower eastern counties 2. Number of outgrowers and employees in the industry increased	<ul style="list-style-type: none"> • Inexperience of smallholders new to French bean production • Initial cost of setting up irrigation infrastructure • Initial low production volumes may restrain buyers/exporters 	<ul style="list-style-type: none"> • More farmers earning year-round income from export production • More consistent supply
2. Improve farmers access to extension services	3. Commercial clusters of smallholder export growers established 4. Greater collaboration between exporters, input supply companies and county extension services 5. Greater use of e-production and market information services	<ul style="list-style-type: none"> • Few trained extension workers available in target areas • High extension start-up cost for export companies 	<ul style="list-style-type: none"> • Increase in yields and productivity • Higher quality produce • Higher sales
3. Modernize smallholder production systems	6. Higher proportion of farmers using irrigation 7. More efficient use of low residue pesticides 8. Labor-saving technologies adopted	<ul style="list-style-type: none"> • Limited expertise of farmers • Relatively high cost of approved pesticides • Cost and availability of equipment 	<ul style="list-style-type: none"> • Increased yields • More production and income generated • Improved Gross Margins
Strategy II: Increase standards compliance and traceability of smallholders			
4. Raise level of compliance with statutory regulations and trade standards	9. More growers compliant with standards 10. National traceability system established	<ul style="list-style-type: none"> • Cost of certification • Weak regulatory systems • Competition for products between exporters 	<ul style="list-style-type: none"> • More competitive in export markets • Costs of export reduced

	11. Greater collaboration between export companies and government regulatory agencies.		<ul style="list-style-type: none"> • Greater returns to exporters and farmers
Strategy III: Reduce Postharvest losses			
5. Attract new investment in postharvest infrastructure handling	<p>12. More cool and cold storage facilities established in production areas</p> <p>13. More collection centres constructed for field grading</p>	<ul style="list-style-type: none"> • Cost of facilities and equipment • Distance of new production areas from the airport 	<ul style="list-style-type: none"> • Better quality produce • Higher net returns • More competitive industry
6. Improve smallholder aggregation and collection systems	<p>14. More smallholder groups operating commercially</p> <p>15. Logistics costs reduced</p> <p>16. Less wastage</p>	<ul style="list-style-type: none"> • Low levels of group and institutional business experience • Initial small volumes and quality/price fluctuations 	<ul style="list-style-type: none"> • Increased export volumes and prices • Reduced fluctuation of market supplies

ANNEX I: REFERENCES

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ANNEX II: LIST OF ACRONYMS

AAK	Agrochemicals Association of Kenya
ADC	Agriculture Development Cooperation
ADSP	Agribusiness Development Support Project
AFFA	Agriculture, Fisheries and Food Authority
AIRC	Agricultural Information Resource Center
ASAL	Arid and Semi-Arid Lands
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Kenya
ASCU	Agricultural Sector Coordination Unit
AU	African Union
CAGR	Compounded Annual Growth Rate
CH	Central Highlands
CIF	Cost Insurance and Freight
CL	Coastal Lowlands
COMESA	Common Market for Eastern and Southern Africa
DAP	Diammonium Phosphate
DSL	Dryland Seed Company Limited
EAC	East African Community
EAGA	East African Growers Agriculture
EASEED	East African Seed Company Limited
EL	Eastern Lowlands
FAK	Fertiliser Association of Kenya
FAO	Food and Agriculture Organization
FAQ	Fair Average Quality
FCI	Farm Concern International
FEWSNET	Famine Early Warning Systems Network
FPEAK	Fresh Produce Exporters Association of Kenya
FTF	Feed the Future
GCI	Global Competitiveness Index
ha	Hectare
HCD	Horticultural Crops Development Authority
HP	High Potential
HRI	High Rainfall I
ICBT	Informal Cross-Border Trade
IFPRI	International Food Policy Research Institute
IPM	Integrated Pest Management
IPDM	Integrated Pest and Disease Management
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KAINet	Kenya Agricultural Information Network

KALRO	Kenya Agricultural Research Institute
KEBS	Kenya Bureau of Standards
KEPHIS	Kenya Plant Health Inspectorate Services
kg	Kilogram
KHE	Kenya Horticultural Exporters
KPLC	Kenya Power and Lighting Company
KSC	Kenya Seed Company
KSh	Kenyan Shilling
KVC	KAVES Value Chain
LPI	Logistics Performance Index
MoA	Ministry of Agriculture
MRS	Marginal Rain Shadow
MT	Metric Ton
NAAIAP	National Accelerated Agriculture Input Access Programme
NGO	Non-governmental organizations
PCPB	Pest Control Products Board
PHL	Post Harvest Losses
PMG	Producer Marketing Group
ppb	Parts Per Billion
PSDA	Promotion of Private Sector Development in Agriculture
RRA	Rapid Rural Appraisal
SA2	Semi-Arid 2
SACCO	Savings and Credit Cooperative Society
SSA	Sub-Saharan Africa
STAK	Seed Trade Association of Kenya
TMT	Thousand Metric Tons
t/ha	Tons per hectare
USAID	United States Agency for International Development
USAID-KAVES	Kenya Agricultural Value Chain Enterprises
USAID-KHCP	Kenya Horticulture Competitiveness Project
VAT	Value Added Tax
WH	Western Highlands
WHSL	Wholesale
WL	Western Lowlands
WSC	Western Seed Company Ltd.
WT	Western Transitional

ANNEX III: LIST OF STAKEHOLDERS CONSULTED/INTERVIEWED

Expert Name	Title/Position	Institution
Mark Okado	Project Coordinator	Carolina Fresh Produce Ltd
Apollo Owuor	Managing Director	Kenya Horticultural Exporters
Jacob Otieno	MD	ADPP
Daniel	Agronomist	KHE
Buogi Mak Buogi	Leader	Buogi Mak Buogi
Maina	Medium-scale Farmer	Mwea
Nicholas Ambanya	Consultant	
CJ Kadera	Consultant	
Daniel Agawo	Consultant	

