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Annex 23

Market Study

For the GCF-FAO Project Transforming Livelihoods through Climate Resilient, Low Carbon, Sustainable Agricultural Value Chains in the Lake Region Economic Bloc, Kenya “”

Kenya, March 2023

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A. INTRODUCTION

The main objective of this study is to analyze the market for fruit, dairy, coffee, poultry, tea and African leafy vegetables and the financing system in Kenya to best address smallfarmer needs in the context of the transition towards climate-resilient and low-carbon practices in these value chains. The principle underlying this study was the need to ensure profitability and feasibility of proposed interventions to address climate change in order to maximize adoption and ensure long-term sustainability, replicability and scalability. Hence, the specific objectives of the study were to:

- Provide an overview of the key value chains for each target VC, current VC productivity, market demand and main actors, strengths and barriers small farmers face in producing and accessing markets.
- Conduct an assessment of financial institutions by describing the main financial entities and their services, barriers to accessing and extending credit.
- identify the support needed to provide buyers and farmers with enhanced market access.
- identify the support needed to provide farmers with enhanced financial access.

The results of the analysis has informed the definition of measures that will support smallholder farmers in LREB to increase their resilience to climate change and reduce their climate footprint in the 6 targeted value chains. The key results of the assessment are as follows:

Access to market

The study notes that demand in the commodities produced in the 6 value chains is solid, and exhibiting increasing trends locally, regionally, nationally and internationally. The study has identified that the key barriers related to access to market are related to poor quantity and quality of products due to poor and non resilient production techniques/technologies, losses, wastes and inadequate handling, and inadequate production and processing infrastructure and equipment at farm and agribusiness levels). This results in difficulties in selling and negotiating appropriate prices, and exacerbates the risks faced by individual farmers and their organizations.

Access to finance

Access to finance is a pillar for agricultural production in Kenya. Financial institutions are reluctant to offer agricultural credits in the current context because of the perceived high risk of failure as a result of climate change and variability impacts. The weak organization of producers and the lack of financial education and technical support to farmers to develop business and financial plans, and the difficulties faced by farmers to meet eligibility criteria also creates barriers to accessing finance. The difficulties for producers to access credit are mainly related to the complexity of the administrative formalities and to the high costs of borrowing. Climate change and climate variability pose additional risks and feed into financial risk aversion by creating additional uncertainties regarding repayment ability.

Effects of climate change on markets

Agriculture is one of the socio-economic sectors most sensitive to climate change, dependent as it is on soil characteristics, weather patterns and biodiversity. Climate change affects precipitation, water flows, humidity and temperature. The frequency and magnitude of extreme weather and climate events will increase, and the distribution and abundance of pest species and pollinators may change. These changes will influence crop growth, phenology and yields, ultimately leading to shifts in zones suitable for cultivation and land use changes¹. This will in turn affect agricultural domestic and export commodity markets. Climate change feeds into price volatility by creating production uncertainty. (Please refer to Feasibility Study, Part A for detailed analyses of climate change impacts and risks on the 6 value chains).

¹ Thomas et al 2019. Climate extremes and agricultural commodity markets: A global economic analysis of regionally simulated events

B. METHODOLOGY

1.1 Desk Research

The analysis employed mainly qualitative data through literature/desk reviews and qualitative data collected during value chain analysis studies, the economic and financial analysis, and the cooperative census. Additional data and information was obtained through consultation with national government authorities, departments of agriculture at county level, and farmers. The study analyzed the status of the value chain in production, value addition, distribution and marketing, and identified the existing gaps and possible areas of intervention. Please refer to Annex 24 and Annex 6 for details on consultations and studies undertaken during the project feasibility assessment period.

Thorough literature reviews of all documents relevant to the review assignment was conducted. This involved review of available secondary data to provide preliminary information regarding the value chain in line with the study objective. A compendium of literature reviewed included recent value chain analysis reports, County Integrated Development Plans, national policies and strategies on sustainable food and nutrition security, Economic Survey Reports and have been referenced in footnotes sections of this report. The main documents consulted were related to the Value chains in the project area, the value chains map, the strengths, weaknesses, opportunities and threats to the development of these value chains, the constraints and obstacles to obtaining good quality products, accessing the market and access to finance.

C. OVERALL ANALYSIS OF THE MAIN ECONOMIC ACTIVITIES

1 FRUIT VALUE CHAIN

1.1 Performance

Fruit production is becoming very important in Kenya for domestic consumption and export. Kenya's tropical and temperate climate zones favor the cultivation of a wide range of fruits. In the coastal lowlands, farmers grow mangos, citrus fruits, and bananas. In the middle altitudes, crops include bananas, mango, passion, avocado and citrus². The fruit value chain in Kenya is supported by a climate that allows for year-round cultivation, fertile soils, and a competitive labor force with good education and technical background. Counties in LREB are promoting the fruit value chain by providing a supportive environment for production. They also support entrepreneurship through value-addition techniques.

Table 1: National Fruits production by Area, Volume and Value in 2019-2020

Crop	2019			2020		
	Area (Ha)	Volume (MT)	Value (KES)	Area (Ha)	Volume (MT)	Value (KES)
Banana	71,901	1,512,013	24,622,881,364	72,486	1,871,521	29,028,891,206
Mango	56,090	900,863	15,260,446,464	56,437	809,857	15,379,435,988
Orange	9,291	78,040	1,907,023,284	12,604	145,445	3,522,833,425
Lime	4,955	74,590	2,951	2,380,839,822	82,110	2,161,375,000
Lemon	2,043	16,142	376,220,443	2,050	16,486	476,850,000
Tangerine	1,149	11,512	247,693,541	1,377	16,434	418,054,690
Grapefruit	173	2,821	47,528,747	193	2,468	36,100,045
Passion	1,406	16,886	562,760,578	1,313	16,479	578,400,400
Avocado	20,240	420,430	9,003,403,239	26,481	500,274	9,438,124,806

Source : AFA-Horticulture Crops Directorate

Fruits are a significant export for Kenya, which is becoming an important juice producer in East Africa. Exports have grown at an annual rate of The Counties in LREB where fruits were listed as a priority crop (passion, banana, avocado citrus, and mango) are : Siaya, Kericho, Kisumu, Bomet, Kisii, Vihiga, Nandi, and Nyamira. Available production data is presented below. Data for Kisii, Kericho, Kisumu and Vihiga was not available.

In Bomet county in 2016 banana was grown in 432ha and the production that year was 10,238 tonnes valued at 128,153,000 Ksh. Mango was grown in 20ha, and the production was 300 tonnes valued at 400,000 Ksh. Passion fruit was grown at 40ha, with the production of 600 tonnes valued at 18,000,000 Ksh³.

In Nandi 2017, banana was grown at 320 ha and the production was 5747 tonnes valued at 115,000,000 Ksh. Passion fruit was grown in 15ha, and production was fifty tonnes valued at 17,500,000 Ksh⁴.

In Nyamira banana production has been on the increase both in the area under bananas and yields per unit area. Income from bananas has also risen especially after the intervention by County Government and other partners like USAID, INFAS/Africa Harvest, and ASDSP. In 2013, the area under banana was estimated at 2,105 hectares with a production of 31,575 Tons (15 tons/Ha) and by 2017, the total area under production was 2259 Ha giving a total production of 42,475 tons of bananas. This gave an estimated value of Ksh 553,600,000. In 2013/2014

² Chebet, D. K. (2021). *Investigation of arbuscular mycorrhizal inoculation on growth of tropical fruit seedlings under saline, flooding, and nutrient stress conditions* (Doctoral dissertation, JKUAT-CoANRE).

³ Department of Agriculture Livestock at cooperatives, 2016

⁴ Agriculture report, 2017

Banana was identified as one of the flagship projects that would contribute to the economic development of the County. Passion fruit production is mainly done on small scale in Borabu, Nyamira north, Nyamira South, Masaba North, and Manga Sub Counties. The crop does well due to the prevailing climatic conditions and fertile soils. The major challenge has been accessing clean planting material and the occurrence of fusarium wilt and woodiness diseases associated with uncertified planting materials.

In Siaya county 29,400 ton of fruit was harvested in 2016, valued at 87,790,300 from 1075ha. The the specific fruit performance is not available.

Kenya was the leading exporter of avocado in Africa in 2020 and among the top 10 world's largest exporters but only exported 10% of its total avocado production⁵. The leading counties in 2020 production were Kisii, Nyamira and Bomet. They contributed 6.8, 5.8 and 3.9 percent respectively of the total value.

The production costs for each fruit type vary as summarized in table 2 to 5 below⁶

Table 2: Estimated production costs (Kshs) for Mango

Activity/Input	Year 1-4	Year 5	Year 6	Year 7
Seedlings/suckers	12,300	0	0	0
Fertilizer	11,600	3600	3600	3600
Agrochemicals	8500	6500	6500	6500
Labor	42,530	7,000	8,000	8,000
Other	430	130	130	170
Total direct cost	73,360	17,230	18,230	18,270

Table 3: Estimated production cost for Passion fruit

Activity/Input	Year 1	Year 2	Year 3
Seedlings/suckers	66,000	0	0
Fertilizer	95,700	95,700	95,700
Agrochemicals	81,000	81,000	81,000
Labor	93,400	61,100	61,100
Irrigation	450,000	0	0
Trellising	420,000	0	0
Total direct cost	1,206,100	237,800	237,800

Table 4: Estimated production cost for banana

Activity/Input	Year 1	Year 2	Year 3	Year 4
Suckers	82,500.00	0	0	0
Fertilizer	32,500	40,000	47,000	47,000
Agro-chemicals	30,000	0	0	0
Labor	33000	7000	5000	5500
Others	1780	470	520	525

⁵ Horticulture vindicate report 2019-2020

⁶ USAID-KAVES Value Chain Analysis, 2016

Total cost	179,780	47,470	52,520	53,025
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Table 5: Estimated production cost for Avocado

Activity/Input	Year 1-4	Year 5	Year 6	Year 7
Seedlings/suckers	12,300	0	0	0
Fertilizer	11,600	3600	3600	3600
Agrochemicals	8500	6500	6500	6500
Labor	42,530	7,000	8,000	8,000
Other	430	130	130	170
Total direct cost	73,360	17,230	18,230	18,270

1.2 Value accumulation for fruits value chain⁷

Figures 1-4 below show the value accumulation for different types of fruits along the value chain. Revenue share and price per kg of fruits sold varied for different actors as shown. In the banana value chain the farmer and retailer had the highest revenue share at 25% while in the Mango value chain the retailer had the highest revenue share at 33%. In the passion and avocado value chains, the exporter and retailer had the highest revenue share at 60% and 38% respectively

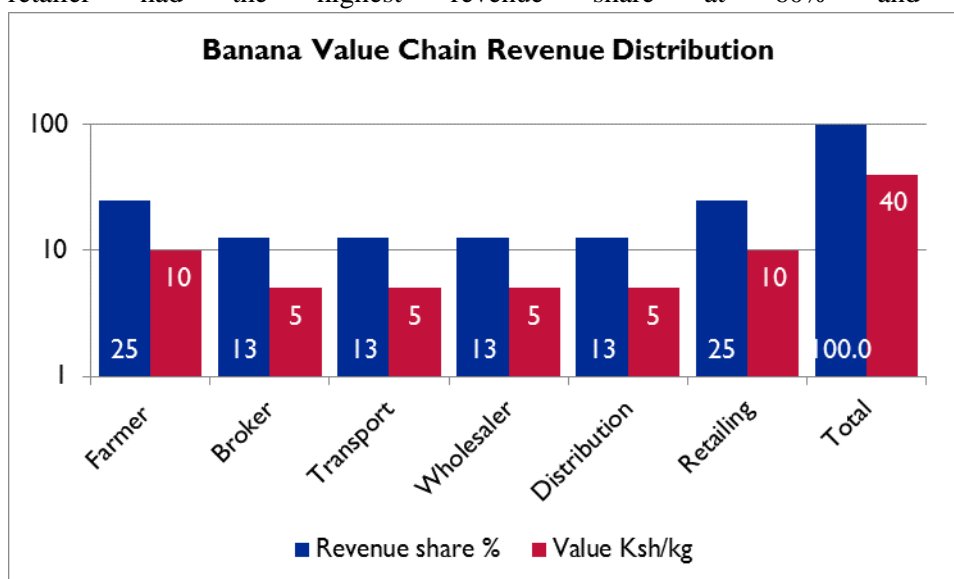


Figure 1: Banana Value Accumulation

⁷ USAID-KAVES Annual Report: 2016

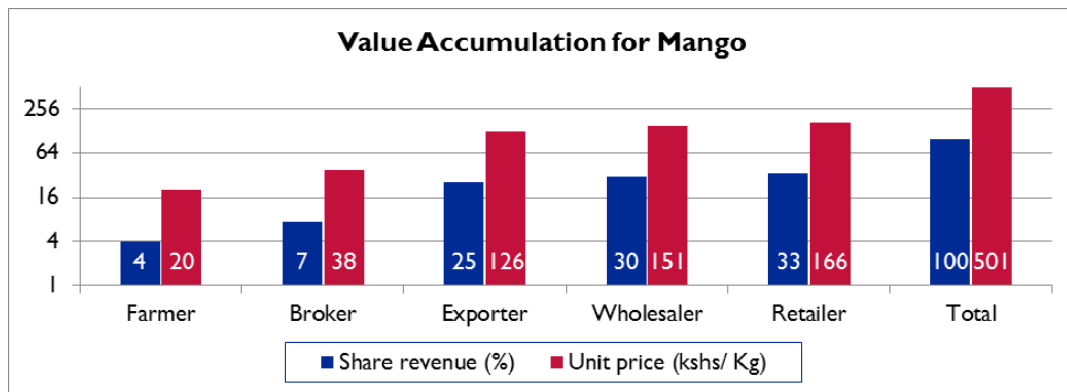


Figure 2: Mango Value Accumulation

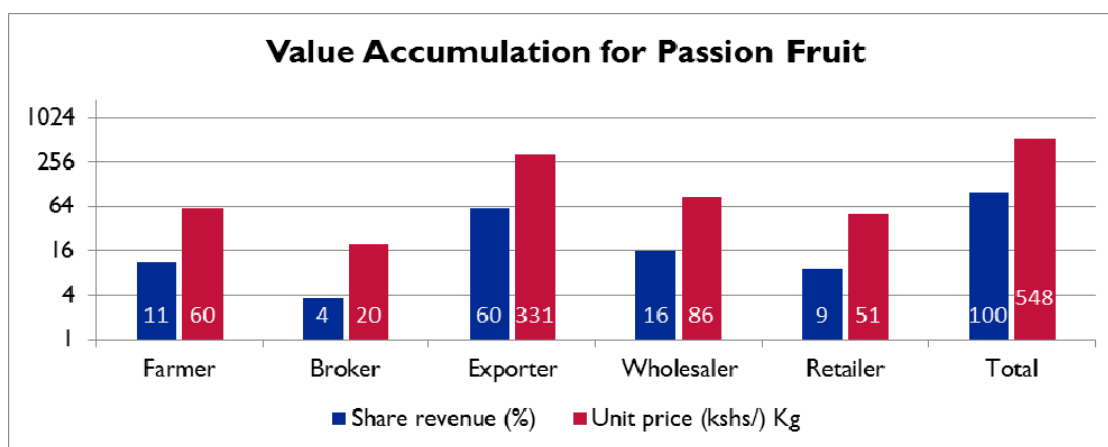


Figure 3: Passion Fruit Value Accumulation

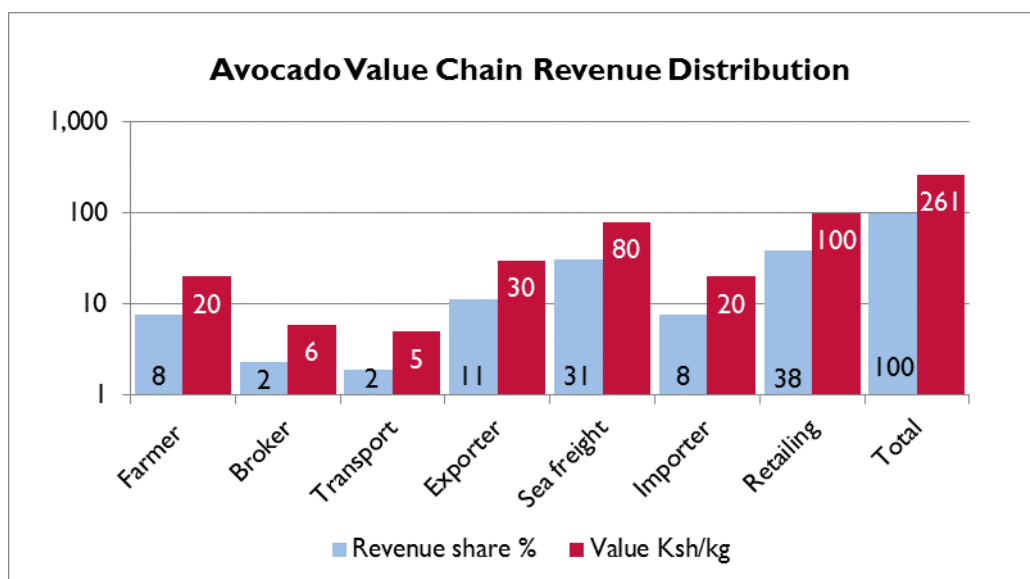


Figure 4: Avocado Value Accumulation

1.3 Market demand for Fruits

Apart from providing rich nutrient, mineral, and vitamin content, fruits are now known to lower blood pressure, reduce the risk of heart disease, stroke, cancers, eye and digestive system problems. The growing consciousness in Western countries and locals to adopt fruit-rich diets is one of the major drivers of the growing demand for fruits.⁸ Globally, demand in organic, fairly traded, and otherwise sustainably produced fruits and vegetable reached USD 33 million in 2020, with predicted increase of 6 to 8% annually.⁹ Europe, the second-largest global market, and the leading location for Kenyan exports, has in place a series of sanitary and phytosanitary regulations that in essence create demand for organic, socially responsible production and processing.¹⁰ Europe currently imports 57% of its fruit and vegetables from non-European countries, with fruit accounting for 43% alone (17 billion Euro in 2021¹¹). Kenyan imports of fruits and vegetables to EU countries increased by 59% between 2017 and 2021.

Locally, there is a growing trend of middle-class urban dwellers who shop at supermarkets and are willing to pay premium prices for safe and high-quality fruits and vegetables. In all cases, prices depend on quality: higher quality bananas fetch 1.75\$ per Kg while lower bananas cost 1.20 per kg. Avocado prices have also risen steadily, between USD 1.50 per Kg in 2017 to 1.9 in 2021¹² for the export market (compared to 25 KSH per Kilo on the Nairobi local market).

1.3.1 Mango demand

There are three sources of demand for mangoes in Kenya : the fresh market, the processing market, and the export market. The target markets includes open-air markets, supermarkets, hotels, juice processors, and export markets¹³. In 2021, the self-ban ¹⁴

Neither processors nor exporters are currently able to satisfy their demand for mango, only 40 and 50 percent of their demand is met¹⁵. Domestic demand for fresh mango fruit is projected to grow from 610,000 MT in 2014 to 955,000 MT in 2022, driven by income and population growth. Demand for mango in the processing industry is projected to grow from 50,000 MT in 2014 to an estimated 250,000 MT in 2022, driven by increased demand for juice in the local and regional markets. Additionally, export demand for fresh fruit will grow from 13,900 MT in 2014 to 51,000 MT in 2022, driven by seasonal production advantages and diversification of the market and products¹⁶. Taking these markets together, total demand will increase from 623,900 MT in 2014 to 768,600 MT in 2017 and 1,006,000 MT in 2022.

Export demand

⁸ Nair, K. P. (2010). The agronomy and economy of important tree crops of the developing world.

⁹ <https://www.expertmarketresearch.com/reports/organic-fruits-and-vegetables-market> or <https://www.prnewswire.com/news-releases/global-organic-fruits-and-vegetables-market-2020-to-2026---rising-awareness-about-healthy-and-safe-food-301101308.html>

¹⁰ <https://www.cbi.eu/market-information/fresh-fruit-vegetables/buyer-requirements>

¹¹ <https://www.cbi.eu/market-information/fresh-fruit-vegetables/what-demand>

¹² <https://www.freshelaexporters.com/avocado/prices/kenya>

¹³ Usaid-Kaves Mango Value Chain Analysis 2015

¹⁴ Galán Saúco, V. (2002, September). Mango production and world market: Current situation and prospects. In *VII International Mango Symposium* 645 (pp. 107-116).

¹⁵ Isaboke, H. N., & Musyoka, K. (2022). Analysis of the factors affecting farm-level output of mangoes among small-scale farmers in Mwala Sub-County, Kenya.

¹⁶ Usaid-Kaves Mango Value Chain Analysis 2015

Kenya remains a small player in the international mango trade, exporting approximately two percent of national production or one percent of the fresh mango traded on the world market¹⁷. In 2011, Kenya earned KSh1 billion (US\$11.8 million) from mango exports. Between 2006 and 2010, Kenya's mango exports grew by 17.7 per annum, the sixth fastest rate of growth across exporting economies¹⁸. It is projected exports will grow to 96.7 MT in 2030 if the same growth rate continues¹⁹. Like the processing sector, mango exporters cannot procure sufficient volumes of mango to meet the demand for their product. Exporters suggest that they can only meet 50 percent of potential export demand due to the limited supplies of quality fruit that meets export requirements²⁰.

Domestic and regional market

Currently, the domestic market for mango is significantly larger than the export market both in volume and value. Within the mango sector, the domestic market especially urban consumers are the largest contributor to the economy in terms of national revenue earnings income generation for smallholder producers²¹. Domestic demand for Mango has grown exponentially over the last years²². The domestic market is largely informal with a range of stakeholders engaged in specific segments of the supply system. The supply of the domestic market comes primarily from small-scale and medium-scale farms. There is a general lack of market information, a lack of transparency, and a lack of formal contracts between farmers and buyers in this food supply system.

1.3.2 Banana demand

In 2020, bananas production in Kenya was 1.86 million tonnes. Banana production in Kenya increased from 400,000 tonnes in 1971 to 1.86 metric tonnes in 2020 growing at an average annual rate of 7.14%. Kenya has over 400,000 smallholder banana farmers with 1.7 percent of Kenya's total arable land planted covered by bananas both the dessert ripening banana, cooking, and plantain varieties. Kenya has around 71,000 hectares of bananas which contribute to Ksh 25 billion annual income in a production of 1.5 metric tons of the product, according to KALRO.

The supply of bananas in the country is dependent on weather patterns and varies with the season. In October, November, January, and February the prices are low due to the glut while the highest prices are in August, and September. A report from Horticultural Crops Directorate (HCD) stated that there is a gap of 71,000 MT of unmet market demand in the banana market based on information from traders and retailers.²³

The development of value addition for banana in making crisps, flours, and essence has also increased the consumption and demand of bananas, especially for processing companies and individuals. Export prospects for the crop have improved over the last decade and entrepreneurs are exporting banana fruit and processed products, tapping into the organic market in Europe. However, the exported quantities are still exceedingly small as the main means of transportation from East Africa is by air, which is expensive, not to mention the risk of losses²⁴.

1.3.3 Citrus demand

Citrus is a wider name for species such as orange, pomelo, lemon, citron, Tangerine, and mandarin, among others. Citrus remains a vital horticultural crop in Kenya. They can thrive well under wider areas, from low altitudes at sea

¹⁷ FPEAK, 2012

^{15,19} ITC, Trade Map, 2012

²⁰ Mango Working Group, July 2011

²¹ Van Hoyweghen, K., Fabry, A., Feyaerts, H., Wade, I., & Maertens, M. (2021). Resilience of global and local value chains to the Covid-19 pandemic : Survey evidence from vegetable value chains in Senegal. *Agricultural Economics*, 52(3), 423-440.

²² World Bank, 2020

²³ Horticulture vindicate result 2011

²⁴ USAID-KAVES VALUE CHAIN ANALYSES 2013

level to highlands at 2100m above sea level. Sweet oranges, mandarin, and pixie are the main citrus species that are grown commercially.

In 2020, citrus fruit production for Kenya was 349,919 tonnes. Citrus fruit production in Kenya increased from 14,000 tonnes in 1971 to 349,919 tonnes in 2020 growing at an average annual rate of 11.14%. Production does not meet the local demand necessitating the importation of large quantities of citrus fruits and products²⁵. However, local market demand for citrus outweighs the supply which in the case of Kenya is below 25% of the production potential, resulting in importation from South Africa and Egypt²⁶.

1.3.4 Passion fruit demand

The demand for passion fruit is high both in local and regional markets as well as in the export market. There is the great market potential for passion fruit both in the domestic, regional, and global markets. In the domestic market, there is high demand for passion fruit for fresh juice and concentrate for use in fruit canning factories²⁷. Passion fruit market include export, local fresh and processing. It is popular in the cottage industry for fresh juice processing in Uganda which is one of the leading market destinations²⁸.

Kenya is ranked among the leading five exporters of passion fruits to the EU. The EU demand for passion fruit has been expanding at 13 percent per year outstripping the global supply. However, Kenya's passion fruit supply to the EU is declining. The decline in exports of passion fruit to the EU is attributed to a lack of clean planting material, inadequate linkages between smallholders and national exporters, low rate of compliance to the market requirements, and inefficient collection and onward distribution system which impedes smallholder success in capturing intermediate margins, and expensive and unreliable overland, air and ocean export transportation systems which lead to uncompetitive costs, excessive transit times, and unreliable quality upon arrival²⁹.

The volume of Kenyan passion fruit exported to Europe is smaller but has increased over the past few years. While passion fruit exporters are optimistic about market growth for Kenyan fruit, they say that traceability systems must be present and pesticide residue levels controlled. Fruit supplied by brokers cannot provide this level of assurance, so exporters seek supplies more directly through contracts with smallholder groups.

The leading counties in production of purple passion are Elgeyo Marakwet, Bungoma Uasin Gishu, Kirinyaga and Embu counties. Kisii, Bomet, Nandi and Vihiga are selected counties that produce passion fruits. The area of land cultivated production and value for 2020 was discussed above³⁰.

1.3.5 Avocado Demand

Kenya was the leading exporter of avocado in Africa in 2020 and among the top ten world's largest exporters but only exported ten percent of its total avocado production. In 2019-2020, the area increased from 20,240ha in 2019 to 26,482ha in 2020 while production increased from 420,430tons to 500,274tons, 31 percent and 19 percent increase, respectively. The value on the other hand increased from Kshs9billion in 2019 to Kshs9.4billion in 2020, representing an increase in value of 5 percent.³¹

²⁵MOA, 2003

²⁶ Muendo, K. M., & Tschirley, D. L. (2004). *Improving Kenya's Domestic Horticultural Production and Marketing System: Current Competitiveness, Forces of Change, and Challenges for the Future Volume I: Horticultural Production* (No. 680-2016-46735).

²⁷ Mukoye, B., Macharia, I., & Avedi, E. (2022). Distribution of passion fruit (*Passiflora* spp.) pests in Kenya. *African Phytosanitary J*, 3(1), 47-55.

²⁸ Validate horticulture report 2019-2020

²⁹ National Passion Fruit Business Plan, 2012 – 2022

³⁰ Passion fruit counties production 2020

³¹ VALIDATED REPORT 2019-2020

This production increase was due to the increased harvest area for avocado and improved prices in the international markets. As the global demand for avocados is increasing and the profitability of avocado is much higher than other tropical fruits, more farmers are starting to plant the fruit. In addition, the Kenyan government is also actively supporting avocado production by providing free avocado seedlings to farmers and subsidizing small scale avocado farmers³². Besides the government supply, there are private nurseries supplying avocado seedling to farmers priced at an average of Ksh 150 - 250 per seedling³³. 70 percent of the production are by small-scale farmers, who grow the fruits for subsistence, local markets, and export purposes³⁴. The local demand for avocado is growing in Kenya. The rise in demand has been caused by realization of the health benefit as well as increased processing activities.

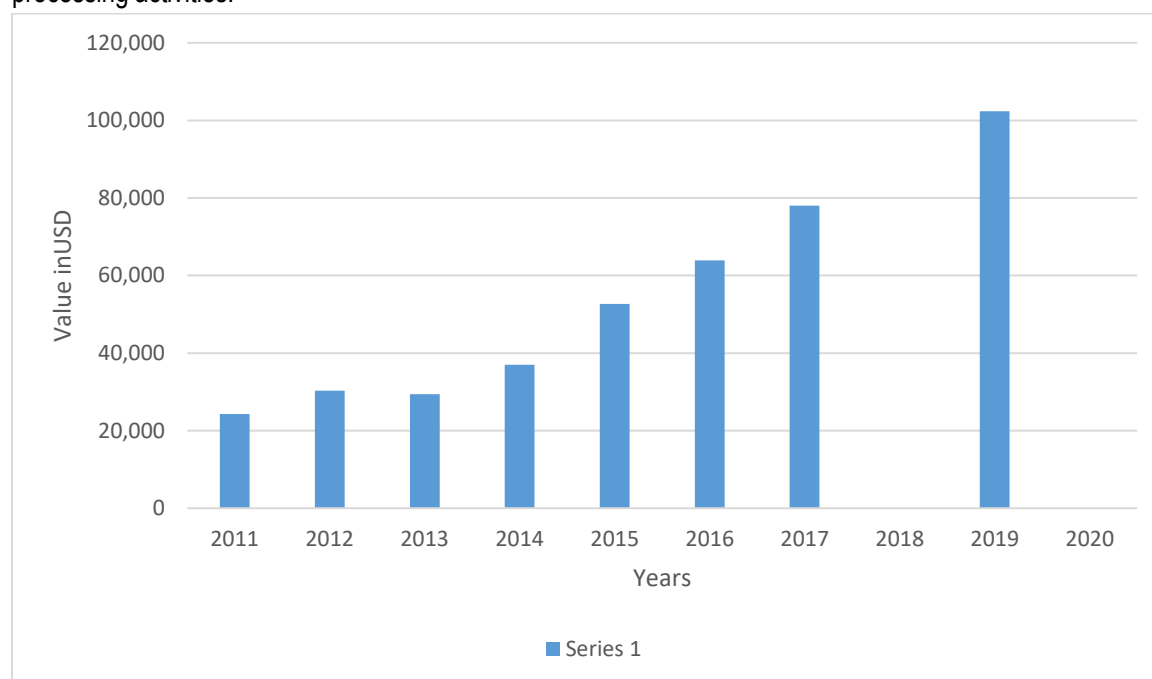


Figure 5:Export value of Kenya avocado

Source : Freshela 2020

1.4 Strategies for connecting producers with buyers in Fruit value chain

There are two main market destination for fresh fruits, the local and export market. The Export markets include the Europe and the middle East. Local assemblers buy at farm gate and provide market access for small producers selling to middlemen/brokers and sometimes directly to the wholesalers. Middlemen/brokers supply to the wholesalers who in turn sell to exporters retail outlets and institutions.

The export market is served by a few large-scale own company farms and contracted smallholder farms. Independent smallholders produce the bulk of fruits for domestic markets. The main traders in the regional markets are the wholesalers³⁵.

³² Horticultural Crops Directorate, Validated Report 2019-2020

³³ Discussions with Horticultural Crops Directorate

³⁴ Statista 2020

³⁵ Muendo, K. M., & Tschirley, D. L. (2004). *Improving Kenya's Domestic Horticultural Production and Marketing System: Current Competitiveness, Forces of Change, and Challenges for the Future Volume I: Horticultural Production* (No. 680-2016-46735).

1.5 Communication strategies between the producers and the buyers in Fruits value chains

Banana

Local assemblers buy at farm gates and provide market access for small producers selling to intermediaries/brokers and sometimes directly to the wholesalers. Intermediaries/brokers supply to the wholesalers who in turn sell to retail outlets and institutions (schools, hospitals). Wholesalers also purchase directly from small-scale and limited large-scale producers. **Passion fruit**

The main players in the citrus value chain are smallholder farmers, who invest on their own in the development of tree nurseries and farm cultivation and planting. Once the fruits are ready for sale, there is the entry of two types of middle agents : those buying fresh fruits for the domestic rural and urban market (wholesale buyers/traders and vendors/hawkers); and local brokers who buy on behalf of wholesale traders for the export market³⁶.

Avocados

Wholesalers of avocados are present all throughout Kenya in wet marketplaces close to urban areas and major cities. Avocado retailers can be found in rural and urban settings. In most cases both wholesalers and retailers obtain their avocados through marketing agents. Due to the informality of the sector and the lack of traceability it is virtually impossible to distinguish the origin and source of the avocados sold at wholesale and retail level.

The volumes of fresh avocado that are currently sold through supermarkets, restaurants and hotels is limited. There is a growing trend of middle-class urban dwellers who shop at supermarkets and are willing to pay premium prices for safe and high-quality avocados. Avocado growers, exporters, and other value-chain players in Kenya have recently founded the Avocado Society of Kenya. The society aims to promote cooperation among stakeholders in the value chain and gain access to new export markets³⁷. Avocado Society of Kenya (ASK) links growers and exporters of the avocado to ethical buyers locally and abroad. They train members in Good Agricultural Practices and help them set systems to be compliant with local and global standards.

Citrus

Once the fruits are ready for sale, there is the entry of two types of middle agents : those buying fresh fruits for the domestic rural and urban market (wholesale buyers/traders and vendors/hawkers); and local brokers who buy on behalf of wholesale traders for the export market³⁸.

1.6 Terms of payment at the end of the sale of the Fruits

Avocado

In the export market, traceability, product regulations and GAP certificates are important requirements to enter the export market. Most Kenyan produced avocados do not meet the stringent requirements to access the high-value export market. Significant on farm investments are required to change that. Small-scale farmers are not always able to make these investments, nor do they have access to Agri-finance products that cover these types of costs.

³⁶ Mwatawala, M. W., Baltazari, A., Msogoya, T. J., Mtui, H. D., Samwel, J., & Chove, L. M. (2018). Reduction of Preharvest and Postharvest Losses of Sweet Orange (*Citrus sinensis* L. Osberck) Using Hexanal in Eastern Tanzania. *Postharvest Biology and Nanotechnology*, 255-264.

³⁷ <https://kenyaavocados.co.ke/index.php/about-us>

³⁸ Mwatawala, M. W., Baltazari, A., Msogoya, T. J., Mtui, H. D., Samwel, J., & Chove, L. M. (2018). Reduction of Preharvest and Postharvest Losses of Sweet Orange (*Citrus sinensis* L. Osberck) Using Hexanal in Eastern Tanzania. *Postharvest Biology and Nanotechnology*, 255-264.

Therefore, the highly profitable export market is inaccessible for most small-scale avocado farmers³⁹. Transactions for the export market are handled per unit of avocado, whereby they are packed into cartons of approximately four kilograms (4-6 units of avocado). Adequate investments in postharvest handling, transport, and packaging of avocados for the export market have proven to greatly reduce post-harvest losses⁴⁰

A major challenge for the local market is quality since, avocados are transported to local markets on motorcycles, in buses and on the top of lorries. During harvest, transport and storage, the fruit stored in sacks is handled roughly and temperature management is virtually non-existent. These elements have a significant impact on rejection rates, which in turn affect post-harvest losses. The marketing representatives provide very low farm-gate pricing to farmers in anticipation of these losses as their "invisible" costs.

Passion fruit

The climatic conditions under which passion fruit is produced determine the quality of the fruit which has a direct influence on the price of the fruit in the market. For instance, the Passion fruit produced at high altitude areas takes too long to ripen, this has led to the picking of premature fruits by impatient farmers and unscrupulous exporters thus negatively impacting the competitiveness of the produce at the international markets⁴¹. Poor export market price for passion fruit is due to uncompetitive quality produce attributed to excessive MRLs, and immature and under-size fruits. Picking of immature fruits is common in high-altitude passion-producing areas partly due to difficulty in ascertaining fruit physiological maturity under cold environments.

There are smallholder farmers at the coast who grow local yellow passion fruit for the supply of seedlings. The cost per kilogram of yellow passion seed is Ksh 6,000 making growing yellow passion fruit for purposes of seed production a lucrative business. This could be replicated in the LREB region to earn incomes for producers.

Banana

The supply of bananas in the country is dependent on weather patterns and varies with the season. In the months of October, November, January, and February the prices are low due to glut while the highest prices are during the months of August, and September⁴²

Mango

The small-scale farmers grow multiple varieties, use no irrigation, and rarely use any fertilizers on their orchards. Because of the low production by individual farmers, coupled with the mixed growing of varieties, aggregation for marketing is a challenge, contributing to market inefficiencies. The small scale farmers relies on village assemblers, export agents, and local traders to access markets. This tends to result in low farmgate prices for farmers.

Large and medium-scale mango farmers can negotiate and sell directly to exporters, wholesalers, supermarkets, and agents. They grow specific varieties of mangoes for commercial purposes, unlike small-scale farmers who grow a mix of mango varieties. They are also well-capitalized and can apply necessary inputs to control pests,

³⁹ Amare, M., Mariara, J., Oostendorp, R., & Pradhan, M. (2019). The impact of smallholder farmers' participation in avocado export markets on the labor market, farm yields, sales prices, and incomes in Kenya. *Land Use Policy*, 88, 104168.

⁴⁰ Owuor, T., 2020. Mango Value Chain Road Map, Makueni County, Republic of Kenya

⁴¹ Fischer, G., Melgarejo, L. M., & Cutler, J. (2018). Pre-harvest factors that influence the quality of passion fruit: A review. *Agronomía Colombiana*, 36(3), 217-226.

⁴² Horticultural Crops Directorate, Horticulture Validated Report 2019-2020

diseases, and soil fertility. Large scale farmers can stimulate flowering and, using supplementary irrigation, can produce an early September crop when there is a shortage of mangoes for export, and they can command higher prices.

Mangoes delivered to processing factory are weighed, inspected, and sorted to meet the general requirements. Losses at this stage are estimated at 10-31 percent. Higher losses were recorded for those delivered by the farmer, with lower-end losses for those delivered by brokers as they will have already done pre-selection. Major reasons for rejection include immature fruit, insect/pest damage, over-ripeness, and bruising.

Export markets demand a level of quality that is much higher than that demanded by domestic fresh markets or processors. To ensure quality fruit, exporters rely more on their staff to supervise harvesting, sorting, packaging, and transportation. This ensures less waste because only the best mangoes are selected for harvest and carried in the best packages to prevent damage.

Citrus

Lack of adequate funding has hampered its role in supporting horticulture value chains and as such, there is no specific national-level association responsible for citrus like those for mangoes. Payments terms are based on condition of the fruit. Due to low productivity and general low supply, postharvest losses are minimal. The farmer is able to sell all produce in good condition. In the market, consumers go for the green fruit and type of citrus, lime is more sour than lemon. Consumers are ready to pay more for lime than lemon, though lemon is more available than lime in the market. Lime that has yellow colour is disposed of by selling it cheaper than the green fruit.

Oranges are bought based on the variety (local or imported), size, physical condition (no damages), level of ripening, and smell⁴³.

1.7 Government intervention in the fruits value chain

Ministry of Agriculture conducts training on proper agronomic practices geared towards optimizing productivity also offer extension services. Production support is critical to increasing productivity. Kenya's horticultural sector is characterized by insufficient extension services, ineffective extension messages, lack of climate information services, and a poor delivery system. The Ministry of Agriculture, Livestock, and Fisheries are present in every County up to the location level, providing extension and advisory services. However, the delivery is weak and sometimes not available to farmers in remote locations.

1.7.1 Direct government and project/program interventions

The Kenya Climate Smart Agriculture Project (KCSAP) is a Government of Kenya project jointly supported by the World Bank. KCSAP has been implemented over five years (2017-2022) under the framework of the Agriculture Sector Development Strategy (ASDS) (2010-2020) and the National Climate Change Response Strategy (NCCRS, 2010). The overall goal of the KCSAP project was, to increase agricultural productivity and build resilience to climate change risks in the targeted smallholder farming and pastoral communities in Kenya, and in the event of an eligible crisis or emergency, to provide an immediate and effective response. The project has been supporting adoption of climate smart technologies in the agriculture sector. The program is working in 24 Counties including LREB Counties of Bomet, Siaya, Kisumu, Kericho, Busia and Kakamega.

AgriFi Challenge Fund Kenya (Self Help Africa).

⁴³ Kongai, H., Mangisoni, J., Elepu, G., Chilembwe, E., & Makoka, D. (2018). Analysis of citrus value chain in eastern Uganda. *African Crop Science Journal*, 26(3), 417-431.

This is a European Union initiative to support productive and market-integrated smallholder agriculture through the provision of financial support worth EUR 18 million to Agri-enterprises. It has contributed to improvements in the capacity of smallholder farmers and pastoralists to practice environmentally sustainable and climate-smart agriculture as a business in inclusive value chains. The program works in all the 47 Kenya Counties and ends in 2023.

Kenya Crops and Dairy Market System Development program (USAID, RTI)

The KCDMSD program is part of USAID's Feed the Future, the U.S. Government's global hunger and food security initiative that helps to increase agricultural production and reduce poverty and malnutrition in Kenya. The KCDMS activity is implemented in 12 Kenyan counties and designed to spur competitive, resilient market systems in Kenya's horticulture and dairy sectors. The programme focuses on strengthening the following value chains: dairy, fodder/feeds, and horticulture (mango, passion fruit, avocado, banana, pineapple, and sweet potato). Grants range between KES 2.5 million and KES 25 million and 50% co-funding. The program worked in Western Kenya and ended in 2022.

Kenya Agricultural Value Chain Enterprises (KAVES)

The Kenya Agricultural Value Chain Enterprises (KAVES) activity collaborated with smallholder farmers, businesses, and national and county government partners to address constraints up and down the value chain (such as agro-processors, input suppliers, transporters, exporters, retailers, financiers) and develop fully-functioning, competitive value chains. KAVES aimed to increase the productivity and incomes of smallholder farmers, and other actors along the value chain, who are working in the dairy, maize (and other staples) and horticulture sectors.

The activity worked with more than 30 Kenyan government and private sector organizations including: Ministry of Agriculture, Livestock and Fisheries, county governments, Agricultural Sector Development Support Programme (ASDSP), Kenya Dairy Board (KDB), Kenya Plant Health Inspectorate Services (KEPHIS), Kenya Food Security Steering Group, Pest Control Products Board (PCPB), Horticulture Competent Authority Structure, Horticultural Crops Directorate (HCD), Kenya Agricultural and Livestock Research Organization (KARLO), public and private sector actors in the dairy, maize, and horticulture value chains.

USAID Kenya Horticulture Competitiveness Programme. The Kenya Horticulture Competitiveness Project improved food security and nutrition and raised incomes for more than 200,000 smallholder farmers. The project helped farmers grow more and better-quality fruits, vegetables, and flowers, with a special focus on strengthening the value chains related to eight crops: sweet potato, Irish potato, passion fruit, mango, banana, tomato, cabbage, peas, and beans. The Project also expanded the processing of horticultural produce, linking small-scale farmers with local and export markets, and improving the overall agricultural policy environment. It aimed to increase the incomes of smallholder farmers through new product development, domestic market interventions, marketing services, policy interventions, and environmental management.

aKenya Market-led Horticulture Programme also known as hortIMPACT was a 5-year project, funded by the Embassy of the Netherlands in Kenya (EKN). HortIMPACT was implemented across Kenya by a SNV-led consortium whose other core partners are HIVOS, Solidaridad & DLV Plant. The project focused on selected fresh fruits and vegetables. HortIMPACT goal was to contribute to increased food security & increased incomes for 75,000 farmers and the development of a dynamic and sustainable horticulture sector in Kenya in 5 years. The programme focused on enhancing the entrepreneurial capacities & performance of 75,000 small & medium sized farmers for improved access to domestic & international markets.

Kenya Agro-Weather & Market Advisories System (KAMAS).

The Ministry of Agriculture Livestock and Fisheries through the KCSAP project and with the support of the world bank has set-up Kenya Agro-Weather & Market Advisories System (KAMAS)⁴⁴. It was aimed at assisting farmers in various value chains, to access up to date climate, agronomic and market information so as minimize negative impact of climate and market information asymmetry.

1.7.2 Main national regulations around fruits value chain

Kenya has developed the Kenya Good Agricultural practice (GAP) standard (KS 1758), benchmarked with the Global Gap, for ease of interpretation and acceptance of Kenyan produce in the world export market. Fruits (Mango, passion, avocado, citrus, and banana) are only supposed to be exported from farms certified by HCD for export; equally, exporters require certification from HCD and Fresh Produce Exporters Association of Kenya (FPEAK) to export fruit after meeting the minimum set standards. Due to economies of scale, the costs of implementing and maintaining the elevated levels of compliance and certification tend to favor larger businesses.

Kenya is a signatory to various agreements aimed at enhancing trade amongst member states, and notable amongst these are the regional trade agreements under the East African Community (EAC), the Common Market for East and Southern Africa (COMESA), and trade agreements with the European Union. While these partnerships offer Kenya great opportunities to widen and broaden its market access for fruits, there are various challenges that present barriers to entry into these markets.

At the national level, policy reforms and interventions relevant to the horticulture industry and fruit 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

1.8 Summary of difficulties encountered by producers and buyers, and support needed

1.8.1.1 SWOT Analysis for fruit value chain

The selected VCs offer strength, opportunities, threats and weaknesses as detailed in the table 3.

Table 2: SWOT Analysis for fruit value chain

Table 3: SWOT Analysis for fruit value chain in Kenya

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none"> -Export companies undertake contract farming and provide input and agronomic advice to their producers. Availability of subsidized fertilizer Availability of grafted seedlings -Availability of fertile and productive land -Favorable climatic conditions with reliable rains -Availability of fresh, processing and export markets Increasing demand for juices -Value chain with actors 	<ul style="list-style-type: none"> -Few and untrained extension officers on the specific value chain -High cost of inputs, including pesticides, fuel, fertilizer, and seedlings -Price fluctuations and delayed payment by buyers -Inadequate storage facilities Poor postharvest management and Good Agricultural Practices -High cost of aggregation -Production of varieties in small, scattered quantities -Lack of water for supplementary irrigation -High postharvest losses, 	<ul style="list-style-type: none"> -Introduce new harvesting tools -Demand is still growing for fruits in local and international markets. -Because of export opportunity, there is political interest, making it easier to garner support from agencies -Substantial installed processing capacity -Growing domestic markets -Value addition into other products 	<ul style="list-style-type: none"> -Pest and diseases affecting the yield. -Access to knowledge for smallholders on the fruit value chain is not well organized. Difficult to meet market standards and certification with high-cost implication -Rapidly declining soil fertility -High and escalating cost of inputs -Unpredictable weather patterns/ Climate change -High prevalence of pests and diseases

⁴⁴ <https://kamas.co.ke/>

-Production season advantage over competing countries in the Middle East market -Diverse end markets for fruits reduce marketing risks. -Fruits are important contribution to healthy diets (Vitamins/Minerals) -Large number of women involved as they participate activities such as harvesting, sorting, and packaging.	- Low productivity - Frequent droughts occasioned by change in weather patterns - Low adoption of climate smart practices	-Formation of producer groups for better marketing -Export markets in Middle East -Production of early maturing varieties for export markets	-Competition of cheap fresh fruits imports in Kenya's mango export destinations. -Competition from cheap imported juice concentrate
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1.8.1.2 Difficulties encountered by buyers and producers

1. Lack of market transparency due to lack of accurate and free market information in Kenya, which has led to an increased sense of risk and uncertainty, resulting in high transaction costs for actors along the value chain. Subsequently, markets are inefficient and unresponsive to producer needs. Smallholder farmers are especially affected by these conditions and find it difficult to penetrate formal markets with a lack of collective action as a major challenge⁴⁵.
2. Horticultural production for the domestic market faces the challenge of continued influx of similar products from regional markets.
3. Most retailers in rural-urban centers and road sites have little to no infrastructure for storing and/or displaying their products, which tends to further risk the durability and quality of the fruit.
4. Fruit fly infestation at production stage causes major losses at farm and post-harvest levels. The total loss is estimated to be as high as 30% at both levels. In addition, fruit fly infestation affects market access of the crop since the pest is a quarantine pest. This also affects the market since avocado buyers are unable to get adequate produce for the market. Over the years KALRO has developed integrated pest management options which are environmentally friendly, for the control of fruit fly on avocado including pheromone traps, field sanitation, use of attractants, and soft chemicals except that these technologies are not disseminated to farmers to help reduce infestation.
5. Poor access to markets and profitability of climate smart, low carbon sustainable agricultural products. The market incentives to sustain climate resilient and low-carbon production are insufficient. Farmers are not certain they will obtain price premiums or other adequate market incentives for their commodities produced using climate resilient and low-carbon technologies and practices. Producers do not know if adopting climate resilient, low-carbon practises will lead to increased benefits since there is no data tracking the sales of commodities produced using a set of climate resilient, low-carbon practises or another.
6. There is limited knowledge on certification schemes – and the advantages thereof – and of GAP among smallholder farmers.
7. Prevalent market demands are biased towards profitability and not climate resilience. Among all actors in the value chain, none is dedicated to ensuring environmental or climate sustainability of the produce.

⁴⁵ Muthini, Davis & Nyikal, Rose & David, Jakinda. (2017). Determinants of small-scale mango farmers market channel choices in Kenya: An application of the two-step Craggs estimation procedure. Journal of Development and Agricultural Economics. 9. 111-120. 10.5897/JDAE2016.0773.

1.8.2 Existing financial services in the project Counties with Fruits VC

Financial institutions are important players in the agriculture sector through the financing of activities, including farm inputs, trading, and processing.

Tableau 1: Existing financial services in the Fruits VC⁴⁶

Equity bank and Faulu bank	Kilimo Biashara	The Kilimo Biashara initiative is an example of how farmers have been able to access loans for the production process, despite the risk associated with rain-fed agriculture. The fund was also financing small-scale farmers, farmers groups/self-help groups, and cooperatives and farming companies for the purchase of farm inputs ; fertilizers, chemicals, and seeds (up to KSh150,000). It was a \$ 5 million facility financed by IFAD and AGRA to cushion banks against risks of lending to the agriculture sector
Kenya government	5-year Financing Locally Led Climate Action (FLLoCA) Program	Climate Financing ⁴⁷ . The FLLoCA Program seeks to address the financing gap while building resilience at the community level. Specifically, the Program's objectives are to : <ol style="list-style-type: none"> 1. Support the development and strengthen policy, legal and regulatory frameworks at national and county levels for accelerated access to climate financing for building resilience at local levels. 2. Strengthen the capacity of national and county level institutions and stakeholders to accelerate climate financing at the local level. 3. Increase access to climate finance to support investments in climate resilience and low carbon emissions at the local level (urban & rural) ; 4. Support community-led local initiatives for enhanced community resilience and enhanced sustainable development; 5. Increase access to green/environmentally friendly technologies to deliver low carbon climate-resilient development at national and local levels ; and 6. Enhance transparency and accountability on the support provided and actions implemented.
CFC Stanbic Bank	An Agricultural Production Loan (APL)	a short-term credit that lets you pay for your agricultural input costs. This product is suitable for grain farmers cultivating on either dry land or on an irrigation basis. Loans are provided to individual farmers, groups and legal entities in the agricultural sector, including commercial farmers and agri- businesses. Input costs that qualify for production credit include: Seeds and fertilizer; Fuel, oil and lubricants; Herbicides and pesticides; Repairs and maintenance; Crop Insurance premiums
Co- perative Bank of Kenya	Vuna Kilimo loans	To enable individuals, cooperatives or corporate firms undertaking agricultural production activities access loans for purchase of farm inputs, equipment, set up greenhouses and irrigation systems
	Tegemeo loans.	To address the short term financial needs of farmers supplying accredited buyers and Aggregators and also to Aggregators through advances based on their deliveries
	Loans Small-scale.	Loan offered to large scale farmers to enable them access farm inputs, working capital, farm equipment and other social needs e.g. school fees, medical bills, furniture etc
	Loans for cereal and horticulture producers	To enable individual farmer, associations/group/co-operatives to access farm inputs and agro dealers access working capital under the Ministry of agriculture credit guarantee scheme
	Large Scale Loans	Loan offered to large scale farmers to enable them access farm inputs, working capital, farm equipment and other social needs e.g. school fees, medical bills, furniture etc
Family Bank	Input loans	Working capital to finance stock &/or inputs such as certified seed, fertilizer, chemical applications
	Contract Grower Finance, input loans	This loan product is designed for qualifying farmers who want to obtain credit facilities for land preparation, certified seed, fertilizer, chemical applications and appropriate post-harvest handling & storage. The farmers may either be engaged in: Cereals , maize, wheat, barley, sorghum & other cereals varieties; Horticulture crops; Sugar cane; Tea; Cotton

⁴⁶

<https://www.canr.msu.edu/hrt/research/usaid/Appendix%201%20-%20List%20Financial%20Institutions%20in%20Agriculture.pdf>

⁴⁷ Financing locally led climate action (FLLoCA) Program, County readiness assessment report.

Strengthening the capacity of counties to access climate finance, The Treasury and Planning 2021

Juhudi Kilimo	Asset based loans and technical assistance	Juhudi Kilimo provides asset based loans and basic business and finance training to smallholder farmers and enterprises that allow them to purchase wealth generating financial solutions for their agribusiness. It was started by K-Rep bank and has since been spun-out into a sustainable NBF.
Kenya Women Finance Trust - KWFT	Green House Farmers Kit	This is a loan facility that enables farmers to acquire complete farmer kit that provides modern farming solution. It includes quality seeds as well as advanced technology adjusted to customer needs and capacity
	Input loans	This is a product targeting farmers to help them acquire quality inputs for their farming activities affordably
Century Microfinance Bank Limited	Mazao loan, aka (Agricultural Loan),	This is used in financing Farm input and Dairy improvements. The repayment period is between 3 to 12 Months, with a grace period depending on the crop cycle. The facility has an inbuilt insurance cover for both crop and livestock giving the farmer peace of mind. The loan size ranges between Kshs. 5,000 and Kshs. 1,000,000
	Mazao Factor.	Upon request the farmer can be paid upfront for up to 80% of the value of the produce that has been delivered to a bulker, producer co-operative, exporter or processor
Eclof Kenya	Kilimo Fresh	Horticulture Product. This is a loan accessible to smallholder farmers in horticulture crops value chain. Purpose: a) Purchase of farm inputs; b) Acquire labour and services; c) Purchase equipment; d) Construction of structures e) Working capital; f) Transportation; g) Procurement of water and storage Benefits: a) Favourable grace period given; b) Technical assistance. c) Market linkages; d) Client training.
Rafiki	Flexible loans with no security	The product is for farmers and agro dealers who do not have conventional security but have sufficient cash flows to meet the loan requirements.
	Flexible loans	The product is for farmers and agro dealers who can mix conventional and non conventional security but have sufficient cash flows to meet the loan requirements
	Advance payments	This is a loan product which offers advances to farmer or farmer groups who make deliveries to a milk processor.
Inuka Africa	Financial services, training and capacity building	Inuka is a non-deposit taking MFI that provides financial services, training and capacity building to micro, small and mid-size enterprises with a special focus on smallholder farmers and agri-business actors
Vision Fund Kenya	Mkopo Sokoni.	PURPOSE & DESCRIPTION Loans that are advanced to Vision Fund Kenya clients that have regular remittances from institutions they sell their products such as milk, tea, horticultural produce etc. (max. 12 Months)
SMEP Microfinance Bank	Input Financing	This is financing given to farmers to purchase quality farm inputs like seeds, fertilisers and agro chemical
	Green house Financing.	This is financing for acquisition of Green house structures, inputs, irrigation kits, and agronomical support.
Jitegemea	Mazao Loan	This is an agribusiness product which aims at supporting farming as a business (Greenhouses and Input)
Jamil Bora Bank	Green House Financing	This is a facility to provide personalized farming solutions to farmers and enhance farming as a business in Kenya. The product seeks to address the issues of securities of the loan, huge and continuous harvests, market linkages and value for their money.
East African Growers	Contract Farming	60% of the supply to East African Growers Ltd come from their own farms. The remaining 40% of production is from contract farmers. One half of the produce from contract farmers comes from
Agri finance Corporation	Government Financial Institution	Agribusiness loans: These are loans designed to benefit agri-business traders. It is meant to provide start-up capital for those seeking to start, or are engaged in agricultural microenterprises. Microfinance group loans: A micro-credit facility targeting groups trading in agricultural produce and agricultural inputs particularly the youths and women who have no tangible security to secure credit. Stawisha Group Loan is in 3 levels which will allow groups to access a higher amount as they successfully grow their business. Horticulture and floriculture development loans: These are loans to finance horticultural and Floricultural projects
Netafim and Amiran	Irrigation finance packages	Netafim, in partnership with Kenyan agriculture supplier Amiran, microfinance consulting firm Conexus, and Kenyan banks, is bringing drip irrigation packages to smallholder farmers. Kits are available in 250 square meter, 500 square meter, and one-acre sizes along with training and after sales services and starter packages of seeds and fertilizer. To help facilitate the upfront investment, the partners are developing a consumer loan product with commercial banks that includes an initial grace period with an 18-month payback. The financing component specifically targets women clients (50 percent) and offers a lower down payment and fewer collateral restrictions than ever before. In addition, the local extension provided by Amiran helps mitigate risk of crop failure

1.8.3 Barriers to access credit

1. Fruit production is a long-term investment with two or more years of no harvest after the establishment of the orchard. This may pose challenges to financial services providers. However, financial products could benefit producers with already productive orchards and especially for the purchase of inputs.
2. Farmers find the loan application process tedious while others fear the consequences of defaulting as most farmers can only access loans as a group and therefore one farmer defaulting could have consequences for the others.
3. Farmers have also indicated that loans are very risky due to the uncertain nature of rain-fed agriculture⁴⁸.
4. There remain capacity gaps particularly with respect to the development of climate change and climate finance policies, and the establishment of special purpose account climate financing.

1.9 Opportunities for the CRLCSA project

i. Implementaton of climate/temperature-controlled storage

With Kenya's plan to increase export market as well as considering the expected impact of climate change (increased temperatures, humidity, rainfall, drought, heat extremes), temperature-controlled storage infrastructure will become even more important. This will offer increased opportunities for value addition in Kenya.

ii. Promote adoption of cold chain solutions along the value chain

As fruits are highly perishable and have less shelf-life during the peak harvesting period the market gluts reduce prices of fruit. Cold storage facilities are crucial for maintaining produce quality, prolonging product shelf life, and minimizing traffic jams during peak production.

iii. Funding the grower schemes

The declines in smallholders supply linked to the concerns of supermarket buyers about issues such as consistency of product characteristics and product quality, maximum residue levels for pesticides and social and environmental issues such as child labor and handling and use of pesticides. While these problems can be overcome through grower schemes, the schemes become increasingly expensive as the levels of traceability, monitoring and verification increase. Realizing the value-addition potential of crops through better farmers' organizations, extension services, and research and development support.

iv. Investment in and encouragement of irrigation farming,

This will help to increase agricultural productivity and improve resilience to climate change risks. Climate change has made rain-fed agriculture less reliant. Because fruit value chains require economies of scale, the right balance between promoting smallholders and developing large-scale and capital-intensive farms is paramount for competitiveness.

v. Strengthening the environmental sustainability of horticulture production.

Sustainable horticultural practices may reduce production input, reduce environmental impact, increase resource use efficiency, and improve water body and soil biodiversity.

vi. Interventions are needed at marketing level

Access to markets is still a challenge for many small holder fruit farmers. Supporting market access would provide incentives for smallholders to invest in seed and other inputs that would increase their productivity. Demand for products derived from organic, sustainable, and equitable production practices is increasing nationally and globally, with demonstrated customer willingness and ability to pay price premiums for quality products. Incoming regulations regarding coffee and tea imports into EU, for instance, and increasingly stringent phytosanitary rules at national and global levels are gradually reorienting demand towards climate resilient, low-

⁴⁸Barrett, H. R., Ilbery, B. W., Brown, A. W., & Binns, T. (1999). Globalization and the changing networks of food supply: the importation of fresh horticultural produce from Kenya into the UK. *Transactions of the Institute of British Geographers*, 24(2), 159-174.

carbon commodities. It will become important to position Kenyan farmers and agribusinesses in this evolving market without excluding smallholder farmers, who face more significant constraints to reorient their production.

Organization to work with credit agencies to develop financial products that are accessible by smallholder fruit growers.

Fruit like mango and avocado provide high annual returns but require investment and a long start-up period of up to five years. This would give more farmers incentive to invest and maintain the fruits.

vii. Develop the basic business and accounting skills of farmers

Training farmers on how to 'farm as a business' by using the available market information to make informed decisions (e.g., crop selection), maximize their final selling price and access loans to invest in climate resilient and low carbon practices.

viii. More linkages established between nursery operators and fruit farmers

These would solve the issues of farmers buying seedlings that are of poor quality from the sides. These would help farmers have more information on different improved fruit varieties that are resistant to climate change pests and diseases and are high yielding.

ix. Support farmers to meet certification standards

This could be done through establishment of more collection centers.. Collection centers are a locations where farmers take their produce for selling to the local and regional markets, through traders. They serve as a central point, which brings together the most important value chain actors like farmers, traders and transporters. Collection centers bring together many buyers ; this is a leverage to farmers because they are sure to sell their products, offering favorable prices, market information, and security of farmer's stocks. They also encourage and support farmers to try diverse ways to work together to supply large quantity products of produces and sharing the resulting profit (E.g., Market committees). They will be able to attract traders and institutional buyers and increase their negotiating power.

2 DAIRY VALUE CHAIN

2.1 Performance

The dairy value chain is one of the key value chains in the agriculture sector contributing about 4% to the national GDP. In Kenya, dairy is a vibrant sub-sector with an estimated value of 4.5% of the GDP, and 12% to the national GDP, employing over 1.7 million citizens and growing at a rate of 5% per year. At the national level, the Kenya government has prioritised dairy among the productive sectors in the country's vision 2030 blueprint and the Agriculture Sector Transformation and Growth Strategy (2019-2029).

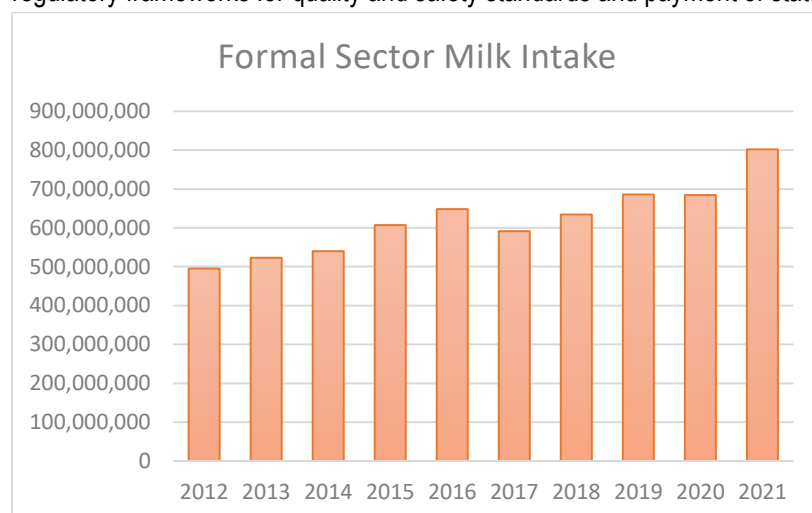
The key Counties where dairy has been prioritized as a key value chain in the LREB region are Kisii, Kericho, Kisumu, Migori, Nyamira, Transzoia, Vihiga, Kakamega and Homabay.

The sector provides livelihoods to about 1.8 million rural households in Kenya, who produce about 80% of the total domestic milk. The sector has been growing at an estimated rate of between 3–4% annually. The contribution of cattle milk has been growing with increased total national milk production. Reliable statistics estimate that the country has close to 6.8 million dairy cattle, of which 3.2 million are lactating annually.

Driven by growing urban demand, national per capita milk consumption is expected to grow at an annual rate of 2.8 percent for the next ten years, from 106 liters per person in 2012 to 139 liters by 2022. The total national milk consumption will grow at 6 percent per year to reach 8.0 billion liters, because of population growth. Analysis suggests that urban milk demand will grow at an annual rate nearly double that of rural demand over the same

period to 3.91 billion liters. Kenya will require an additional 3.52 billion liters of milk by 2022 (79 percent over the 2012 levels) to satisfy demand, with urban areas accounting for 59 percent of the total growth⁴⁹.

Previous estimates have shown that small scale producers were producing between 70% and 80% of the milk while the large-scale dairy farming was accounting for between 30% and 20% of the national milk production⁵⁰. The dairy value chain is broadly divided into informal and formal market channels, based on compliance with regulatory frameworks for quality and safety standards and payment of statutory revenues.



2.2 Estimated production costs for dairy in Kenya⁵¹

	Estimated production costs (USD or KES/ha/year)	Average production (litres/ha/year or farm/year)	Product prices KES per L
Assumptions based on VC analyses	Average cost of milk production = KES 13.02 per litre. Open grazing system have the lowest costs (KES 10.57), due to lower feed costs. Zero grazing system have the highest cost (KES 17.81).	Average production of MILK per cow = 7-8 litres per day. Average production per lactation is between 2,000-2,400 litres per cow per year	Average farm gate price is Kes 35 (in the dry season, prices go as high as Kes 50)
References	Tegemeo Institute. Report a Study on Cost of Milk Production in Kenya, 2021	Tegemeo Institute. Report a Study On Cost of Milk Production in Kenya, 2021	Kenya Dairy Board Website

2.3 Average annual income per household for dairy value chain

Table Incomes achieved by Dairy Smallholders using Basic and Improved Systems (USAID-KAVES Annual Report 2016)

Farming Practices	BASIC	IMPROVED
REVENUE (1,000 lts/pa)	KSh	KSh

⁴⁹ USAID-KAVES Dairy Value Chain Analysis, 2014August

⁵⁰ Milk Production and marketing 2013

⁵¹ Dairy Value Chain Analysis, FAO 2023

Milk sales	145,600	674,506
Calf and cull cows	97,808	179,506
Manure sales	-	24,500
Milk consumed	21,900	21,900
Manure used at home	31,500	98,000
Total Gross Revenue	296,808	998,412
PRODUCTION COSTS		
Annual pasture crops	-	695
Bought feed	74,780	123,740
Recurrent veterinary	40,660	57,300
Selling expenses	7,072	38,543
Reproduction	6,000	8,000
Overhead and hygiene	33,579	76,457
Hired labor	60,000	62,000
Total Gross Revenue	222,091	366,736
PROFIT		
Total cost per liter of milk produced	36	17
Total gross profit	(26,462)	400,678
Total net profit	(54,591)	329,670
Total net profit from milk, calves, culls	74,717	631,677

2.4 Analysis of the overall market demand for Dairy

Almost all Kenyan production goes to satisfy local demand. Kenya has about 34 active milk processors. Although the market for processed milk and milk products grew strongly over the past 10 years, approximately 70-80% of the milk is distributed to the consumer through the raw milk market⁵².

Export Trade in dairy products is insignificant. Net imports represent only about 0.5% of total milk produced in Kenya. Milk powder makes about 70% of imports by value and is mostly used by Kenyan dairy processors during dry season to constitute fresh milk. New KCC and Brookside are the only processors in Kenya with the capacity to process milk into powder⁵³.

Currently, the annual milk production is about 5.2 billion litres with the bulk being cow milk (3.9 billion litres) and this is projected to grow to about 12.6 billion liters by 2030⁵⁴. It has been reported in the year 2022, the country is facing a deficit of between 1.275 and 3.53 billion litres of milk per year. The per capita consumption of milk and dairy products is also projected to double by the year 2030, fueled by urbanization, increasing per capita consumption and high population growth⁵⁵.

⁵² Ettema, F, 2015. Dairy Development in Kenya

⁵³ Auma, J., Kidoido, M. and Rao, J. 2017. Feed the Future Accelerated Value Chain Development (AVCD) Program: Dairy component value chain analysis. Nairobi, Kenya: International Livestock Research Institute (ILRI).

⁵⁴ Ingasia, et al 2020, Milk Vending Machines in Kenya's Retail Market: Trends and scenario analysis

⁵⁵ Rademaker, I.F., R.K. Koech, A. Jansen, and J. Lee, 2016. Smallholder Dairy Value Chain Interventions. The Kenya Market-led Dairy Programme (KMDP) status report. Wageningen UR Centre for Development Innovation. <https://library.wur.nl/WebQuery/wurpubs/fulltext/395978>

Export opportunities are mainly in the Eastern and Southern African region. In 2014, exported milk and dairy products were worth KES 1 billion⁵⁶

Due to increased demand in Kenya and relatively low production costs in Uganda, Kenya is currently a net importer of milk. Production of value-added products such as milk powder, ghee, yoghurts and cheese are growing, but overall, still low. Enforcement of quality standards is insufficient. From an import–export perspective, these are important weaknesses.

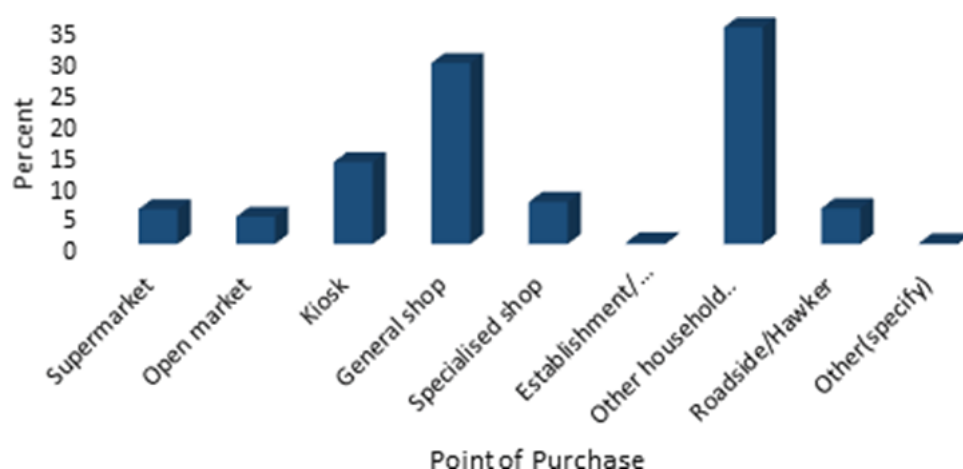
A regional market for Kenyan dairy products is widely available because of free movement of dairy products within the East African Community (EAC) and tripartite regional arrangements involving EAC, Common Market for Eastern and Southern Africa (COMESA) and Southern African Development Community (SADC) facilitating regional trade. In the broader African region, demand for milk is expected to increase across the board following increasing populations, urbanization, and rising incomes.

The rising demand presents several opportunities for sector-wide and project specific interventions. Unfortunately, production remains non-commercialized, heavily rain-dependent, and the market is still highly informal. The informality of the market sector is, therefore, holding back investment in processed dairy products. The situation is exacerbated by climate change that has seen the country experience frequent droughts.

2.5 Market Profile

Milk is collected at collection centers or farm gate by cooperatives, individual traders, or milk processors after which it is transported either to the market as raw, to a chilling plant or to the processor. Chilling and bulk cooling facilities in Kenya are either owned by cooperative societies, cooperative unions, collecting agents for processors or government-installed facilities.

The other key players at this node are formal and informal traders who purchase milk directly from producers or dairy cooperatives and transport it in aluminum containers and sell either directly to consumers, milk bars or milk processors. The formal traders are licensed to trade in milk by KDB and use the recommended transportation and packaging equipment. These main purchase points are supermarkets and kiosks. The distribution of the sales volumes is as shown in the figure below. The biggest volumes were sold by households, possibly from one neighbor to another while the general shop sold a substantial volume of milk. The other players in the retail sector include milk traders/hawkers and milk bars with over 1600 registered milk bars according to Kenya dairy board.



⁵⁶ KDB 2015

. Most dairy farmers have formed dairy cooperatives through initiatives by NGOs and the government which is key in passing any form of communication to the farmers. The milk buyers mostly relay their milk quality and quantity demands to farmers through cooperative officials. Price negotiations are also done at the cooperative level. Milk payments to farmers are done every end month based on milk amount delivered at the cooperative. Record keeping is therefore very crucial at the cooperative level. Some cooperatives have piloted quality-based milk payment systems where farmers are paid based on quality delivered. There are however many challenges due to the nature of production that is smallholder dominated.

2.6 Terms of payment at the end of the sale of the Dairy

Milk payments are mainly done per quantity of milk purchases. In a study by Kenya Dairy Board in 2020, the average gross margin (GM) per litre of milk produced was KES 21.69⁵⁷. In all production systems, variable costs such as purchase of feeds constitute the largest proportion of production costs and, therefore, managing yield remains the most important driver of profits. Active management of production costs and reducing seasonality of feed availability are key strategies to achieving greater yield management in commercial dairy production⁵⁸. " The cost of purchased feeds alone constitutes about 53% of the cost of milk production and up to 70% when the opportunity cost of own fodder is included"⁵⁹.

Milk packaging is a critical component in milk marketing and quality control, however, the conventional milk packaging materials are costly resulting in high and unaffordable prices of packaged milk. As a result, there is a tendency to package milk in non-food grade materials that are unhygienic and environmentally unfriendly. Moreover, there has been a shift from packaged milk to unpackaged milk through emergence of milk ATMs in response to demands of low-priced milk by the low-income groups.

Of the milk processed, 85 per cent is sold as fresh milk either as short life pasteurized milk or long-life UHT milk while 3 per cent is processed to make yogurt, 7 per cent as fermented milk and 3 per cent is sold as powdered milk. The remaining 2 per cent is processed with value-added products such as cheese and butter⁶⁰.

2.7 Government intervention in value chains

Breeding

The Kenya government through the Department of Livestock Production has previously made deliberate efforts to improve local dairy breeds by enhancing farmer accessibility to breeding services through subsidized AI services. However, the structural adjustment programs initiated in the early 1990s forced the government to liberalize AI services and allowed several players into the sector. These changes had varying implications on smallholder dairy farming, particularly on access to breeding services. The expectations that the private sector would fill the gap left by the government and provide affordable services to the farmers were not fully realized.

⁵⁷ Tegemeo Institute. Report on a Study On Cost Of Milk Production In Kenya, 2021

⁵⁸ Ibid

⁵⁹ Report on a Study on Cost of Milk Production in Kenya, KDB 2021

⁶⁰ KDB, 2017

Other than Kenya Animal Genetics Resource Centre (KAGRC) which is the governments genetic resource centre that produces semen for sale to farmers through the private sector, genetics in Kenya is mainly private sector driven. Several companies import semen while the Artificial insemination (AI) service is provided mainly by private providers.

Often, the breeding goals of local dairy farmers and the breeding organizations that control semen supply are not always well aligned, ultimately affecting the rate of genetic progress in semen importing countries. At the farm level, farmers face challenges of missed cycles due to lack of knowledge and skills on cycling and heat detection, unethical practices by inseminators and wrong choice of breeds among others. This has led to high cost of obtaining AI services with some farmers resulting to use of bulls.

Fodder

One of the measures that have been taken by government and development partners is the introduction of hybrid fodder varieties suited for different Agro-Ecological zones. Institutions such as CIAT, ILRI and KALRO have run trials and introduced forages to different parts of the Country. In some parts of the LVB, USAID's Feed the Future program AVCD and KCDMS has played a key role in introducing climate smart practices and forage production and conservation strategies to small holder farmers.

Extension services The bulk of extension services costs are spent on staff remuneration leaving a small proportion for facilitation and infrastructure development. The staff to farmer ratio (1 :5000) is also very low. This inequitable resource allocation affects basic extension services such as travel, transport, communication, demonstrations, tools to seek new information and/or adopt new technologies from research. The result has been limited follow-up of extension and advisory services leading to low adoption of new dairy technologies and productivity. In addition to the extension services provided for by the government, there are other extension service providers mainly from the research institutions, universities, development partners, NGOs, private companies among others.

2.7.1 Direct government and project/program interventions

- i. **Kenya Market Led Dairy Program (KMDP) implemented by SNV**
Funded the Dutch Ministry of Foreign affairs that focused on improved productivity and quality of milk.
- ii. **Kenya Market Led Dairy Supply Chain Project (KEMDAP)** implemented by Heifer International.
- iii. **Smallholder Dairy Project** jointly implemented by the Ministry of Livestock Development (MoLD), the Kenya Agricultural Research Institute (KARI) and the International Livestock Research Institute (ILRI), with primary funding from the UK Department for International Development (DFID);
- iv. **Kenya Dairy Sector Competitiveness Program (KDSCP)** which was a 5-year effort to improve Kenya's dairy industry competitiveness, and implemented by Land O'Lakes, Inc., with financial and technical support from USAID.
- v. **Smallholder Dairy Commercialization Programme (SDCP)** an IFAD funded project which was implemented by the Ministry of Livestock Development ;
- vi. **East African Dairy Development (EADD) Programme** funded by the Bill and Melinda Gates Foundation and implemented by the Heifer Project International, TechnoServe and ILRI;
- vii. **Kenya Dairy Project (KDP) funded by private donors and implemented by Technoserve Inc.** in Nyala in Nyandarua North, Sabatia Dairy Farmers Cooperative in Eldama Ravine, Ndumberi Dairy Farmers in Kiambu and Muki Dairy in North Kinangop (Land O' Lakes, 2008).
- viii. **Kenya Crops and Dairy Market System Development program (USAID, RTI)**

The KCDMSD program is part of USAID's Feed the Future, the U.S. Government's global hunger and food security initiative that helps to increase agricultural production and reduce poverty and malnutrition in Kenya. The KCDMSD activity implemented in 12 Kenyan counties and designed to spur competitive, resilient market systems in Kenya's horticulture and dairy sectors. The programme focused on strengthening the following value chains : dairy, fodder/feeds, and horticulture (mango, passion fruit, avocado, banana, pineapple, and sweet potato). Grants range between KES 2.5 million and KES 25 million and 50% co-funding.

ix. Kenya Agricultural Value Chain Enterprises (KAVES)

The Kenya Agricultural Value Chain Enterprises (KAVES) activity collaborated with smallholder farmers, businesses, and national and county government partners to address constraints up and down the value chain (such as agro-processors, input suppliers, transporters, exporters, retailers, financiers) and develop fully-functioning, competitive value chains.

2.7.2 Policies and regulations in the Dairy value chain:

The National Livestock Policy and the Kenya National Dairy Master Plan, and both are anchored on the Agricultural Sector Development Strategy and Vision 2030. The strategic vision of the Kenyan National Dairy Master Plan is "to transform milk production and trade into an innovative, commercially oriented and globally competitive dairy value chain by 2030". There are four strategic action plans for realizing this and their focus is increasing productivity and competitiveness; efficient delivery of demand-driven services by public and private sectors; formulating beneficial working policy and regulations, infrastructure, and enforcement; and mainstreaming cross-cutting issues into dairy value chain development.

Table 2: Dairy Regulatory Framework

Value chain element	Policy Framework	Legislative Framework	Responsible organization	Aim
Entire Value Chain	Kenya Vision 2030 Agricultural Sector Development Strategy (2010-2020) National Livestock Policy (2008, 2013,2019). Kenya National Dairy Master Plan (2019)	Dairy Industry Act (1984/2012)	KDB	Regulation, development and promotion of dairy sector
Input (FeedSupply)		Standards Act (1981 / 2012)	KEBS	Setting and controlling standards or codes of practice for commodities produced or imported into Kenya

Input (FeedSupply)		Fertilizers and Animal Foodstuffs Act(1985 / 2012) Standards Act Cap 496 Animal Feedstuff Bill (Currently Under review)	State Department of Livestock (Veterinary Services)	Regulation of the importation, manufacture and sale of agricultural fertilizers, animal foodstuffs and substances of animal origin intended for the manufacture of fertilizers and foodstuffs
Input (Reproductive Services and Breeding)		State Corporation Act with respect to Order No. 112 (2010 /2012) and Gazette Notice No. L.N 110 (2010)	KAGRC	Production, preservation, and conservation of animal genetic material (semen, embryo, tissue and live animals) and rearing of breeding bulls for provision of high-quality disease- free semen to meet the national and export demand
Input (Reproductive Services and Breeding)		Draft Livestock Breeding Bill (2015)	Proposed : Kenya Livestock Breeding Board	Regulation of livestock breeding and establishment of a livestock breeding board Training and provision of equipment to inseminators
Input (Veterinary Services)	Kenya Veterinary Policy (2014)	Veterinary Surgeons and Veterinary para-profession Act (2011/2012)	KVB	Training, registration and licensing of veterinary surgeons and veterinary paraprofessionals and provision for matters relating to animal health services and welfare
Input (Veterinary Services)		Animal Disease Act (1989/2012)	MoALF - Department of Veterinary Services	Regulating matters related to animal diseases
Input (Veterinary Services)		State Corporation Act (2012/2010) with respect to Legal Notice 223 (1990)	Kenya Veterinary Vaccines Production Institute	Undertaking research and development with respect to new vaccinesand the production and distribution thereof
Input (Research and Extension Training)		Kenya Agricultural and Research Act (2013)	KALRO	Promotion, streamlining, coordination and regulation of agricultural and livestock research and expedition of equitable access to research information, resources and technology and promotion of the application of research findings and technology in the field of agriculture

Input (Research and Extension Training)		Technical and Vocational Education and Training Act (2013)	TVET Board TVET Curriculum Development Assessment And Certification Council	Licensing, registration, and accreditation of institutions and trainers, as and regulation on training institute organization and training quality and relevance
Human Resource Development		Draft Livestock Breeding Bill (2015)	Naivasha Dairy Training Institute Animal Health Institutes ATCs/PTCs	Capacity building and training
Processing (milk bulking, chilling and processing ; Feed manufacturing)		Environmental Management And Coordination Act (2012 (1999/2006)	NEMA	Environmental protection, impact assessment, monitoring and restoration/streamlining of handling transportation and disposal of various types of waste to protect human health and the environment

2.8 Summary of difficulties encountered by producers and buyers, and support needed

2.8.1 Strengths and obstacles encountered in the dairy sector

The selected VCs offer strength, opportunities, threats and weaknesses as detailed in the table below.

Table 4: SWOT analysis for Dairy Value chain

Dairy VC			
Strengths	Weaknesses	Opportunities	Threats
<p>Relatively well-established sector with diverse input and services markets.</p> <p>Diverse financial services (banks, MFIs, SACCOs) offering agriculture (dairy farming) financial products.</p> <p>Strong history of keeping cattle ; large livestock population with availability of quality dairy genetics.</p> <p>Widespread market distribution network for milk and dairy products.</p> <p>Growth in formal processors with incentives for milk suppliers.</p>	<p>High cost of production; low milk quality ; high milk losses ; high consumer prices</p> <p>Low overall value addition due to ¾ of milk sold raw.</p> <p>Poor access to and quality of inputs and services (feeds, AI, extension equipment, etc.).</p> <p>DVC fragmentation and low supplier loyalty</p> <p>Low bargaining power of smallholders.</p> <p>Processor oligopoly.</p> <p>Few appropriate financial products for dairy sector (rigid conditions and high interest).</p> <p>Limited data availability and poor record keeping in the sector ; accusations</p>	<p>Growth in commercial and on-farm fodder production and conservation, fodder</p> <p>Contracting services and feed rationing at farm level.</p> <p>Adoption of climate smart practices</p> <p>Increased demand for, and improved, services (AI and animal genetics, animal health, heifers, vaccines, drugs).</p> <p>Provision of embedded services by DFCSs to reduce side-selling.</p> <p>Combining insurance with credit packages to reduce risks for banks/MFIs and enhance access to finance.</p> <p>Growing domestic and regional markets.</p> <p>Growing demand for diverse dairy products and expanding</p>	<p>Decreasing farm sizes.</p> <p>Public concerns with Milk quality (aflatoxin, Antibiotics, microbial).</p> <p>High fodder and animal Disease and zoonoses Incidence (ECF, FMD, TB, brucellosis).</p> <p>Road infrastructure, transport facilities not up to par in all areas, high cost of power.</p> <p>Environmental degradation and climate change impacts (e.g. increased risk of disease outbreaks).</p> <p>Danger of market distortions through donor investments.</p> <p>Cheap milk imports from Uganda threaten market for domestic milk.</p>

Dairy VC			
Strengths	Weaknesses	Opportunities	Threats
	<p>of unethical practices by feed suppliers and milk traders.</p> <p>Weak governance and management capacity of cooperatives to operate effectively.</p>	<p>possibilities in value addition attracting investors.</p> <p>Entry of young farmers willing to commercialize dairy (inheriting or leasing land).</p> <p>Large tract of land available in some regions for medium- and large-scale dairy farms (from 50 to 5,000 acres).</p> <p>Use of ICT options to enhance data collection and record keeping.</p> <p>Exploration for QBMPs and feed quality testing.</p> <p>Many counties have prioritized dairy sector development with big plans for investment.</p>	<p>Poor quality feed resources imported from neighboring countries.</p> <p>Low attractiveness of sector for foreign input suppliers.</p> <p>Protectionist policy (Taxes for milk imports from non-EAC countries).</p>

2.8.1.1 Difficulties encountered by buyers to access the best products and reach markets.

1. Low skills and knowledge level of almost all farmers (small, medium, and large-scale).
2. Low level of commercialization by smallholders (dairy not the core business).
3. High cost and seasonality of raw milk production due to low ability/skills to produce and preserve quality fodder.
4. Inefficient and high cost of milk collection and cold chain development (hence : High cost and low quality of Milk at factory gate).
5. Lack of loyalty between value chain actors and high fragmentation.
6. Lack of credible input suppliers and service providers.
7. Large raw milk market and lack of level playing field for the formal sector.
8. Lack of clarity on a common vision among stakeholders about how to steer the dairy industry into a more sustainable growth path.
9. Ineffective sector regulation : Policies in place, but not enforced on the ground,

2.8.2 Existing financial services in the project target Counties

Tableau 3: Existing financial institutions in the dairy VC⁶¹

Institution	Financial service	Specifications
Family Bank	Dairy Financing:	These loans are targeted towards meeting personal needs or short term working capital of individual farmers, cooperatives, chilling plants and milk bulking agents.
	Dairy Instalment Sale Loans:	This medium-term asset loan enables dairy farmers to purchase assets that enhance their dairy revenue-earning capacity e.g. milking and transport equipment etc.

⁶¹

<https://www.canr.msu.edu/hrt/research/usaidd/Appendix%20-%20List%20Financial%20Institutions%20in%20Agriculture.pdf>

Kenya Commercial Bank	Dairy Herd Improvement Loans:	This medium term semi working capital loan allows farmers to boost production by giving them financing to buy better breeds of dairy cows
Kenya Women Finance Trust	Dairy Farming loans:	KWFT has a Dairy Farming Loan that enables dairy farmers to invest in high breed dairy cows for better productivity and an insurance cover for the cow purchased.
	Maziwa Plus Loans:	To enable Dairy groups/ associations, societies, individuals and dairy companies access loans for dairy production and value addition equipment including buying additional cows and chilling equipment.
	Dairy goat farming:	KWFT supports dairy goat farming by enabling farmers to purchase quality dairy goats.
	Agro-dealer loans:	This loan targets financing of agro-dealers involved in agricultural value-chains, such as agro-vets, commodity traders, etc.
Equity Bank	Kilimo Biashara (input loan)/ Kilimo Kisasa (asset loan)	Loans backed by Kenyan Govt in 2008 (in collaboration with Ifad and AGRA)
	Loans for dairy farmers	
SMEP Microfinance Bank	Dairy farming loan.	This is financing farmers to enable them purchase quality dairycows.
	Livestock financing	This is financing for purchase of inputs, quality breeds and equipments for modern farming in livestock like dairy goats, beef goats, pigs, rabbits, poultry, fish, and beekeeping value chains
Jamii Bora Bank	Loans for dairy producers	The loan is intended at enhancing production efficiency and boost returns for the dairy producers through improved access to better breeds of dairy cows (herd).
Agri finance Corporation	Government Financial Institution	Agribusiness loans : These are loans designed to benefit agri-business traders. It is meant to provide start-up capital for those seeking to start, or are engaged in agricultural microenterprises. Microfinance group loans : A micro-credit facility targeting groups trading in agricultural produce and agricultural inputs particularly the youths and women who have no tangible security to secure credit. Stawisha Group Loan is in 3 levels which will allow groups to access a higher amount as they successfully grow their business.

2.8.3 Barriers to access credit

1. Despite there being a variety of formal and informal credit services and providers, the accessibility of the dairy farmers to financial services remains poor. This emanates from the unwillingness and lack of interest by the financial services providers due to the high risk borne by the smallholder dairy producers.
2. Inadequate collateral,
3. Limited information on different credit products offered by credit service providers,
4. Inadequate guarantor ship.
5. Lack of leverage and the risk of losing property in case of a default,
6. High interest rates,
7. Complex and complicated documentation process,
8. Short-term nature of credit demanded by financial institutions
9. Insufficient information about financial institutions offering credit and credit products⁶².
10. For commercial banks, dairy businesses represent relatively high risk due, for example, to dependence on variable weather, unclear markets, and financial illiteracy of many dairy farmers and that they lack formal collateral because of the inadequate property registration system.

⁶² Ibid

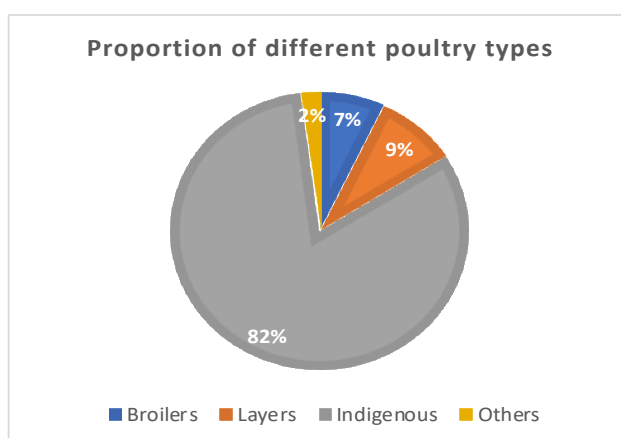
2.9 Opportunities for the CRLCSA program

- i. The project could support dairy sector through introduction of drought tolerant pasture; development of feed storage facilities; training on fertility cycle monitoring and input subsidies to farmers; establishment of emergency fund to insure producers; introduction of drought- and disease-tolerant breeds.
- ii. Establishment of climate-proofed milk collection and processing plants; strengthen use of flooding early warning systems.
- iii. Improve access to high-end markets; increase farmers' access to insurance products and contract milk farming.
- iv. Support dairy farmers' access to financial services and insurance products and contract milk marketing.
- v. Smallholders are very much exposed to seasonality. Some of the seasonality may be removed just by instituting good feeding planning practices where forage is bought at a low price when it is abundant and used during the dry season when its price is high, and pasture is not available. Farmers' knowledge of animal's feeds should be improved since rising costs of commercial feeds drive the cost of production up.
- vi. There is a high level of taxation for yogurt processing versus other forms of processing. The project could work with KDB on establishing neutral taxation policy.
- vii. Strengthening the governance and managerial capabilities of cooling plant operators and fostering public-private partnerships to establish more milk cooling centers is crucial. In Kenya, the poor cold chain is a recognized problem for the dairy sector. Cold chain is non-existent in the informal dairy market, and even in the formal market some milk is not cooled until it reaches a processing plant. Cooling at farm level is rare, since most farmers lack reliably electricity access and refrigerators require a sizeable upfront investment. Village collection centers generally lack cooling equipment. The ones issued by the government are no longer functional or are not connected to the grid.
- viii. Reduce barriers in access to credit to address the high interest rates and collateral requirements; support financial packages that combine insurance with credit; encourage borrowing in collectives.
- ix. Develop joint regional investment promotion strategies to increase the region's capacity to produce dairy products for export.
- x. Improve equitable participation of women, men, and youth in the opportunities offered by dairy production and marketing businesses by targeting existing or emerging dairy POs as crucial actors in the value chain that provide newer, promising spaces for local dairying households and communities.
- xi. To help avoid duplication of efforts, the government, regulatory agencies, and dairy sector stakeholders should create forums with all stakeholder representatives.
- xii. Prioritize facilitating regional trade and exports from the region, given the binding constraint of weak domestic ability to pay for higher value products.
- xiii. Increase cooperation between public and private parties, as well as the connections between them and global development initiatives.
- xiv. Facilitate more ongoing trainings for farmers on fodder production, fodder conservation, and the use of alternative feeds from extension service providers, farmer cooperatives, and the government.

3 POULTRY VALUE CHAIN

3.1 Performance

Figure 6 Proportion of different poultry types in Kenya



In Kenya, the poultry production increased from 44 million heads in 2016 to about 57 million heads in 2020⁶³, and contributes around 8 percent of agricultural GDP⁶⁴. The indigenous chicken form the largest proportion of 82%, layers 9% and broilers 7%, while other poultry species which include guinea fowl, turkeys, ducks, and geese make up 2 %⁶⁵. Poultry farming is mostly practiced on small-scale, and predominantly for domestic consumption. The value chain is characterized by dualism, comprising both smallholder and large-scale poultry producers. The former are the majority keeping small flocks of up to 30 birds⁶⁶. Notably, approximately 71%

of eggs and poultry meat in Kenya are produced from indigenous poultry⁶⁷.

The poultry production systems in Kenya include free-range ; semi-intensive poultry system ; and intensive commercial systems. The extensive systems are spread all over the country. The description of each system is presented below in table 4.

Table 5. Poultry Production systems in Kenya

Production system	Description
Intensive production system	Broiler farming in Kenya is practiced in urban and peri-urban areas, such as around Nairobi and Kisumu. This system requires little space and exotic birds mainly sourced locally or imported from Uganda. Birds are kept in large hangar and fed compounded feed. This system is market oriented. It is estimated that over 3 million broiler chickens are raised in Kenya, in small, medium, and large farms. Flock sizes per cycle vary from 50–500 (small scale) through 500-10 000 (medium) to over 10 000 (large and integrated farms).
Semi intensive production system	Farmers keep flocks of 30 to 100 birds confined in simple structure. The birds are both indigenous and exotic, birds are provided with feed supplements. Farmers sell most of the birds, though some are self-consumed. Semi-intensive production system is practiced throughout the country. The exact number of semi-intensive farms is not known, though experts estimate they likely keep up to a third of all chickens in the country.
Extensive system (free range)	This is a low-input low-output system where birds are left to freely roam for feed. Farmers keep flock ranging from 5 to 30 local birds, often managed by women and children. It is a subsistence-oriented system, with little and opportunistic informal marketing. Although popular throughout the country, free ranging is predominant in

⁶³ FAOSTAT. 2022. Available online at: <https://www.fao.org/faostat/en/#data/QCL> (accessed November 2022).

⁶⁴ ASL2050 FAO (2017)

⁶⁵ MOLFD, 2012

⁶⁶ Kingori, A. M., Wachira, A. M., & Tuitoek, J. K. (2010). Indigenous chicken production in Kenya: a review. *International Journal of Poultry Science*, 9(4), 309-316.

⁶⁷ Nyaga, P. (2007). Poultry sector country review, FAO Animal health, and production Division.

	western Kenya regions, some parts of lower eastern, north Rift areas and coastal areas
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Source : ASL 2050 FAO⁶⁸

Several County Governments across the country have prioritized investment in the improved indigenous chicken value chain because of its socioeconomic importance to the rural communities. In the past two decades, the sector has undergone major structural changes due to the introduction of modern intensive production methods, genetic improvements, improved preventive disease control and biosecurity measures, increasing income and human population, and urbanization. These changes present tremendous opportunities for poultry producers, particularly smallholders, to improve their farm income and resilience. This study covers 5 counties namely, Bungoma, Kisumu, Trans Nzoia Vihiga and Nandi. The key production statistics at county level are highlighted below and thereafter general productivity trends in the region.

Bungoma

There are a total of 197,318 households who keep livestock in Bungoma County. Out of these, 161,433 households, or 82%, rear indigenous chickens. About 90% of the county's population is involved in this value chain, most at a small-scale level. There are a total of 1.2 million local chickens in the county, with a total value of about KShs 596 million⁶⁹. Poultry is kept so widely in the county because it is easy to manage through free range production, its feeds are readily available, and it is a key product with a huge market across the county⁷⁰. In efforts to improve the value chain, the county government has leased Chwele Chicken slaughterhouse to Shiffa Chicks (a private investor) for 20 years in a bid to revive the slaughterhouse. Shiffa sources indigenous chicken from small holder farmers, slaughter, packages and sells between Sh600 and Sh750 per chicken⁷¹. The County Government has also partnered with British government through the Sustainable Urban Economic Development programme, SUED to boost sectors of urban infrastructure and agriculture specifically hatchery and feed mill, among other integrated activities in the poultry value chain.

Kisumu

On average, 93% of the households in Kisumu County rear chicken, either under free range (traditional), semi-intensive (backyard), or commercial-intensive production systems, though the free-range system is the predominant. In 2014, 78% of the poultry production in Kisumu County came from indigenous/local chicken. The county's annual poultry meat and egg production is estimated at 69,172 Kgs and 1,012,266 respectively⁷². Kisumu county has a Chicken slaughterhouse at Mamboleo in the outskirts of the city, which charges Kshs. 10/bird while the meat inspector is paid Kshs. 2 per bird.

Trans Nzoia

Rearing indigenous chickens is a low-capital enterprise that attracts many farmers. Indigenous chickens are reared by almost all the farming households in Trans Nzoia County that practice mixed cropping and livestock rearing. They are kept for both meat and egg production at subsistence and commercial levels. There are an estimated 693,730 birds in the county, producing about 208,119 kgs of meat. Around 90% of the population participates in the value chain⁷³.

Vihiga

⁶⁸ Africa Sustainable Livestock (ASL) 2050 Livestock production systems spotlight Cattle and poultry sectors in Kenya. FAO. Nairobi

⁶⁹ ASDSP. 2014. Bungoma County, Nairobi, Kenya

⁷⁰ Kenya County Climate Risk Profile: Bungoma County

⁷¹ farmkenya/article/2001419169/chicken-abattoir-in-bungoma

⁷² Kisumu County Integrated Development Plan, 2013-2017

⁷³ Kenya County Climate Risk Profile: Trans Nzoia County

Indigenous chickens are reared by most households in Vihiga County. Over 80% of the county's population is involved in the different nodes along the value chain. Indigenous chickens have been associated with the culture of the indigenous communities residing in Vihiga County, which helps account for their popularity.

Nandi

Indigenous chickens are at the center of a popular household enterprise in Nandi County, where about 90% of the population keeps chickens. Most of these chicken farmers are small-scale producers, with each household holding an average of 10 chickens. Nandi County has about 700,000 birds of which 93% are indigenous chickens, 5% are laying chickens, and 2% are geese and turkeys (County Government of Nandi, 2018)⁷⁴. The County Government of Nandi through ASDSP Programme has undertaken various poultry projects across the county which include development of viable option innovations to increase productivity of indigenous chicken value chain through utilization of high-capacity incubators, hatchers, and brooders. Two modern poultry incubators have been installed at Kaimosi Agricultural Training College (ATC) with capacities to process 2112 eggs each, in a single hatching and 4 brooding panels with capacities to brood 700 chicks each. The government through the National Agricultural and Rural Inclusive Growth Project (NARIGP) has facilitated farmers access improved indigenous breeds like Kenbro, Kuroiler, Kari, and Rainbow Roosters.

In poultry, productivity parameters comprise of body weights, final weight gain, clutch sizes, egg hatchability and increased number of chicks weaned per hen. A recent baseline report⁷⁵ on poultry in the region indicated productivity is dependent on survival rates from chicks to maturity which was estimated at 58% for indigenous chicken and 56% for improved indigenous chicken. Egg productivity among farmers in the North rift region (Nandi County) was 240 eggs per hen per cycle, higher compared to 117 eggs per hen per cycle recorded in Nyanza region (Kisumu County)⁷⁶. This is much lower than 300 eggs produced by exotic chicken under tropical conditions. However, reducing the laying cycle by restricting prolific birds from brooding and incubating their own eggs can have increased production.

These projects all aim at increasing agricultural productivity and profitability of specific value chains including poultry.

3.2 Estimated production costs⁷⁷

Table 6: Estimated production costs for poultry

	Estimated production costs (USD or KES/ha/year)	Average production (tons/ha/year or farm/year)	Product prices (USD or KES/Kg)
Assumptions based on VC analyses	Total direct costs of indigenous chicken (30 birds) = 17,411 KES per farm . Total direct costs of improved breeds (90 birds) = 90,915 KES per farm	Average production of EGGS for improved indigenous chicken breed per ha/year or per farm/ya. 150-230 eggs/hen/year (for a 30 bird flock = 4,500-6,900 eggs/farm/year)	KES 1,000 per tray of 30 fertile eggs, KES 450 to 500 per tray of table eggs

⁷⁴ Kenya County Climate Risk Profile: Nandi County

⁷⁵ Kenya Baseline Survey Report for Transformational Strategies for Farm Output Risk Mitigation (TRANSFORM) – Final Report, 2022.

⁷⁶ Kenya Baseline Survey Report for Transformational Strategies for Farm Output Risk Mitigation (TRANSFORM) – Final Report, 2022.

⁷⁷ Poultry Value Chain Analysis, FAO 2023.

References	Kingori, A. M., Wachira, A. M., & Tuitoek, J. K. (2010). Indigenous chicken production in Kenya: a review. <i>International Journal of Poultry Science</i> , 9(4), 309-316. MOLFD, 2012	FAO Kenya, 2023. Poultry Value Chain Study - Draft Report	FAO Kenya, 2023. Poultry Value Chain Study - Draft Report
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3.3 Average annual income per household for poultry value chains

Table 7: Household income by gender of household head (Omiti J., 2007)

		Household	Share of crop	Share of livestock	Share of Non-farm	Share of chicken in	Share of chicken in farm
District	Gender	total income (KES)	income in household	income in household	income in household	household total income	income
Mwala	Male	230,901	0.29	0.20	0.51	0.02	0.05
	Female	163,800	0.35	0.27	0.38	0.02	0.04
	Significance level	0.140	0.214	0.060	0.042	0.909	0.582
	Total	214,125	0.31	0.22	0.48	0.02	0.05
Bomet	Male	225,491	0.30	0.24	0.46	0.02	0.04
	Female	110,281	0.34	0.40	0.26	0.04	0.05
	Significance level	0.056	0.350	0.004	0.008	0.085	0.343
	Total	207,057	0.30	0.27	0.43	0.02	0.04
Total	Male	228,043	0.29	0.22	0.48	0.02	0.04
	Female	142,914	0.35	0.32	0.33	0.03	0.05
	Significance level	0.002	0.117	0.002	0.002	0.102	0.823
	Total	210,591	0.31	0.24	0.45	0.02	0.04

Source : Omiti, J. O. H. N. (2007). Overview of the Kenyan Poultry Sector & Its HPAI Status. *Poultry sector issues*, 1-27.

3.4 Analysis of the overall market demand for Poultry

Kenya's annual poultry meat production is 88 million metric tons, valued at KES 48.6 billion. The current poultry consumption is 76,135 MT based on a per capita consumption of 2.58 kg, this is low compared to the WHO-recommended per capita consumption of 12 kg. As per the recommended consumption per capita, the projected poultry meat consumption by 2030 is expected to reach 797,995MT. It is anticipated that the amount of meat to meet this demand shall be produced by 371,998,098 broilers producing 557,997 MT and 1,487,992,392 indigenous chicken producing 239,398 MT of meat annually.

Like chicken meat, Kenyans consume fewer eggs than the average person around the world. The average annual consumption of eggs per person around the world is 200. However, Kenya only consumes 40 eggs per person

annually. Favorably, Kenyan consumers show strong preferences for indigenous chicken eggs and are prepared to pay 41.53% more than they would for other kinds of eggs. The increase in consumer preferences for Indigenous Chicken (IC) eggs is attributed to the fact that they have both nutritional and health associated benefits.

3.5 Strategies for connecting producers with buyers in Poultry value chain

Smallholder broiler farmers mostly produce them under contract with buyers because of the high cost of feeding the birds beyond their market age. Broilers are mainly sold as live birds or dressed carcasses and therefore unlike in the indigenous chicken, there are no cases where producers sell directly to consumers. Farmers sell their broilers through several market outlets. These include other rural and urban brokers, retailers and hotels and processors. Established firms that engage farmers on contract agreements include Kenchic and Farmer's Choice who buy live birds from farmers and produce a range of poultry products; dressed chickens, chicken pieces (e.g., legs, thighs, and breast), sausages and burgers. These products are sold to retailers (supermarkets) and restaurant under formal contracts. Broiler chicken brokers sell to majorly to urban hotels, restaurants, supermarkets, distributor agents, butcheries, and other caterers (95%). A few large-scale farms sell their dressed broilers to supermarket outlets.

Indigenous poultry meat and eggs are mainly marketed through direct and retail selling systems. In a value chain analysis of the Kenyan poultry industry conducted in 2010 in Vihiga county among other counties (Kiambu, Kilifi and Nakuru), the market structure of indigenous chicken mapped included rural brokers who buy chicken and eggs from farmers at farm gate or from small weekly markets held locally and assemble them for subsequent sale to brokers in larger urban markets.

30% of the birds are sold at the farm gate to fellow farmers in their neighbourhood for rearing, these farmers later sell 20% to rural brokers and 80% to final consumers. Rural indigenous chicken producers sell 50% directly to final consumers.

While farmers value the role played by traders, they feel that the traders/brokers drive hard bargains and there is little room for negotiation ; in that regard, farmers have formed associations that support producer buyer negotiations and increase their bargaining power.

3.6 Communication strategies between the producers and the buyers in Poultry value chains

Most small-scale farmers offload their chicken through the brokers thus creating a vibrant informal system ; except for the few involved in out-grower contracts, which is mostly for broilers with large enterprises such as Kenchic and Isinya. Thus, the traders and middlemen are in control of the value chain and together with limited information flow, remain exploitative to the producers. There is a lot of non-disclosures among these actors especially on price and weights. For instance, in situations where some buyers take away live birds from farmers for slaughter and processing in their own facilities, farmers are unsure of the weights given since this information is provided later. This leaves an uncoordinated market system, largely controlled by brokers while producers are forced to sell their products due to lack of sustainable and profitable outlets.

Traders in the poultry value chain act as intermediaries between the farmers and the end consumer. They include rural assemblers/aggregators, rural retailers, rural wholesalers, urban retailers, urban wholesalers, and urban retailers. The intermediaries can be grouped into two categories depending on the type of product they specialize in i.e., live-bird traders and egg traders. Most of these intermediaries are specialized in their functions in the chain, either in the handling of eggs only or live and dressed birds only. Live-bird intermediaries deal in live exotic and/or indigenous poultry but sometimes handle dressed birds, depending on the client's preference. Majority of the intermediaries that handled eggs do not handle dressed chicken. Intermediaries mainly serve farmers who are unable to transport their live birds or eggs to the market due to high transport costs, who need urgent cash and cannot wait for a market day, or who lack information on where to sell or who to sell to. High transaction costs have

indeed been attributed to the choice by many farmers to trade at the farm-gate rather than walk their produce to the market⁷⁸.

The number of intermediaries between the farmer to consumer in the value chains differs depending on the market and County. The typical number ranged between one and four, indicating that some markets and regions are highly fragmented and hence entail high transaction costs⁷⁹. The intermediaries include:

i) *Rural assemblers*

They collect live birds or eggs from farmers at the farm-gate and bulk them before transporting to the market. Most of these rural assemblers pay for the birds or the eggs on the spot thus taking ownership whereas others collected the birds or eggs on credit and remit the money after sale. Where credit is involved, the arrangement or agreement on price and time of payment is verbal. They trade around 10-20 birds or crates of eggs and sell them generally by hawking the birds/eggs to hotels in the rural towns or door to door in residential estates in urban centers⁸⁰.

ii) *Rural retailers*

Rural retailers purchase live birds or egg either directly from farmers who walk their birds or eggs to the market, or from rural assemblers. These transactions are made on a cash basis. Most of these rural retailers have no business relationships with the farmers they buy from. However, some have had repeated transactions with certain rural assemblers that have led to the development of trust. Rural retailers sell their live birds mainly to rural restaurants and individual consumers. The sale of eggs and live birds to final consumers, however, is mostly on a cash basis.

iii) *Rural wholesalers*

They purchase live birds from other traders and assemble them in bulk before selling to the next actor in large consignments only. Some rural wholesalers have business relationships with the traders they buy from that have been mainly forged through repeated transactions. Some rural wholesalers act as typical brokers in the sense that they assist distant traders to market the traders' consignment without taking ownership / possession of the birds. In the case of eggs, rural wholesalers assemble large volume of eggs by buying from rural assemblers and selling them to urban-based brokers.

iv) *Urban wholesalers*

They are in major markets and towns and are supplied by rural assemblers and transporters who buy large consignments from rural wholesalers or directly from medium and large-scale farms. Most urban wholesalers have business relationships with their suppliers forged through repeated transactions over many years. Such urban wholesalers therefore receive regular consignments from their suppliers and usually can specify the volumes they want. The weight of the birds is the major quality parameter used but some traders check the physical condition (such as the alertness) of the bird. The sale of chickens can be on cash or credit basis depending on the length of the relationship. The relationship, however, remains informal and the agreements made are not formalized into written contracts.

v) *Urban retailers*

⁷⁸ Okello, Julius J., et al. "Value chain analysis of the Kenyan poultry industry: The case of Kiambu, Kilifi, Vihiga, and Nakuru Districts." *HPAI Africa/Indonesia Team Working Paper* (2010).

⁷⁹ Bebe O.G. and Owuor G. 2008. Maximizing market value of indigenous chicken in rural and urban markets in western Kenya. Unpublished report. Egerton University, Njoro.

⁸⁰ Ibid, 25

They include supermarkets and shops in major towns. They sell both dressed chicken and table eggs. They source their bird from established farms which raise the birds on contracted terms. Table eggs, on the other hand, are purchased from urban-based brokers who in turn source them directly from rural/urban wholesalers and/or rural assemblers.

Large commercial producers comprise of farms that import poultry breeding stock (parent birds or fertilized eggs) from Mauritius, Holland, Egypt, India, and South Africa. They then sell day-old chicks to local smallholder and commercial farmers while exporting some to neighbouring countries, mainly to Uganda, Tanzania, and Ethiopia. Where the smallholder farmers are contracted by large commercial farms, they are provided with day-old chicks and feed while the farmer provides labour and management, the flock is bought back less cost of input upon maturity. Large commercial producers then sell some of the mature birds to meat processors, who either sell them locally in secondary and tertiary markets or export them under licensed brands like Halal Chicken

3.7 Terms of payment at the end of the sale of the Poultry

The consumer purchased the products either in their raw form (live bird or a piece of raw meat) or processed (piece of cooked meat) from retailers or hotels. 30% of the birds are sold at the farm gate to fellow farmers in their neighbourhood for rearing, these farmers later sell 20% to rural brokers and 80% to final consumers.

Broilers:

Producers of broilers mostly have contracts with buyers such as Farmers choice and Kenchic. The broilers are sold to buyers at the market age based on weight of the birds.

Indigenous poultry:

Consumers pay farmers based on weight of the birds. During festive seasons such as Christmas the prices go up due to high demand for indigenous poultry.

Eggs:

Eggs sales prices are based on whether they are from indigenous poultry or exotic poultry. The current price (March 2023) of exotic chicken eggs is Ksh 570 for a 30 egg tray while the price of indigenous chicken eggs is about Ksh 750 for the same tray (anecdotal)

The price of products in all the study value chains varies according to the buyers' preference, market demand, and availability of produce. Several parameters explain this state of affairs. The quality of the product and its cleanliness play a role in the bargaining process, cost of transport and the place of retail with supermarkets being more expensive than local kiosks. Some affect the price, given the cost of transport.

3.8 Government intervention in the poultry value chain

The Ministry of Agriculture is mandated to carry out farmer trainings and provide extension services; however, they are grossly under resourced; and extension officer to farmer ratio are higher than the 1:400 as recommended by FAO. For example, Nandi County Extension staff to Farmer ratio stands at ratio of 1: 638. In Vihiga County there is extension officer per ward with about 7,000 farmers. To bridge the gap in extension services ICT technology has been deployed to provide e-extension services in several counties including Bungoma, while Kisumu has a County Agricultural toll-free call center and Vihiga county has built capacity of Community Facilitators for the Field Farmer Schools (FFS) who educate farmers on the best farming practices.

The Livestock, Veterinary and Trade are the three key departments at the county that support value chain. With reference to this value chain, the livestock Departments are mandated to promote commercialization and industrialization of livestock production through facilitation and offering of regulatory services. The Department of Veterinary Services are mandated to prevent, treat, and control diseases and regulate the movement of poultry and poultry products. However, the staff are few and this has given rise to animal health private extension services

providers. The department of Trade which is occasionally coupled with Cooperative activities investments more on facilitating access to agricultural credit, promote value addition and commercialize marketing of agricultural produce through competitive pricing.

3.8.1 Direct government and project/program interventions

- i. **Hatching hope Kenya:** It aims to improve the livelihoods of 40,000 households (180,000 people) in western Kenya by strengthening their production skills and business knowledge, building the capabilities and capacity of farmer groups, which will enable them to become profitable market actors as they are connected to sustainable markets
- ii. **Arid and Semi-arid lands Agricultural Productivity Research Project (ASAL APRP) (2012-2017):** Funded by the Government of Kenya and the European Union developed two improved indigenous (kienyeji) chicken breed lines (IKC) with high egg production and enhanced growth rates. The two IKC breed lines have been registered with the Kenya Livestock Breeders' Association (KLBA). These two breed lines are now being disseminated and popular amongst farmers because they produce more eggs, heavier birds, and are more disease resistant than local breeds.
- iii. **National Agricultural and Rural Inclusive Growth Project (NARIGP) and Kenya Climate Smart Agriculture Project (KCSAP):** Both NARIGP and KCSAP are funded by National Government / World Bank are addressing the challenges faced by smallholder farmers in the improved indigenous chicken value chain by impacting knowledge and skills on climate smart resilience technologies, innovations, and management practices. The delivery is through private extension service providers
- iv. **The Smallholder Poultry Agribusiness Development (SPADE) 2011 to 2016:** Initiative supported by Technoserve aimed to sustainably improve the livelihoods of 12,000 smallholder poultry producers of indigenous chicken. SPADE operated in the Western and Nyanza regions and comprised three primary activities: sustainably improving smallholder farmer poultry production; expanding access to financial services for smallholder poultry farmers; and improving poultry market access for smallholder poultry farmers. The total beneficiaries at the end of the project were of 5,168 of which 66% women.
- v. **ASDSP**

ASDSP II E-Commerce -<https://asdspmarketinfo.kilimo.go.ke/> is an online shop for value chain actors to market their products at free of charge. Indigenous chicken is amongst the products on the platform. It was developed by ASDSP II to enhance market for farmers within the value chains the project and county are investing in.

SIDA through the ASDSP II project funded poultry value chain in Kisumu, Bungoma, Nandi, Trans Nzoia and Vihiga where Indigenous Chicken has been prioritized as livelihood transformative value chains in the county do have Indigenous Chicken Platforms with strategic plans.

3.8.2 Policy and regulations in the Poultry value chain

Despite the huge role poultry farming plays in the Kenyan economy and a major source of livelihood for many Kenyans, both small scale and large scale, there is no single statute that provides for poultry farming in Kenya as a standalone. Originally, it was provided for under the Crop Production and Livestock Act, but the said statute was repealed by the Crops Act in 2013 when the Act came into force. However, the Crop Act does not expressly cover or cater for poultry farming in Kenya. This then leaves regulation of poultry farming by national policies, strategies, and national institutions with the mandate of implementation the aforementioned. There are, however, bills in parliament that are yet to be made laws: Poultry Development Bill 2012, Animal Health Bill, and Veterinary Public Health Bill. The bills have been drafted based on guiding principles that seek to regulate and promote safe and healthy poultry farming in Kenya in accordance with international standards.

Nonetheless, there are general policies and regulations within the Ministry of Agriculture, Livestock and Fisheries at the national level that guide the operations of the value chain. The key ones are detailed below in table 4.

Table 4: Policies and regulations revlevant to poultry VC

Policy / Regulations	Details	Implications
National Poultry Policy 2009	Create mechanisms that ensure poultry production is increased and sustained through improving the following : nutrition, feeding, breeding of local poultry, poultry disease control and biosafety and better marketing infrastructure.	<ul style="list-style-type: none"> - Enhance poultry production and productivity - Facilitate timely detection, diagnosis, treatment, and control of poultry diseases. - Promote competitiveness of the poultry industry locally, regionally, and internationally - Promote value addition and marketing of poultry and poultry products.
Poultry Development Bill 2012	Provides an institutional framework to guide the development of the poultry industry, and for the control of the importation and exportation of poultry and poultry products.	<ul style="list-style-type: none"> - Gives the responsibility of promoting awareness about the health benefits of poultry rearing and consumption to the government. - Encourage government to partner with civil society groups to provide training, sensitization, and awareness programs on the health benefits of poultry rearing and consumption. - Emphasizes on the need to have good husbandry practices and gives the government the mandate to promote and encourage both existing and upcoming hatcheries to come up with appropriate breeds that support enhancement of conservation of the genetic pool.
Meat Control Act (Cap. 356).	The Act aims to enforce standards in the meat industry by regulating slaughterhouses and the importation and exportation of meat products.	<ul style="list-style-type: none"> - Sets meat products standards which apply throughout the entire value chain. - Regulates licensing and control of slaughterhouses, on meat transportation and the regulation on the export or import of meat.
VAT Act 2012 and the subsequent amendment in 2013	VAT-exemption of compounded feeds	<ul style="list-style-type: none"> - Enhances access to poultry feeds through reduced feeds cost
The Veterinary Surgeons Act Cap 366	Makes provision for the registration of Veterinary Surgeons and for other matters incidental to and connected with the practice of veterinary surgery	<ul style="list-style-type: none"> - Accreditation of practitioners
Pharmacy and Poisons Act Cap 244	An ordinance to make better provisions for the control of the profession of veterinary and the trade in vaccines, drugs, and poisons	<ul style="list-style-type: none"> - Constraint to the delivery of veterinary services by only allowing veterinarians to possess drugs for purposes of treatment but not as stockists.

3.9 Summary of difficulties encountered by producers and buyers, and support needed

3.9.1.1 Strengths and obstacles encountered by producers

The selected VCs offer strengths, opportunities, threats and weaknesses as detailed in the table below.

Table 8: SWOT Analysis for Poultry value chain

Poultry VC			
Strengths	Weaknesses	Opportunities	Threats
<p>Availability of production technologies relevant to small holder producers e.g., Breeds that are fast growing and adaptive to local conditions.</p> <p>Diverse poultry production systems and breeds, which gives chances to respond to market demands</p> <p>Connectivity, through the port of Mombasa to international market for feed ingredients that are not locally produced</p> <p>Presence of development agencies that support the value chain in all the nodes e.g., NARIGP, ASDSP and other donor funded projects</p>	<p>Shortage of ingredients for poultry feed, making the sector less competitive in comparison to neighboring countries with sufficient grain.</p> <p>Limited opportunities for value addition due to an overall preference for selling chicken meat rather than by-products.</p> <p>Farmers' exploitation by middlemen because of limited market opportunities for farmers.</p> <p>Inadequate qualified/specialized poultry veterinarians and knowledge support.</p> <p>Extension services lack knowledge of key risks to agriculture, such as climate change, which exacerbates the lack of support to farmers in accessing risk-based financial schemes.</p> <p>Weak supply and uptake of basic vaccination practices.</p> <p>Poorly developed market system leading to over and undersupply and price fluctuations.</p>	<p>Cooperatives can substantially support farmers with accessing climate and market-based information to set appropriate prices, increase their empowerment at the market and selling stages, and accessing credit and agricultural insurance.</p> <p>Build capacity of the human resource in the veterinary field, both public and private to be sensitive on impacts of climate on the value chain and respective adaptive and mitigation strategies.</p> <p>Diversification of sources of feeds feed i.e., hydroponic, black soldier fly amongst others</p> <p>Enhance the market opportunities for indigenous poultry products by promoting information on consumption which is healthier due to higher nutritional qualities than the commercial options, as well as profitability due to lower inputs and their adaptability to effective climate.</p> <p>Develop and strengthen sector-based business development services along the value chain</p>	<p>Feedstuff contaminated by mycotoxins especially during rainy seasons when fish used in feed is difficult to dry</p> <p>Poultry diseases are not sufficiently under control posing risk of disease outbreaks of e.g., NCD</p> <p>Rapidly growing and more competitive poultry industry in neighbouring countries.</p> <p>Shortage of grain and increasing competition of poultry with human nutrition</p> <p>Dumping of poultry meat and/or eggs from regional markets.</p>

3.9.1.2 Difficulties encountered by buyers to access the best products and reach markets

1. Uncoordinated market system, largely controlled by brokers while producers are forced to sell their products due to lack of sustainable and profitable outlets.
2. Market fragmentation with too many market intermediaries hence the farmer does not receive maximum profits.
3. Lack of market information. There is a lot of non-disclosures among poultry market actors especially on price and weights. For instance, in situations where some buyers take away live birds from farmers for slaughter and processing in their own facilities, farmers are unsure of the weights given since this information is provided later.

3.9.2 Existing financial services in the project Counties

Table 9: Existing financial services in the poultry value chain⁸¹

Institution	Financial service	Specifications
Co-operative Bank of Kenya	Tegemeo loans.	To address the short term financial needs of farmers supplying accredited buyers and Aggregators and also to Aggregators through advances based on their deliveries
Juhudi Kilimo	Asset based loans and technical assistance	Juhudi Kilimo provides asset based loans and basic business and finance training to smallholder farmers and enterprises that allow them to purchase wealth generating financial solutions for their agribusiness. It was started by K-Rep bank and has since been spun-out into a sustainable NBF
Letshego	Credit:	Dairy, Other fish products, Dairy, poultry, agriculture inputs, biogas
SMEP Microfinance Bank	Livestock financing	This is financing for purchase of inputs, quality breeds and equipments for modern farming in livestock like dairy goats, beef goats, pigs, rabbits, poultry, fish, and beekeeping value chains
Agri finance Corporation	Government Financial Institution	Agribusiness loans: These are loans designed to benefit agribusiness traders. It is meant to provide start-up capital for those seeking to start, or are engaged in agricultural microenterprises

3.9.3 Barriers to access credit

- i. There are no specific poultry financial services across the country.

3.10 Opportunities for the CRLCSA program

- i. Train farmers on building climate-proofed poultry and input storage facilities using local resources (e.g., timber, stone).
- ii. Diversification of feeds and fodder crops as feeding is the main variable cost poultry production.
- iii. Support organization of producers into farmer cooperatives to render transport means more accessible and affordable; establish local collection points; increase access to cages and boxes for markets.
- iv. Promote electronic marketing, contracted marketing, promote value adding activities such as sale of differentiated chicken parts
- v. Facilitate collective marketing, contract farming, improve market information systems linked to climate information
- vi. Facilitate development of market infrastructure, address the cost of poultry value addition equipment and technology and promote processing to enhance safety regulation mechanisms for high quality poultry

⁸¹

<https://www.canr.msu.edu/hrt/research/usaid/Appendix%20-%20List%20Financial%20Institutions%20in%20Agriculture.pdf>

- products. Value added products ensure steady supply because they can be kept in cold storage hence avoiding seasonality of supply.
- vii. Promote collective marketing through cooperatives (bulking centers) should be a focus in improving marketing of chicken from smallholder farmers. This will not only give the farmers bargaining power but also reduces the marketing costs for the assemblers. These groups can also serve as avenues for value addition and sharing information on improved production methods. They would play an active role in sharing and exchanging critical backward and forward linkage information in collaboration with the various value chain actors. Producer/marketing groups also provide an opportunity for gender mainstreaming in value chain as women and youth groups could be targeted.
 - viii. Most markets do not have specialized places for keeping live chickens until they are sold. They are normally kept in crowded cages under the sun with little food leading to stress, weight loss and consequently deaths. Provision of a live poultry sections within market structures where chickens could be received, tagged, treated for disease while awaiting purchase would reduce losses due to deaths in storage.
 - ix. Agricultural policies have been biased towards crops production and large livestock such as cattle leading to neglect of small livestock like chickens. Consequently, extension and resource allocation has also been biased towards crops and large livestock. Lobby for advancing the Poultry Act 2012 will ensure inclusion of the sector on the national agenda and subsequently considerable allocation of resources towards research in poultry breed development, improved production systems as well as marketing systems will be availed to boost performance of the sector.
 - x. Promote breed improvement as a strategy for adaptability of poultry production systems. This will prevent production losses that come with inappropriate on-farm flock multiplication practices. They should promote models for hatching chicks and distributing at scale to sustain a market-oriented poultry enterprise. Models such as serialized hatching, synchronized hatching
 - xi. Promote coordination between agro-dealers and the Department of Veterinary Services, Kenya Veterinary Vaccines Production Institute (KEVEVAPI) and other relevant government agencies to improve disease surveillance and reporting, access quality vaccines, promote appropriate vaccine handling, storage and administration and implement rigorous vaccination calendars for the endemic diseases to ensure effective disease prevention and control. There is need to incorporate education program to train farmers on the need to use qualified animal health service providers instead of self-administration of drugs.
 - xii. Setting up and or building the capacity of existing poultry producer cooperatives is essential in sustaining the growth of smallholder poultry farmers and competitiveness of the sector. The cooperatives where successful as in Kiambu county have been involved in setting up a feed mill ensuring they get quality feed reducing the cost of production substantially. The farmers also collectively source for inputs and access markets thus benefit from economies of scale. Cooperatives with basic equipment can also ensure food safety and hygiene of poultry and poultry products that go to the mass market.

4 AFRICAN LEAFY VEGETABLES

4.1 Performance

Kenya alone has more than 200 species⁸². The priority species include amaranth, African nightshade, cowpeas, spider plant, Ethiopian kales, slender leaf, jute plant, and pumpkin leaves among others. Findings indicate 80%⁸³ of Kenyan households grow the vegetables at subsistence level in rural and urban communities in Kenya owing to their nutritive and medicinal value, agronomic advantage, and their potential to be commercialized as source of income⁸⁴. Their commercial potential has not been exploited.

The introduction of exotic fruits and vegetables negatively affected their consumption and production of ALVs. However, they have recently received recognition through crop research at international, regional, and national institutions – resulting in their commercialization via formal and informal markets⁸⁵.

In the LREB the main ALV-producing counties include Busia, Kisii, Vihiga, Nyamira, Trans-Nzoia, Kakamega, Bungoma, Kakamega, Nandi, Kericho and Migori. ALVs are also produced in other counties in Kenya such as Kiambu, Nakuru, Embu and Meru. The main varieties produced and consumed include the African nightshade (*managu*⁸⁷), leafy amaranth (*terere*), spider plant (*sagaat*), slender leaf (*mitoo*), cowpeas (*Kunde*), jute mallow (*mrenda*), pumpkin leaves (*malenge*) and African kales (*kanzira*)⁸⁸.

Table 10 Priority ALVS in Lake Victoria Region	
Common Name	% Contribution in production
Cowpeas	30
Amaranths	21
African nightshades	12
Jute mallow	11
Spider plant	7
Slender leaf	7
African kale	7
Pumpkin leaves	5

Source : Department of Botany and Horticulture, Maseno University⁸⁶

National Level Performance

Before the year 2000, ALVs were dominant in the back streets of town centers. There were still large volumes that were consumed at household level. However, owing to their nutritional value, demand has progressively increased to grocery shops, main shopping areas, supermarkets and even exportation (of dried vegetables) to Kenyans and other Africans living abroad. The production has been commercialized following the increased marketing and consumption in the urban centers such as Nairobi. The value chain has attracted global interest with the recent recognition by UNESCO in 2022 as part of Kenyan cuisine and culture and most importantly their ability to improve nutrition and sustain smallholder farmers' livelihoods.⁸⁹

To meet consumer demand in the urban markets, farmers, need to consider quality and fresh produce as well as value addition products. Value adding will address the challenge faced by some urban dwellers who avoid purchasing due to the long process of preparing. The women who run small grocery shops commonly known as

⁸² <http://www.b4fn.org/case-studies/case-studies/african-leafy-vegetables-alvs/#:~:text=More%20than%20200%20species%20of,food%20ingredients%20in%20Kenya%20alone>.

⁸³ <http://www.b4fn.org/case-studies/case-studies/african-leafy-vegetables-alvs/>

⁸⁴ Mary Oyiela Abukutsa-Onyango; 2021 Production and Marketing of African Indigenous Leafy Vegetables

⁸⁵ KALRO; Climate Smart Agricultural Technologies, Innovations and Management Practices for Indigenous Vegetables Value Chain, March 2020

⁸⁶ Department of Botany and Horticulture, Maseno University (2022)

⁸⁷ <https://www.agcenture.com/2020/02/06/kenyeji-vegetables-in-kenya/>

⁸⁸ <https://ruraloutreachafrica.org/african-leafy-vegetables-project/>

⁸⁹ Eliot Gee; <https://alliancebioiversityciat.org/stories/traditional-vegetables-recognized-unesco-kenya>

mama mboga in Kenya address this challenge by adopting ways to provide *ready-to-cook-or-eat* products by washing, cutting, and boiling before selling to local consumers.

According to the Horticulture Validated Report of the Agricultural Food Authority (AFA):

- In 2019 land under production of African leafy vegetables increased from 45,508 Hectares (Ha) 2018 to 54,235 Ha in 2019 a 19% increase which led to an increase in volumes and value (Volumes increased by 28% while value increased by 26%)⁹⁰
- In 2020, the total area, volumes and value of production decreased by 45% (from 98,940 Ha in 2019 to 54,235 Ha in 2020), 19% (from Kshs 10,251,436,747 in 2019 to Kshs 944,431,110 in 2020, and 13% (from 374, 489 MT in 2019 to 303,666 MT in 2020)⁹¹
- The export market in 2019-2020 had increased demand by Kenyans in the diaspora particularly in United Kingdom and Germany.

Table 11 Total Production and Value of African leafy vegetables in 2019-2020 Kenya

Summary of African Leafy Vegetables by Area, Volume and Value in 2019-2020⁹²						
African Leafy vegetable name	2019			2020		
	Area (Ha)	Volume (MT)	Value (KSHS)	Area (Ha)	Volume (MT)	Value (KSHS)
Cowpea	79,535	159,386	3,512,308,830	36,018	113,666	3,348,701,203
African Nightshade	6,950	69,254	2,397,810,725	5,917	58,909	1,831,009,726
Spider Plant	4,280	35,295	1,229,098,895	3,949	36,445	1,315,530,681
Leaf Amaranth	3,996	54,813	1,322,286,150	3,237	38,172	831,076,886
Grain Amaranth	453	3,020	178,728,617	511	2,459	127,453,939
Pumpkin Fruits	1,487	31,022	722,892,977	1,755	35,829	813,596,889
Slender leaf	355	7,107	350,836,860	841	5,605	260,730,596
Pumpkin Leaves	903	6,650	147,623,496	900	6,172	158,159,801
Jute Mallow	672	5,894	309,079,967	657	3,373	155,029,483
Russian Comfrey	75	644	19,460,000	163	1,354	50,321,660
Vine Spinach	193	811	33,530,230	217	1,030	29,476,001
Malabar	41	593	27,780,000	70	652	23,344,245
Total	98,940	374,489	10,251,436,747	54,235	303,666	8,944,431,110

Source : AFA 2021, Horticultural statistics January-July (volumes and values)

Performance in the Lake Region Economic Bloc

Cowpeas, leaf amaranth and African Nightshade are leading in the production of ALVs in LREB. According to the USAID Kenya Crops and Dairy Market Systems Activity (KCDMS) project, ALVs are mainly produced by smallholder farmers on less than one-acre farm unit⁹³. This finding is also corroborated by another study by the

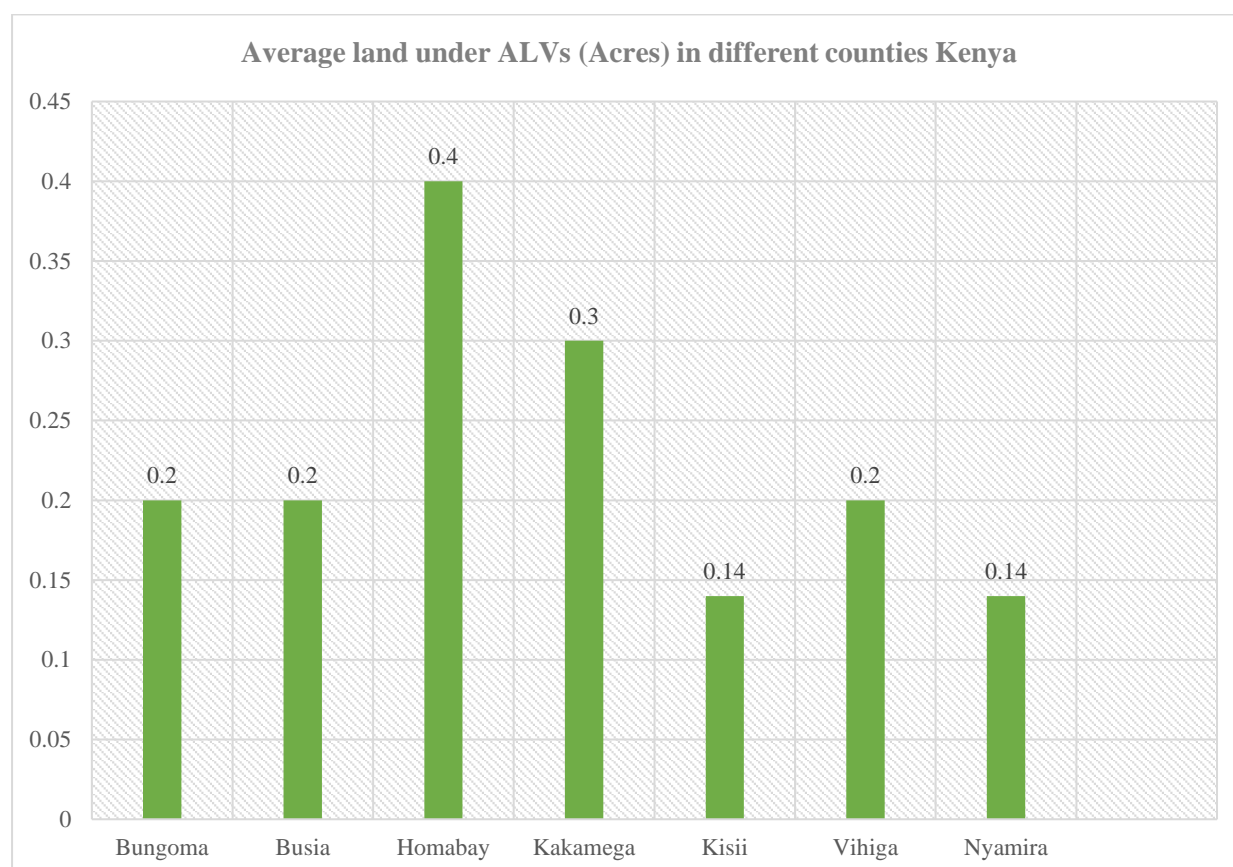
⁹⁰ AFA Horticulture Validated Report 2019-2020 & AFA Horticulture Validated Report 2018-2019

⁹¹ AFA Horticulture Validated Report 2019-2020

⁹² AFA Horticulture Validated Report 2019-2020

⁹³ County specific value chain analysis : production and market systems analysis for African vegetables funded by USAID via RTI in 2020.

European Centre for Development Policy Management (ECDPM) and Agile Consulting for the AgrInvest-Food Systems project of the Food and Agriculture Organization (FAO)⁹⁴.



Source : Author compilation of the Agri-Invest-Food Systems Project in 2021 and the KCDMS value chain studies in 2020)

4.2 Estimated production costs⁹⁵

Table 12: Estimated production costs for ALVs

ALVs	Estimated production costs (USD or KES/ha/year)	Average yields (tons/ha/year)	Product prices (USD or KES/Kg)
Assumptions based on VC analyses	Total Production Costs = 74,998 KES/acre	Yields differ per leafy vegetable. Average yields for all is 380 Kg/acre	Average price of leafy vegetable ranges from 28 KES per Kg (cowpeas) to 47 KES per kg for (African nightshade)

⁹⁴ Rampa, F. and Obiero Were, T. 2021. AgrInvest-Food Systems Project – Increasing sustainable investments in the Kenyan indigenous vegetables chain. Rome. <https://doi.org/10.4060/cb7413en>

⁹⁵ African Leafy Vegetables Value Chain Analysis, FAO 2023

References	FAO Kenya, 2022. Value Chain Study on African Leafy Vegetables - Draft 1 Report. https://www.biodiversityinternational.org/fileadmin/biodiversity/publications/Web_version/500/ch14.htm	National Museum of Kenya, 2020	SNV, 2018; KARLO, Growing Cowpea in Dry area, 2008; https://www.karlo.org/csa/pp/index.php?option=com_content&view=article&id=24&Itemid=305 ; https://www.jica.go.jp/project/english/kenya/015/materials/c8h0vm0000f7o8cj-att/materials_19.pdf
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4.3 Average annual income per household for African leafy vegetables value chains

Table 13: Annual average household income earned by traders per business type in USD⁹⁶

Respondent category	Business type			
	Wholesalers (n = 20)	Retailers (n = 59)	Both (n = 37)	F-test (F-value)
Men heads	1505.00 (711.75)	1544.87 (1136.24)	1640.77 (729.40)	0.070
Women in MHHs	1250.16 (555.25)	1642.69 (1854.65)	1947.53 (734.30)	0.47
Women heads	698.78 (168.86)	971.83 (405.16)	1424.83 (692.64)	4.02**
Average	1294.87 (648.38)	1390.41 (1349.95)	1656.09 (729.65)	0.960

Note Figures in parentheses are standard deviations

4.4 Analysis of the overall market demand for African Leafy Vegetables

Local Demand

- ALVs have for decades been a part of the diet for Kenyans. However, the introduction of exotic vegetables such as spinach, kales and others eclipsed their consumption largely. The average consumption of ALVs in Kenya in 2008 stood at an average of 147 kg per capita by urban consumers per year while rural consumers consume 73 kgs per year. The findings indicate that urban consumers consume more vegetables compared to rural consumers, which could be attributed to their exposure and increased knowledge on the nutritional and health benefits of the value chains as well as access to stable incomes-increasing their purchase power⁹⁷.
- A report by Biodiversity for Food and Nutrition Project (2012)⁹⁸ indicates that about 34% of people living in urban and peri-urban Nairobi consume ALVs.

⁹⁶ Fisher et al. 2020. Participation in and Gains from Traditional Vegetable Value Chains: a Gendered Analysis of Perceptions of Labour, Income and Expenditure in Producers' and Traders' Households,

⁹⁷ Eric Obedy Gido^{1,2*}, Oscar Ingasia Ayuya², George Owuor² and Wolfgang Bokelmann¹; Consumption intensity of leafy African indigenous vegetables: towards enhancing nutritional security in rural and urban dwellers in Kenya

⁹⁸ Mainstreaming Biodiversity Conservation and Sustainable Use for Improved Human Nutrition and Well-being (Biodiversity for Food and Nutrition Project –BFN Project), 2012

- The current expansion in production, marketing, and consumption could be attributed to increasing consumer awareness about their health and nutritional benefits (Schippers 2000) resulting to urban, rural, and peri-urban increased demand⁹⁹.
- Currently, most food retail outlets sell ALV leaves, and their availability and diversity in high value retail outlets such as supermarkets have further induced their consumption in urban areas (Ngugi et al. 2007 ; Irungu et al. 2008). An analysis carried out by the AFA in 2017 indicates that the demand for ALVs has been on the rise due to the increased awareness on the nutrition and health benefits.

International Demand

Currently, there exists a small demand by Kenyans living abroad (e.g., the United Kingdom) for the value chain, although it has not been quantified. Data gathered by AFA 2021 (January- July period) revealed that there is potential for export for vegetables amounting to 43,819.777 tones valued at Kshs. 16,797,875,128.82100. These findings indicate that the existing vegetable markets could be leveraged to market ALVs.

The international demand potential could be attributed to i) rise in African immigrants to the countries such as the US, Europe and Australia demanding for dried vegetables, and ii) reduction of barriers in accessing these markets because of ongoing deals between the Kenyan government and their counterparts abroad. (Brian Moseti, 2021).

Effects of climate change :

Among the counties that prioritized the African Leafy Vegetables value chain, results indicate that climate change is projected to cause higher negative impacts on rainfed cowpea production in Busia, Migori, and Trans-Nzoia, therefore highlighting the need for the adoption of tailored climate-resilient practices. Cowpea production in Bungoma and Kakamega instead has the potential to increase under rainfed conditions, whereas irrigation has the potential to reduce the projected negative impacts particularly in Bungoma, Kakamega, and Trans-Nzoia.

4.5 Strategies for connecting producers with buyers in African leafy vegetables value chain

The value chain lacks a well-structured market system. Producers harvest and pack the produce in sacks and place them at the roadside buying centres. The traders (vendors) who come from the urban markets buy and transport the vegetables to the market¹⁰¹. A few farmers have formal market structures where they aggregate the produce and supply to supermarkets, and to institutions such as hotels, schools, or hospitals.

Market players include wholesalers, retailers, brokers, transporters, and consumers. Notably value-added products are very few and have low demand in the markets. In Kakamega County, some farmers sold collectively to Mace Foods Eldoret although the business was short lived as the buyer collected a few times and cited insufficient supply. The export market is also slim as only very small quantities are exported.

To increase access to the world agricultural markets, Kenya has signed multilateral and bilateral trade agreements¹⁰² with the World Trade Organization (WTO).

⁹⁹ Schippers, R.R. 2000. African Indigenous Vegetables: An overview of the cultivated species. University of Greenwich, Natural Resources Institute: London

¹⁰⁰ AFA statistics 2021

¹⁰¹ P. Nekesa and B. Meso; Traditional African vegetables in Kenya: production, marketing and utilization 1993

¹⁰² https://www.wto.org/english/tratop_e/tpr_e/tp124_e.htm

4.6 Communication strategies between the producers and the buyers in African leafy vegetables value chains

The value chain lacks a well-structured market system. Producers harvest and pack the produce in sacks and place them at the roadside buying centres. The traders (vendors) who come from the urban markets buy and transport the vegetables to the market¹⁰³. A few farmers have formal market structures where they aggregate the produce and supply to supermarkets, and to institutions such as hotels, schools, or hospitals.

With the production and commercialization gaining traction in the country, smallholder ALV farmers have started federating into producer organizations/ cooperatives for various commercial and social capital reasons. The cooperatives are:

- Providing market linkages to farmers, cushioning farmers against brokers and advocating for better prices for farmers- The main buyers of their produce include Mace foods, East Africa grower's fresh ltd, regional markets (Uganda) and local supermarkets and hotels).
- Facilitating affordable access to inputs to farmers though bulking and negotiating inputs' (e.g., ALVs certified seeds etc.) prices.
- Acting as entry point/ development hub for extension services, business development support, agronomic and other technical support to members

○ Bringing farmers together to not only benefit from shared resources (such as aggregation facilities, pooled transport arrangements, collective bargaining etc.) but also improve in their economic, social, and cultural needs.

Table 5: Examples Cooperatives focusing on ALVs as the main value chain¹⁰⁴

County	Name	Year registered	# Of members	# Of active members	Source of energy	Access to information on Climate	Main buyers of their products
Trans-Nzoia	Kwanza Horticultural and Fruits	2020	30	15	Solar	Yes	East Africa Growers Fresh Produce Limited.
	Cherangany Chera Tomato Marketing	2020	504	230	Electricity Solar	Yes	Schools, supermarkets, Local market
Siaya	Siaya County Honey Producers and Processors	2014	1124	380	Electricity Solar	No	Local market Retailers
Nyamira	Nyamira North Women Sacco	2014	1604	756	Electricity Solar	No	Mace Foods Company Ltd
Vihiga	Vihiga Local Vegetables	2019	1317	850	Electricity	Yes	Local hotels, schools and community vendors
Kisumu	Southwest Kano	2009	1000	150	Electricity Firewood	Yes	Local market, customers from Uganda

¹⁰³ P. Nekesa and B. Meso; Traditional African vegetables in Kenya: production, marketing and utilization 1993

¹⁰⁴ FAO, CRLCSA 2022 Census data

					Charcoal Solar LPG		
Migori	Karungu Central	2022	122	122	Electricity	No	Schools in the community
	Lake Belt	2020	500	350	Electricity	Yes	Local market Schools

ALVs are mainly sold at the local markets at the county levels and the current growing urban markets such as Mombasa and Nairobi. The end markets however are majorly the urban consumers and food service joints - restaurants, hotels.

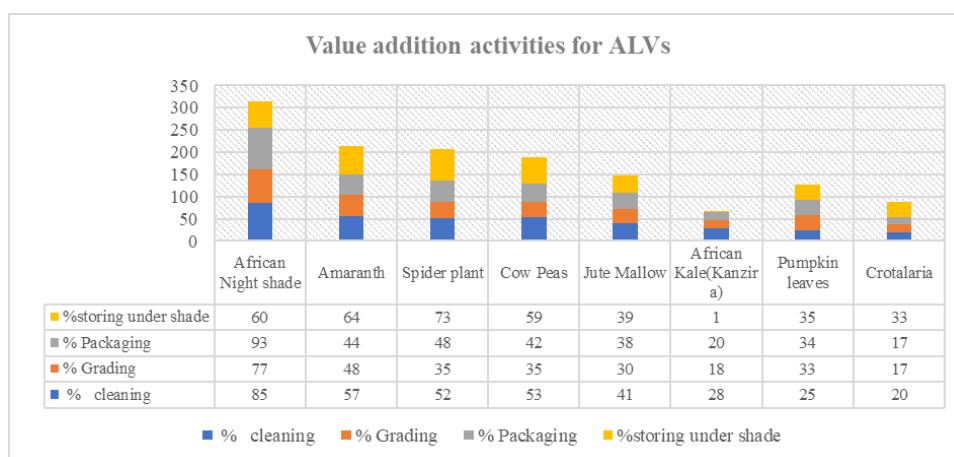
Aggregation from farmer to farmer or from the local market to other markets is carried out by traders/ marketing agents. Few of these aggregators sell to supermarkets and groceries located in urban centres. ALVs are also sold directly to consumers at the local markets. Sometimes, and this mainly happens in Kisii, traders buy the crop while it is still on the farm ; with the trader meeting the harvesting costs.

Once aggregated, the ALVs are sold to retailers and wholesalers. In Kisii county, the World Bank and Government of Kenya funded projects (i.e., NARIGP and KCSAP) have strengthened the capacity of producer groups and umbrella cooperatives to perform the aggregation function. In some cases, the cooperatives were funded by these projects to construct marketing infrastructure for ALVs, complete with cold storage facilities.

4.7 Terms of payment at the end of the sale of the African leafy vegetables

Price is based on freshness of the produce. Current practices to prolong shelf life include early morning and late evening harvesting. Harvesting is done early mornings and late evenings to retain the produce freshness and delivered to the market immediately. Traders also sprinkle water on the produce to create cool environment, which prevent withering and drying. Payment terms vary depending on the market with supermarkets paying weekly while open market traders pay cash on delivery.

Value addition also influences the price of the ALVs. Traders carry out basic value addition activities to increase value, while producers only harvest into bags for picking up by vendors. For example, traders in Migori county carry out basic value addition practices such as washing, sorting, grading, packaging, and storage (-see figure below) while only a few SMEs are involved in medium-scale commercial drying and processing of these vegetables, often for export although the demand is still low¹⁰⁵.



Source (National Museum of Kenya, 2020)

¹⁰⁵ National Museum of Kenya 2020; Feasibility Study on Commercial Viability of African Indigenous Vegetables in Western and Central Kenya

Research revealed that flour made from some of the ALVs such as Amaranth (made by Annico's Enterprise), was supplied to 52 supermarkets in Turkey before the contract was terminated due to business closure in 2017. The Economic Survey Report (2018) indicated there was an increase in exports for value added vegetables and fruits by 23.3 %.

During the rainy season, there is often overproduction of ALVs causing a glut in supply and leading to high post-harvest losses, while in the dry season there is short supply. Hence the importance of introducing processing to prolong their shelf life and penetrate export markets.

More traders practice value addition on African nightshade compared to other varieties. These findings could be attributed to the fact that the variety's delicate stem and leaves deteriorates easily when picked making them less appealing to buyers and depreciating their value¹⁰⁶. Other varieties such as spider plant, cowpeas and Ethiopian kale have stronger leaves, which enable them to stay fresh longer hours.

Farm-gate prices for most agricultural commodities are relatively lower than at other retail outlets and, therefore, rural households with large families prefer farm-gate outlets as opposed to greengrocers. This explains why they would avoid supermarket outlets in the peak seasons, and instead revert to purchasing from local open-air outlets. Notably, profits realized may differ from variety to variety, volumes produced, area of consideration and farm gate prices. A gross margin analysis conducted by National Museum of Kenya in 2020 indicated spider plant has the highest gross margins of 90,430 followed by amaranth with Kshs 68,637 per acre ¹⁰⁷ Crotalaria was reported to have the lowest Gross margin of 2,800 Kshs per acre.

Additionally, farmers in contractual farming realized better profits because of access to affordable inputs, better markets with better prices and better margins¹⁰⁸. The Cost benefit Ratio (CBR) results indicate that, the contracted seed growers would get an approximate of \$7.92 for each dollar invested in the production of African nightshade ; \$6.27 for each \$1 invested in producing spider plant ; and \$5.33 for each dollar invested in amaranth production. The CBR findings for non-contracted farmers was however below one for the amaranths and nightshade which implies that non-contracted farmers are incurring losses. Implicitly, such findings provide an implication that investing in the production of ALVs seeds is worthwhile when it is done with contracted farmer.

4.8 Government intervention in value chains

Extension and advisory services are mainly provided by the county government, development partners and private sector players. In Bungoma, is public provision of extension services to small-scale farmers by government agents and NGOs such as SACRED Africa and One Acre Fund. In the Nyanza counties, KALRO is training farmers on GAPs (including land preparation, planting techniques, crop husbandry), and climate-smart agricultural practices. County governments are responsible for formulation of county relevant policies and development plans that enable operations along the value chain e.g., determination of levies and intercountry trade fees etc. National Government through the Ministry of Agriculture, Livestock and Fisheries (MoALF) is responsible of formulation of policies and regulations in agriculture that create an enables environment for agribusiness.

¹⁰⁶ <https://farmbizafrica.com/markets/10-smart-farms/3422-limuru-farmer-banks-in-on-kenyans-growing-managu-appetite>

¹⁰⁷ Rampa, F. and Obiero Were, T. 2021. AgrInvest-Food Systems Project – Increasing sustainable investments in the Kenyan indigenous vegetables chain. Rome. <https://doi.org/10.4060/cb7413en>

¹⁰⁸ Mvungi, Henry; Alaik Laizer; Philipo J. Lukumay; Justus Ochieng; Godfrey Ngoteya; Fekadu Dinssa; James E. Simon; Ramu Govindasamy; Christine Ndinya; and Martin Odendo. 2020. "Profitability Analysis of Traditional African Vegetable Seeds Production in Kenya." *Journal of Medicinally Active Plants* 9, (4):281-288

Government Parastatals such as Kenya Agricultural and Livestock Research Organization (KALRO) are mandated to promotion of findings and technology in the field of agriculture and development, testing and promoting new varieties. Kenya Bureau of Standards (KEBS) is responsible for development and implementation of standards for seeds and processed fruits e.g. the KS 2752 :2018 Kenya Standard (Processed fruits and vegetables) Code of practice, First Edition. While Kenya Plant Health and Inspection Service (KEPHIS), assures the quality of agricultural inputs and produce to prevent adverse impact on the economy, the environment and human health.

4.8.1 Direct government and project/program interventions

i. Scaling-Up Sustainable Agriculture and livelihood Improvement (SUSAI)

Implemented by Participatory ecological land Use Management (PELUM)The project focused on enhancing the production, consumption, value addition and marketing of ALVs within western counties in Kenya

ii. African Leafy Vegetables Programme in Kenya in Kisii

Implemented by Biodiversity International. Focused on conservation of agricultural biodiversity by documenting identifying and genetically analyzing ALVs, enhancing the genetic material priority ALVs, improve horticultural practices and seed systems and introduced marketing of vegetables and dissemination of information about ALVs. The project ended in 2013 and covered only Kisii County.

iii. Vegetables 4 Planet Project (SNV)

Provided support to the development of amaranth, Ethiopian kales and cow peas in Kakamega in collaboration with World Vegetable Centre (WorldVeg), SNV, Local Government Authorities, local NGOs, business mentors MFOs, seed companies, African Seed Trade Association (AFSTA), African Breeding Vegetable Consortium (AVBC) .

iv. Food Security and Nutrition Improvement Program (Rural Outreach Africa)

Support to African Leafy Project in Butere in Kakamega county

v. Horticultural Innovations and Learning for Improved Nutrition and Livelihood in East Africa (HORTINLEA) in Kenya

Development of sustainable management strategies for a) root-knot nematode pests, viruses and phytoplasmas on African nightshades, b) cowpea insect pests and c) insect pests and diseases on leafy indigenous vegetables in Kenya.¹⁰⁹

4.8.2 Policies and regulations in the African Leafy vegetables VC

Several laws exist that guide the production and commercialization of horticultural products in the country. These (see bullets below) may largely, affect the ALVs sub-sector:

- The Crops Act of 2013: This Act is aimed at accelerating the growth and development of agriculture in general, enhance productivity and incomes of farmers and the rural population, improve the investment

¹⁰⁹ <http://research.ku.ac.ke/en/latest-news/119-latest-research-news/328-kenyatta-university-researchers-partner-to-improve-the-african-indigenous-vegetables-ALV-value-chain>

climate and efficiency of agribusiness, and develop crops as export crops. For ALVs, the Act guides in the production distribution of quality and safe vegetables to ensure food and nutrition security for Kenyans.

- Plant Protection Act 324: This Act ensures the management of pests and diseases in crops. This should in turn reduce losses of vegetables hence increase marketable volumes of ALVs giving a rise to farmers' incomes.
- Plant and Seed Varieties Act 326: Productivity and quality of products depends largely on the quality of seed used for production. This Act recommends that seeds used in the production of ALVs go through the process of certification to ensure farmers plant quality seeds all the time. This also prevents the spread of diseases and thus contributes to reduced losses. Certified seeds for some of the ALVs varieties are now available.
- Irrigation Act: This law provides for the development, management, and regulation of irrigation, to support sustainable food security and socio-economic development in Kenya. It applies to matters relating to the development, management, financing, and provision of support services and regulation of the entire irrigation sector. Irrigation is important for ALVs production if the crop is to be available all year round in sufficient quantities for the market.
- In the LREB, there are policy advances and commitments that are supporting the promotion of the value chain. These include:
 - Vihiga, Nyamira and Kisii counties: These counties have designated ALVs as a flagship value chain in their County Integrated Development Plans (CIDP)
 - Vihiga County: The government set aside KES 40 million to support ALVs; with the support of the NARIGP.
 - Kisii and Nyamira Counties: Constructed ALVs aggregation centers to bulk produce from farmers directly or via village collection centers.
 - Nakuru County: The 2017 CIDP included ALVs as priority crops and has currently launched a public procurement programme to source ALVs from producer for consumption in county schools and hospitals.

The value chain has recently witnessed the emergency of alliances among various actors towards developing intermediate seed systems. Intermediate bridge the formal and informal seed sectors. The Seed Savers Network Kenya, a local NGO based in Nakuru has documented and described local ALV seed varieties. Through the effort of this NGO a nascent multi-stakeholder forum has been launched to bring together all the ALV actors, build trust, coordinate action on ALV production, processing, distribution, and consumption, in the county.

However, there are several policy gaps that may hinder the optimization of the ALV value chain. These include but are not limited to:

There is a general lack of policies targeting ALVs, though recently some of these varieties are receiving attention at the Ministry of Agriculture Livestock and Fisheries (MOALF)

4.9 Summary of difficulties encountered by producers and buyers, and support needed

4.9.1.1 Strengths and obstacles encountered by producers

The selected VCs offer strength, opportunities, threats and weaknesses as detailed in the table 25.

Table 14: SWOT Analysis for ALVs value chain

African leafy vegetables Value Chain			
Strengths	Weaknesses	Opportunities	Threats

<p>Ready available market</p> <p>Presence of research institutions supporting development of high yielding varieties</p> <p>Takes short time to cook saving energy</p> <p>Low maturity period -70-90 days</p> <p>Attracts majority farmers (Women and youth)</p> <p>Presence of government policies governing production markets and consumption</p>	<p>Takes a longer time prepare compared to other exotic vegetables</p> <p>Small land size owned by farmers</p> <p>Very few technologies hence drudgery</p>	<p>Simple value addition processes such as drying and milling</p> <p>Seed bulking due to increased demand</p> <p>Flour fortification policy - creating a national demand</p> <p>Presence of government initiatives fighting against malnutrition.</p> <p>Limited information available on ALVs create opportunity for research and development</p> <p>Export demand e.g UK, USA and others</p>	<p>Highly perishable hence need for value addition</p> <p>No ALVS specific government policies</p> <p>Small Land sizes hence farmers prioritize the perceived high value crops</p> <p>Climate change impacts - Low rainfall and reducing water supply</p> <p>Commercialized exotic vegetables which affect adoption of the ALVs</p>
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4.9.1.2 Difficulties encountered by buyers to access the best products and reach markets

1. Roads in the rural areas in Kenya are in poor conditions making it difficult to transport ALVs to the markets during rainy seasons – leading to delays in delivery, as well as to increased spoilage, loss of quality and increased costs which could result to low supply.
2. Access to quality seeds is even problematic, with the licensed varieties being too expensive for most of the smallholders.
3. There are no traceability measures along the value chain. This brings up the food safety question, as in some cases (especially in the peri-urban areas), there have been claims that wastewater has been used to grow ALVs, owing to scarcity of irrigation water.
4. Food hygiene measures are not in place, and if in place they are not standardized. ALVs are often tightly packed in gunny bags and transported in open trucks and public transport buses to distant markets, and it is not uncommon to find ALVs placed on the ground in informal markets.
5. There are no standards such as certification of origin, safety, and development benefits of the ALVs or labelling schemes that could support the value chain by enhancing consumer confidence.
6. The current 16% VAT on vegetable seed is a major disincentive to the growth of the sector, including the promotion of the ALVs' value chain.
7. County extension officers operate on some "informal rules" that they would respond to requests for agronomic practices but would also require to be facilitated with meals and other incidentals-making the extension system quite unreliable.
8. There are no specific national policies supporting the processing of ALVs.
9. There is a general lack of policies targeting ALVs, though recently some of these varieties are receiving attention at the Ministry of Agriculture Livestock and Fisheries (MOALF)

4.9.2 Existing financial services in the project Counties

Table 15: Existing financial services in the ALVs VC¹¹⁰

Institution	Financial service	Specification
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¹¹⁰

<https://www.canr.msu.edu/hrt/research/usaidd/Appendix%20-%20List%20Financial%20Institutions%20in%20Agriculture.pdf>

Chase bank	Horticulture Input loans.	Tailored products offered to all players in the value chain, including: Farmers who do commercial cultivation of flowers, vegetables, fruits, nuts, legumes, tubers, mushrooms and herbs; Suppliers such as agro dealers, seed suppliers and suppliers of flower breeds; Processors and packagers of vegetables, fruits, juices, Nuts, legumes, tubers, mushrooms and herbs; Traders and exporters
	Tegemeo loans.	To address the short term financial needs of farmers supplying accredited buyers and Aggregators and also to Aggregators through advances based on their deliveries
Letshego	Credit	Dairy, Other fish products, Dairy, poultry, agriculture inputs, biogas
Inuka Africa	Financial services, training and capacity building	Inuka is a non-deposit taking MFI that provides financial services, training and capacity building to micro, small and mid-size enterprises with a special focus on smallholderfarmers and agri-business actors
Equity Bank	Vegetable value chain finance and contract farming	Training and inputs from Bayer (through Agent-Farmers Center), Offtaker (contract farming) is Safari Fresh, Equity Bank provides finance
SMEP MicrofinanceBank	Green house Financing	This is financing for acquisition of Green house structures,inputs, irrigation kits, and agronomical support.
Jitegemea	Mazao Loan	This is an agribusiness product which aims at supporting farming as a business (Greenhouses and Input)
Jamii BoraBank	Green House Financing	This is a facility to provide personalized farming solutions to farmers and enhance farming as a business in Kenya. The product seeks to address the issues of securities of the loan, huge and continuous harvests, market linkages and value for their money.
East African Growers	Contract farming	60% of the supply to East African Growers Ltd come from their own farms. The remaining 40% of production is from contract farmers. One half of the produce from contract farmers comes from
Agri finance Corporation	Horticulture and floriculture development loans	These are loans to finance horticultural and Floricultural projects
Netafim and Amiran	Irrigation finance packages	Netafim, in partnership with Kenyan agriculture supplier Amiran, microfinance consulting firm Conexus, and Kenyan banks, is bringing drip irrigation packages to smallholder farmers. Kits are available in 250 square meter, 500 square meter, and one-acre sizes along with training and after sales services and starter packages of seeds and fertilizer. To help facilitate the upfront investment, the partners are developing a consumer loan product with commercial banks that includes an initial grace period with an 18-month payback. The financing component specifically targets women clients (50 percent) and offers a lower down payment and fewer collateral restrictions than ever before. In addition, the local extension provided by Amiran helps mitigate risk of crop failure.
One acre fund	Financing and insurance	the direct procurement and delivery of farm inputs on credit, arm input insurance on behalf of smallholders

4.9.3 Barriers to access credit

1. ALVs farmers experience the same bottlenecks to accessing finance like farmers in other value chains. These include lengthy application processes, prohibitory high interest rates and lack of collateral.
2. Lack of collateral and security are important and often above capacity of smallholder farmers.
3. Poor access to rural finance among smallholders especially women as they lack of control over assets that could be used as collateral in accessing credit from formal sources.
4. Unfavourable banking policies.

5. Very high interest rates ranging from 7% to 11% depending on risk levels, a rate that is unaffordable for many small holder farmers, particularly given climate risks facing agriculture.
6. There is a lack of suitable business plans and business cases, which limits the ability of small holder cooperatives to access financial services with reasonable risks.

4.10 Opportunities for the CRLCSA program

- i. Development of climate resilient and pest tolerant seed varieties. As Counties' dry spells affect seed germination, and seed sown during dry spells is vulnerable to attack by soil pests- leading to low plant population and diminish expected production volumes.
- ii. Promotion of early maturing varieties; local seed production and increased manure and seed commercialization, storage, and processing.
- iii. Support the value chain through capacity-building of farmers on integrated pest and disease management.
- iv. Improve farmers' access to agro-meteorological information and advisories for vegetable production planning and practices.
- v. Support to organize cooperatives for vegetables to coordinate on storage and transportation facilities; training for capacity building on value addition activities; use early warning systems to reduce harvest losses; training on solar drying, use of insulated containers and cold chain practices (e.g., refrigeration within vans and packaging).
- vi. Training on vegetable storage strategies and timing, and value addition activities
- vii. Facilitate establishment of contract marketing for ALVs.
- viii. Increase communication of climate- and market-based information for farmers to optimize selling practices and profits
- ix. Combine climate- and market information and research through most suitable communication tools to optimize vegetables marketing as well as connection between value chain actors through e-marketing.
- x. *Deploy soil and water conservation interventions/ technologies:* Interventions in soil and water management improve crop health and quality, minimize water, and soil loss. Key interventions to promote, particularly for smallholder farmers include, conservation farming techniques, such as cover crops and mulching, shade nets and green house production; and increasing organic matter through use of compost and green manures
- xi. Work to reduce vulnerabilities associated with climate change and market shocks. Investments in water harvesting and cost-effective irrigation projects, capacity on integrated pest and disease management, improved access to agro-weather information and advisories for vegetable production planning and practices will cushion farmers.
- xii. Explore innovative insurance schemes for ALVs farmers to underwrite the risks associated with crop failure. At the same time, diversification of smallholder farmer household economies, by introducing African Leafy Vegetables alongside other food crops will strengthen the long-term resilience of the household economy and food security.
- xiii. Federate smallholder farmers into cooperatives: Encourage smallholder farmers to form/ join cooperatives. Cooperative societies have been useful in aggregating members' input requirements, pooled/ central purchasing to create economies of scale and save costs to individual members. Secondly, cooperatives can also be used as avenues to source inputs, and explore different market opportunities such as contract farming, and coordinate climate-proof storage and transportation facilities for members. Further the cooperative set up could be strengthened to build the capacity of members to invest in low carbon and climate change

resilient production, train farmer-based climate-smart lead farmers and be repository for climate-related technology, management, and innovations.

- xiv. Develop high yielding and promote use of certified seeds for increased production: Since smallholder farmers tend to use recycled seeds, the project should facilitate availing certified seeds and encourage their adoption by setting demo farms and learning visits with ALV farmers.
- xv. Adopt energy options that reduce emissions and operating costs: Uptake of cleaner energy can result in low carbon and reduced climate change and vulnerability. For example, Cooperatives should adopt use of solar energy in addition to promoting of solar drying machines; as well as other climate-proofed technologies such as cold chains, timed transport logistics etc.

5 COFFEE VALUE CHAIN

5.1 Performance

Kenya's Arabica coffee is the finest in the world and it's the most sought after for its intense flavor, full body, and pleasant aroma.

Coffee market is based on :

- Bean types (Arabica, Robusta and others),
- Coffee types (Ground Coffee, Instant Coffee, Whole-Bean, Coffee Pod and Capsules),
- Distribution channel (Hypermarkets/Supermarkets, Online Channels, Cafes and Food Services and Others),
- Applications (Hot Drinks, Ready to Drink, Flavoured Beverages and others)
- Competitive landscape
- Marketing channel (Auctioning at Nairobi Coffee Exchange or direct farmer sales mediated by marketing agents)

Coffee is marketed mainly through the weekly auctions at the Nairobi Coffee Exchange (NCE). The NCE accounts for over 80% of the total sales. The rest of the coffee is marketed through the direct sales. Commercial marketing agents are the key agents at the NCE. They are contracted by farmers through coffee cooperative societies to sell their coffee to the highest bidder in the auction. The marketing agents and other coffee dealers are registered and licensed by the Coffee Directorate each year to be eligible participate at the auction. The marketing agents, present coffee for auctioning and the coffee exporters buy the coffee for both local and export sales. The exporters make coffee payments within 7 days of purchase by the dealers and within 14 days to growers from the date of the auction. Direct sales channels involve the licensed grower-marketers, who are coffee growers with license to market their own coffee directly to overseas buyers. In case where the grower is incapable to market their coffee directly, commercial marketing agents facilitate the process by drawing up sales agreements between producers and buyers and handling other marketing logistics. Currently there are 11 licensed commercial marketing agents and 22 grower marketers.

Table 16: Coffee Marketers

Coffee Marketer	Amount of coffee handled	Average price per 50 Kg (\$)	%Market share
Tropical Farm Management (K) Ltd.	9,544,537.00	342.68	27%
Coffee Management Services	9,388,589.00	336.60	27%
Sucastainability (K) Ltd	4,956,511.00	324.61	14%

Aristocrats Coffee & Tea	3,606,161.00	308.06	10%
Oaklands Coffee Marketing	3,572,752.00	324.53	10%
Sustainable Management Services	1,424,735.00	323.26	3%
Thika Coffee Marketing	896,236.00	292.30	4%
New KPCU Ltd	760,650.00	285.20	2.5%
Kenya Cooperative Coffee Exporters	447,751.10	328.51	1%
Classic Coffee Ltd	2,095,729.36	326.31	1%
Meru County Coffee Marketing	258,105.00	257.70	1%
Total	35,177,149.10	328.85	100%

Both Kenya and the international coffee markets depend heavily on coffee traders/exporters to supply green coffee for roasting and packing. Almost 95% of the Kenya's coffee is exported in green form every year, and only 5% is exported in roast and ground form mainly within the Africa. This is because the consuming countries prefer freshly ground and brewed coffee. According to Coffee Directorate, there are 84 registered and licensed coffee dealers/exporters. Sasini Ltd, Domarns Coffee Limited, Nairobi Java House are some of the known coffee dealers. Kenyan coffee export market is segmented into traditional, specialty and emerging markets. About 60% of the coffee is exported to the traditional market which is made up mainly of countries in the European Union. About 20% of coffee is exported to the specialty market that is led by the USA and includes Japan, Canada and some countries from the European Union. About 15% of the coffee goes to the emerging coffee markets which includes the Gulf region, China, Korea, Malaysia among others and have developed affinity for Kenyan coffee grades: T, C, MH, ML, and UGs¹¹¹. The rest of the coffee is roasted, packaged and sold domestically.

Coffee exporters are key to the supply chain linking the origin country and consuming destination and bridging the time gaps between supply and demand. They also provide finance to both sellers and buyers (taking on the price risk). They undertake the overseas marketing and commercialization of coffee. They do logistics functions and have coffee quality expertise.

5.2 Estimated production costs¹¹²

Table 17: Estimated productions costs for coffee

	Coffee		
	Estimated production costs (USD or KES/ha/year)	Average yields (tons/ha/year)	Product prices (USD or KES/Kg)
Assumptions based on VC analyses	Kenya Shillings 80 to 100 per kilogram of clean coffee from the previous cost of Kenya Shillings 39 per kilogram. Millers charge not more than KES 4,000/tonne of coffee.	Average annual yield (calculated) for most-contributing counties between 2017-2021: 0.349 tonnes/Ha	Average coffee price for Kenyan coffee Oct2021-Mar2022: 6.58 USD/kg

¹¹¹ Hussain, L. A. S., Inzoli, F., Golinucci, N., Stevanato, N., Rocco, M. V., & Colombo, E. (2020). FEEM Approach to Supply Chain Analysis The coffee sector in Kenya.

¹¹² Coffee Value Chain Analysis, FAO 2023

References	https://www.solidaridadnetwork.org/news/coffee-sustainability-kenyas-looming-crisis-amidst-the-soaring-cost-of-production/	http://coffee.agricultureauthority.go.ke/index.php/statistics/reports	Coffee Directorate Statistical Report for Oct2021-Mar2022
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5.3 Gross Margins for coffee value chains

Table 18: Gross margins for Ruiru 11 variety¹¹³

GROSSMARGIN ANALYSIS				
Enterprise: Coffee (1 ACRE), 1012 trees	Variety: Ruiru 11			
VARIABLE COSTS:		No. of Units	Unit Cost (Kshs)	Cost
Weed Control (Manual)-4 times/year	Labour	4	3,000	12,000
Manures (3kg/tree) -3 tons	Manure	3	1,000	3,000
	Transport	3	2,000	6,000
	Labour (MDs)	10	200	2,000
Fertilizers	CAN (50kg)	4	5,500	22,000
	Transport	4	100	400
	Labour (MDs)	4	200	800
	NPK 17:17:17 (50kg)	4	6,000	24,000
	Transport	4	100	400
	Labour (MDs)	4	200	800
Disease control (CBD, Leaf rust)	Fungicides (Copper-based)	0	0	0
	Spraying Labour (MDs)	0	0	0
Canopy Management	Main Pruning (Ksh.6/tree)	1012	6	6,072
	De-Suckering (Ksh. 3/ tree)	1012	3	3,036
Harvesting	Cherry picking (Labour Ksh. 7.5/kg)	6072	7.50	45,540
	Transport (24 times)	24	400	9,600
Miscellaneous Expenses (10% of TVC)				13,565
Total Variable Costs				149,213
Gross Output (6kg cherry per tree @kshs.80)		6,072	80	485,760
Gross Margin/Acre/Year				336,547

Table 18: Gross Margins for Traditional Coffee (old coffee trees)¹¹⁴

GROSSMARGIN ANALYSIS				
Enterprise: Coffee (1 ACRE), 555 trees	Variety: Traditional Varieties (SL28, K7 and SL34)		Management Level:	Medium
VARIABLE COSTS:		No. of Units	Unit Cost (Kshs)	Cost
Weed Control (Manual)-4 times/year	Labour	4	3,000	12,000
Manures (3kg/tree) -1.7 tons	Manure	1.7	1,000	1,700
	Transport (2 Trailer loads)	2.0	2,000	4,000
	Labour (MDs)	5	200	1,000
Fertilizers	CAN (200g/tree) -50kg bags	2	5,500	11,000
	Labour (MDs)	2	200	400
	Transport	2	100	200

¹¹³ Field interviews with Tinderet Agriculture office, Nandi County and Siboti Cooperative in Transnzoia County

¹¹⁴ From Field data collection (information provided by Tinderet Agriculture officer and farmers from Siboti Coffee)

	NPK 17:17:17 (250g/tree) - 50kg bags	3	5,800	17,400
	Transport	3	100	300
	Labour (MDs)	3	200	600
Disease control (CBD, Leaf rust)	Fungicides (Copper-based)-Kg	1	2,000	2,000
	Spraying Labour (MDs)-2 times/year	10	300	3,000
Canopy Management	Main Pruning (Ksh.8/tree)	555	8	4,440
	De-Suckering (Ksh. 4/ tree)-2 times/year	555	8	4,440
Harvesting	Cherry picking (Labour Ksh. 7.5/kg)	2775	7.50	20,813
	Transport (Trips)	24	200	4,800
Miscellaneous expenses (10% of TVC)				8,810
Total Variable Costs				96,903
Gross Output (Average 5kg cherry/tree/year @ksh.80)		2,775	80	222,000
Gross Margin/Acre/Year				125,098

5.4 Analysis of the overall market demand for Coffee

Coffee is typically grown in the least developed regions of the world, but largely consumed by the most developed countries. Kenya exports 95% of its coffee to international markets while 5% is consumed locally. This can be attributed to the traditional and predominant tea preference, and low purchasing power among the population. Annual coffee consumption is about 15,000 tones which is much lower than tea consumption.

Although coffee has a low consumption rate on the local market, this scenario is gradually changing following the rise of the Kenyan middle class. Recently, there has been a fast-rising coffee drinking culture. Lower quality instant coffee is becoming dominant among Kenya's growing middle class populations in urban areas, most likely because of their higher disposable incomes. Instant coffee is the most commonly consumed coffee product in Kenya ¹¹⁵.

The volumes of instant coffee consumed are far higher than those of specialty coffee. Nescaffe, Mccoffee and Dormans instant coffees are more popular in both rural and urban Kenya. The young consumers perceive 'visiting coffee shops' as trendy. Coffee shops like Java House, Dormans, and Art café among others keep sprouting up in major towns depicting a growing trend in coffee consumption in the country ¹¹⁶. Across the entire coffee sector, consumption is increasing and more brands are starting to appear. Greater variety of coffee brands now are appearing in the supermarkets especially in Nairobi city. Occasions such as Kenya Barista Championships are geared towards popularizing local consumption of coffee in Kenya ¹¹⁷.

The figure below depicts coffee consumption in Kenya the last five years:

¹¹⁵ CO. (2020). COFFEE DEVELOPMENT REPORT, THE VALUE FOR COFFEE, Sustainability, Inclusiveness, and Resilience of the Coffee Global Value Chain. London : International Coffee Organization.

¹¹⁶ International Coffee Organization. (2019). Country Coffee Profile : Kenya. Nairobi : International Coffee Council.

¹¹⁷ CO. (2020). COFFEE DEVELOPMENT REPORT, THE VALUE FOR COFFEE, Sustainability, Inclusiveness, and Resilience of the Coffee Global Value Chain. London : International Coffee Organization.

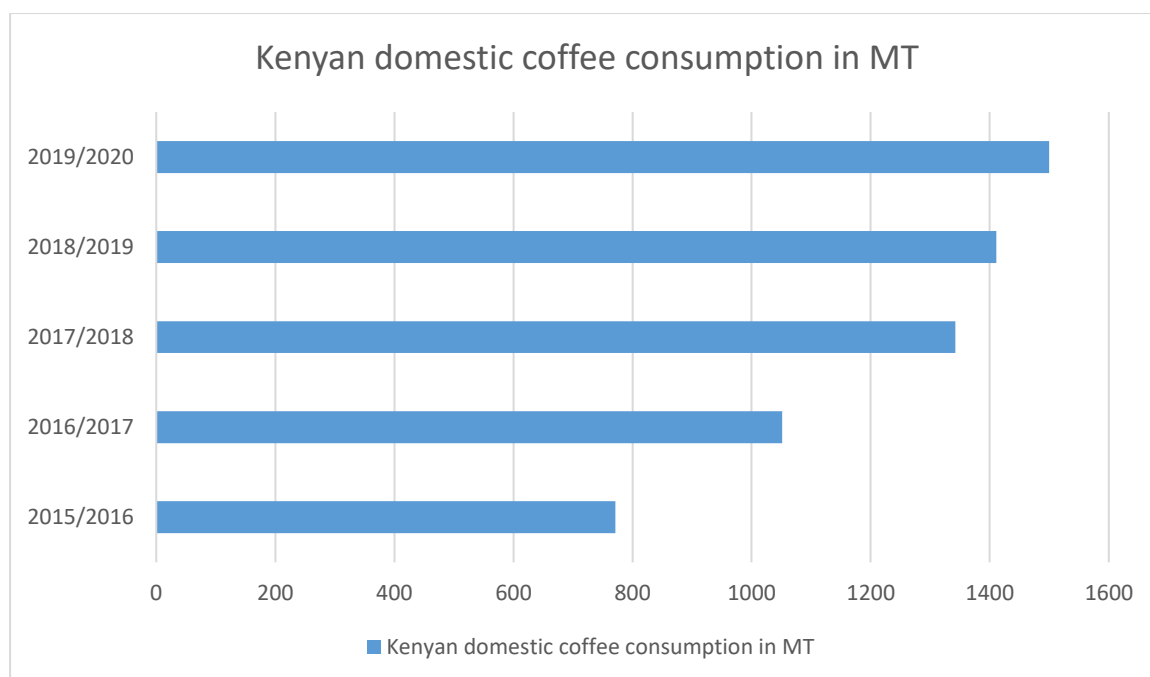


Figure 7: Coffee consumption 2015/2016-2019/2020 (Coffee Directorate, 2020)¹¹⁸

Belgium is the top destination for Kenyan coffee for the last two coffee years with 64,529-60 kg bags in 2020/21 and 52,771-60 kg bags in 2021/22. Germany is the second top destination followed by USA and Korea Republic in that order. Germany has been the leading destination often in position one or two in the past seven coffee years. The increase in Korea Republic could be due to promotional efforts made to the Guest Portrait country effect. Kenya participated in the Korea Republic Expo as Guest portrait country during the 2021 COEX from 14th to 17th July 2021.

The country has lost Syria, Oman and Malaysia as well as Thailand, Qatar and Nigeria which are seasonal destinations. The new destinations in the present season include Bahrain, Burundi, Egypt, Greece, Guatemala, Kuwait and Tunisia. Tunisia is especially one of the emerging markets for Kenya coffee.

In the second quarter of the crop year 2021/2022, the Coffee Directorate has participated in three Expos namely; Gulfood Festivals Exhibition in Dubai, United Arab Emirates (UAE) from 13th to 17th February, 2022, Kenyan Drink and Food Event organized by Montgomery East Africa from 23rd to 25th March, 2022 at the New Sarit Centre-Westlands, Nairobi and the Specialty Coffee Expo event held in Boston, United State of America on 7th -10th April, 2022 hosted by Specialty Coffee Association (SCA)¹¹⁹ (Coffee Directorate, 2022). Table 14 below shows the top 5 international markets for Kenyan Coffee.

Table 19: Top 5 International Markets for Kenyan Coffee 2018/2019-20/2021¹²⁰

Year	2018/2019		2019/2020		2020/2021	
Rank	Country	%age	Country	%age	Country	%age
1	Germany	20	USA	20	Belgium	21

¹¹⁸ <https://coffee.agricultureauthority.go.ke/index.php/statistics/reports>

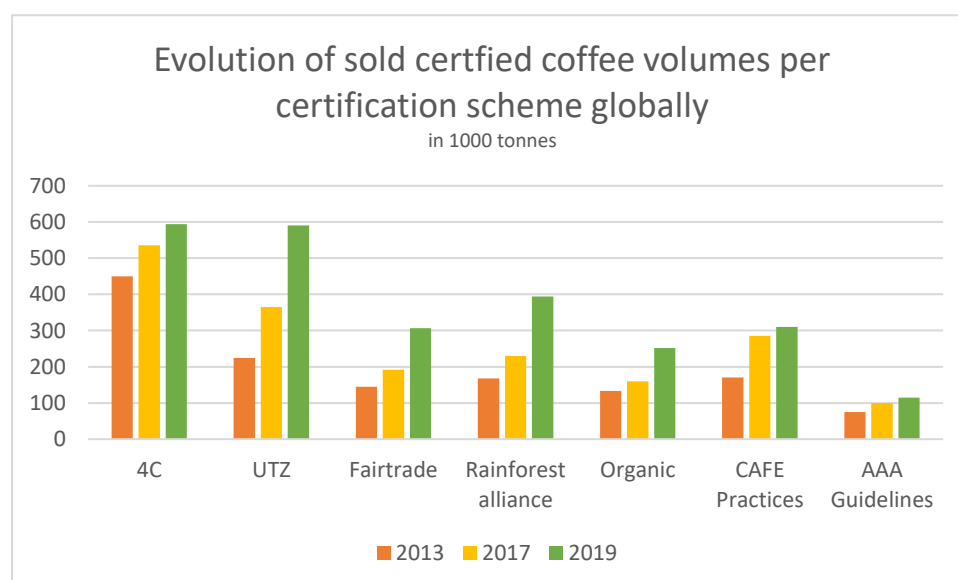
¹¹⁹ Directorate, C. (2022). COFFEE PRODUCTION, MARKETING AND EXPORTS STATUS REPORT-MARCH 2022. Nairobi: Agriculture and Food Authority.

¹²⁰ Coffee Directorate. (2021). Coffee Year Book 2020/21. Nairobi: Agriculture and Food Authority, Coffee Directorate.

2	Belgium	18	Germany	19	USA	15
3	USA	13	Belgium	16	Germany	13
4	Korea	9	Korea	9	Korea	10
5	Sweden	6	Sweden	6	Sweden	7

There are about 25 coffee roasters in Kenya, of which 4 are grower marketers. The growers and private roasters are licensed to roast, pack and market Kenyan coffee locally and internationally. Coffee is purchased through auction and after roasting is retailed in major urban centres and coffee shops. The domestic market consumes both locally produced and imported coffee products. The locally produced coffee brands include Java, Dormans and Gibsons coffee and are sold in retail outlets in Kenya, Uganda, Tanzania and Rwanda. Furthermore, the domestic market is highly diversified from mainstream coffee blends to informal coffee hawkers, a number of independent coffee shops exist alongside big chains such as Java coffee shop, Savannah, Café Deli & Delicatessen, Artcaffe and Bakery Ltd, and Avanti Group of restaurants among others.

Certified coffee has also gained prominence with Europe being the largest global market for certified coffee, which has seen a growth in demand in the past years. The demand for certified coffees in the near future is expected to continue to grow. The figure below shows the growth of sold certified coffee globally for different certification schemes.



Source¹²¹

The market demand is however being affected by concerns related to climate change and biodiversity issues. Prolonged droughts, rising temperatures, biodiversity loss and heavy rains are expected to substantially reduce the areas suitable for coffee cultivation by 2050. Plant disease outbreaks have also been directly linked to climate change. These issues might make it more difficult for exporters to fulfil contracts according to the agreed terms, as availability of coffee is under pressure¹²².

Among the counties that prioritized the coffee value chain, climate change is projected to pose high negative impacts on coffee production in most of the counties, such as Bungoma, Kericho, Kisii, Migori,

¹²¹ <https://www.cbi.eu/market-information/coffee/certified-coffee/market-potential>

¹²² [The European market potential for certified coffee | CBI](#)

Nyamira, and Trans-Nzoia, therefore highlighting the need for the adoption of tailored climate-resilient practices. At the same time, coffee production in Bomet and Nandi has the potential to remain stable under rainfed conditions, whereas irrigation has the potential to reduce such negative impacts particularly in Bomet, Nandi, and Trans-Nzoia¹²³.

5.5 Strategies for connecting producers with buyers in Coffee value chain

Kenya has two coffee marketing systems, the Central Auction system and the direct sale. In a central auction, licensed dealers buy coffee through competitive bidding every Tuesday, at the Nairobi Coffee Exchange. Coffee is auctioned every week. The Nairobi Coffee Exchange is mandated to manage the coffee central auction in the country. The coffee is packed in single sisal bags of 60 kg, but the bids are made per 50 kg bag.

On the other hand, in a direct sale, a marketing agent directly negotiates with a buyer outside the country and a sales contract is signed and registered with the Coffee Directorate. Marketing agents are individuals or companies who are contracted by farmers to present coffee for sale at the Nairobi Coffee Exchange Commercial. Marketing agents offer services for commercial purposes. We also have grower marketers, who are growers licensed to market their own coffee. Kenyan farmers choose their marketing agents once a year, during an annual general meeting with the term of the contract generally starting in early October. This is during the harvest season, which runs from October to December. More than 85% of Kenyan coffee is traded at the Nairobi Coffee Exchange.

The coffee offered through the auction is bought by licensed coffee traders or exporters for onward export overseas. Coffee traders are the buyers of the coffee that is offered at the auction for subsequent export to the overseas buyers or local roasters for the local and international market. Before coffee is presented at the auction, warehousemen store the coffee on behalf of the Marketing Agents before presentation to the market.

Table 20: Coffee Market actors

#	Actor	Role
1	Marketing agents	Contracted by farmers to present coffee for sale at the Exchange Prepare sale catalogues Draw and present Representative Samples to the trade Sample room Auction the coffee on behalf of the farmers Prepare invoices for the buyers Receive payments from the respective traders for coffees bought at the auction Prepare and remit coffee warrants to the traders after payments have been made. Process payments for the farmers Arrange for warehousing of coffee within Nairobi county.
2	Traders	Collect and analyze coffee samples Bid/buy coffee from the auction Export coffee to overseas roasters and import trade or roast for local consumption.
3	Warehouse-men	Store coffee on behalf of the Marketing Agents

¹²³ [Transforming Livelihoods through Climate Resilient, Low Carbon, Sustainable Agricultural Value Chains in the Lake Region Economic Bloc, Kenya \(CRLCSA\). Feasibility Study – Part A. FAO, 2023](#)

		Prepare warrants for coffees on offer at the auction on behalf of the Marketing Agents.
4	KCPA (Millers, Marketing Agents, Warehousemen, Coffee Equipment suppliers and Transporters)	Represent all member companies engaged in the coffee industry, either in the export trade or its related services Act as a forum for discussion and exchange; Disseminate coffee industry information to its members Assist in the promotion of Kenyan coffee and its industry on the international market. Oversee coffee auction at Nairobi Coffee Exchange
5	Financiers	Finance coffee industry actors
6	NCE	Runs the coffee auctions in Nairobi
7	Coffee Directorate	Industry Policy and Regulatory Framework Compliance Market Research and Product Development

5.6 Communication strategies between the producers and the buyers in Coffee value chain

Once the coffee has been sold, the marketing agent pays the cooperatives within 14 days, Cooperatives have money in their banks within 14 days but coffee payments are not made to the producers until June-July. Consequently, farmers don't have cash for fertilizer or pest control, or have to borrow expensively. Also the farmers lack feedback from the market on whether the prices were up or down at the time they sold their coffee and farmers are highly dissatisfied. The industry must find a way to address the lengthy payment cycles from Cooperatives to farmers ¹²⁴.

Coffee is marketed mainly through the weekly auctions at the Nairobi Coffee Exchange (NCE). The NCE accounts for over 80% of the total sales. The rest of the coffee is marketed through the direct sales. Commercial marketing agents are the key agents at the NCE. They are contracted by farmers through coffee cooperative societies to sell their coffee to the highest bidder in the auction. The marketing agents and other coffee dealers are registered and licensed by the Coffee Directorate each year to be eligible participate at the auction. The marketing agents, present coffee for auctioning and the coffee exporters buy the coffee for both local and export sales. The exporters make coffee payments within 7 days of purchase by the dealers and within 14 days to growers from the date of the auction. Direct sales channels involve the licensed grower-marketers, who are coffee growers with licensed to market their own coffee directly to overseas buyers. In case where the grower is incapable to market their coffee directly, commercial marketing agents facilitate the process by drawing up sales agreements between producers and buyers and handling other marketing logistics. Currently there are 11 licensed commercial marketing agents and 22 grower marketers.

5.7 Terms of payment at the end of the sale of the Coffee

Quality of the coffee cherry is very important. Selectively hand-picked coffee cherries, whereby only well-ripened coffee berries/beans fetch the higher prices for farmers. Occasionally, coffee can be harvested by strip picking whereby trees are harvested entirely at one time by picking all the beans off the branches, ripe as well as unripe cherries. Hand picking is the wide spread method of harvesting coffee cherries. Coffee growers and pickers select the highest quality coffee cherries. After harvesting, good cherries are separated from the bad cherries to ensure that only the best red ripe cherries are processed.

¹²⁴ Muthoni, M. P. (2014). Coffee Value Chain Analysis in Kenya (A case of Kenya Planters Cooperative Union). Journal of Business and Management, 6(5), 207-215.

Weight of the coffee cherries delivered at the factory is also a key factor in determining payment of farmers. This is because the factories serve as collection/aggregation centers for smallholder coffee growers. Immediately after harvesting, the growers deliver their coffee berries at the factory by a lorry or track, for primary processing. The farmers empty their bags at the delivery unit of the factory for weighing and a receipt is provided to the farmer for the amount delivered.

Once the coffee is sold, estate growers get paid directly while smallholder growers get paid through the coffee cooperative societies. Payment periods depend largely on the efficiency of the marketing agents and availability of buyers.

Commercial marketing agents are the key agents at the NCE. They are contracted by farmers through coffee cooperative societies to sell their coffee to the highest bidder in the auction. The marketing agents and other coffee dealers are registered and licensed by the Coffee Directorate each year to be eligible to participate at the auction. The marketing agents present coffee for auctioning and the coffee exporters buy the coffee for both local and export sales. The exporters make coffee payments within 7 days of purchase by the dealers and within 14 days to growers from the date of the auction. In case where the grower is incapable to market their coffee directly, commercial marketing agents facilitate the process by drawing up sales agreements between producers and buyers and handling other marketing logistics.

At the cooperative level, it has been reported before ¹²⁵ that due to corruption farmers have no say on the appointment of cooperative board. As some boards want to serve beyond their term. As well farmers have minimal bargaining power over the price per kg of coffee delivered as they are not involved in appointment of commercial marketing agents. Some agents have bribed cooperative boards to be the sole agents in marketing their coffee. Farmers in most cases are not aware of how much their coffee fetched at the NCE auction as this information is never relayed to them the cooperatives. Coffee co-operative societies have been mismanaged leading to embezzlement of funds. This has led to low income for the farmers.

Majority of the value added coffee is sold locally and within African markets. Export speciality markets prefer just green coffee.

5.8 Reasons for product price movement between buyers

According to the interviews conducted, the price of products in all the study value chains varies according to the buyers' preference, market demand, and availability of produce. Several parameters explain this state of affairs. First, the quality of the product and its cleanliness play a role in the bargaining process. Some affect the price, given the cost of transport. Nevertheless, it should be noted that coffee prices are not mostly subject to this situation, since the price is set by the state agencies such as Nairobi Coffee Exchange.

5.9 Government intervention in value chains

Coffee Value chain :

Following the promulgation of the Kenya Constitution 2010 provision of agricultural extension services were devolved to the county governments. The county government extension staff promote the coffee sector by providing access to good practices in coffee production. Moreover, the Coffee Directorate in collaboration with other relevant stakeholders provide capacity building to the counties' agricultural staff and other coffee value chain players. The collaborating private agencies include Technoserve, Solidaridad, certification bodies (UTZ, 4C, Fairtrade) and management services providers. Kenya's coffee sector is funded by the national and counties government, banks, SACCOs and development partners. Commodities Fund (ComFund) – ComFund was established under Crops Act 2013. The Fund is the successor of Coffee Development Fund and Sugar Development Fund which was part of Kenya Sugar Board. ComFund mandate is to provide sustainable and affordable credit and advances to agricultural sector for farm improvement, farm inputs, farming operations, agricultural infrastructural development, value

¹²⁵ Muthoni, M. P. (2014). Coffee Value Chain Analysis in Kenya (A case of Kenya Planters Cooperative Union). Journal of Business and Management, 6(5), 207-215.

addition initiatives, price stabilization and facilitating capacity building related to credit absorption. The facility is a short term working capital advance offered to registered coffee farmers, co-operatives societies, coffee associations and estates growers to enhance their primary processing (pulping) capacities.

The government through the Ministry of Agriculture, is the main body in charge of controlling the policy and regulatory environment of the coffee Industry. It achieves this through the Agriculture and Food Authority's, Coffee Directorate. The Coffee Directorate is in charge of regulation and compliance enforcement, market research and product development and technical and advisory services in the Coffee industry. The directorate is the registering and licensing body of all the coffee commercial marketing agents, exporters/dealers, grower marketers, millers, warehousemen, and management agents.

5.9.1 Coffee General Regulations

The coffee directorate is mandated by the government to ensure adherence to the coffee standards, the coffee industry code of practice and the Coffee regulations. Kenya Coffee Producers and Traders Association (KCPA) is mandated by its constitution as the coffee producers' advocate. It is at the forefront of policy dialogue. Through Research, KCPA undertakes effective lobbying to provide accurate information on coffee issues and realistic action plan to address the issues. KCPA, in partnership with other development partners, heavily invests on research to inform its advocacy initiatives. Some of the legislations governing coffee production include :

- i. The Crops Act (no. 16 of 2013) the crops (coffee) (general) regulations, 2019 arrangement of regulations which outlines :
 - The functions of the Agriculture and Food Authority and county governments.
 - Registration and licencing
 - Production and procesing
 - Coffee trading and marketing
 - Quality assurance
 - General provisions
- ii. Coffee directorate. (2022). The crops (coffee)(general)(amendment) regulations, 2022. Kenya : agriculture and food authority.

These refer to amendments to the crops Act 2013)

5.9.2 Direct government and project/program interventions

i. Commodities Fund (ComFund)

ComFund was established under Crops Act 2013. The Fund is the successor of Coffee Development Fund and Sugar Development Fund which was part of Kenya Sugar Board. ComFund mandate is to provide sustainable and affordable credit and advances to agricultural sector for farm improvement, farm inputs, farming operations, agricultural infrastructural development, value addition initiatives, price stabilization and facilitating capacity building related to credit absorption. The facility is a short term working capital advance offered to registered coffee farmers, co-operatives societies, coffee associations and estates growers to enhance their primary processing (pulping) capacities¹²⁶.

- ii. **Coffee Revitalization Programme.** This ongoingprogramme is a partnership between the Ministry and the World Bank to support coffee revitalization to the tune of Kshs. 1.5 billion in phase one in two years. Phase one will cover Kiambu, Murang'a, Nyeri, Kirinyaga, Machakos, Embu, Tharaka

¹²⁶ ComFund. (2022, November 16). Commodities Funds, Financing crops for prosperity. Retrieved from Who we are: <https://www.comfund.co.ke/who-we-are/>

Nithi and Meru Counties while phase 2 will cover other coffee producing Counties including those in LREB

- iii. Coffee Initiative by TechnoServe and the Bill and Melinda Gates Foundation. The Coffee Initiative worked with local farmers in East Africa to improve agronomy and business practices, establish new coffee cooperatives and strengthen existing ones, and help cooperatives create business plans and access financing for wet mills.
- iv. Kedovo Coffee Project. Founded on a shared dream of transforming the communities of the Aberdares and Mt Kenya mountains in Kenya, through economic coffee production.
- v. The ARABIKA initiative. Action to Re-launch Agriculture and Branding Internationalization of Kenyan coffee in and out of Africa is a 3 year project (May 2021 to April 2024) that synchronizes with the strategies of the Kenya government and its counties in the development of the coffee value chain in the country. It is funded by the Italian Agency for Development Cooperation and implemented by CEFA, AVSI and E4Impact.
- vi. Food Security through Improved Resilience of Smallholder Coffee Farmers in Ethiopia and Kenya' (FOSEK) by Solidaridad. The FOSEK project trained 120,000 smallholders in Kenya and Ethiopia (20% being women) and supported them to implement good practices at the farm level.
- vii. Developing a Low-Carbon Coffee Value-Chain in Kericho, Kenya. It is enabled by the Netherlands Enterprise Agency (RVO) and run by a consortium consisting of Moyee Coffee, The Fairchain Foundation, Agriterro, the Kipkelion District Cooperative Union and the Kenya Agriculture Livestock and Research Organization (KALRO).
- viii. Re-Nature's by Agriterro. It centers around the development and implementation of a regenerative coffee farming system designed for maximum carbon uptake in biomass and soil.
- ix. Kiambu county Profits From Coffee Revitalization Programme. The County Government of Kiambu has partnered with the Italian Agency for Development Cooperation in efforts to revitalize Coffee farming in the county, targeting foreign markets.
- x. Kenya National Coffee Reference Point by HIVOS. The project seeks to establish reference groups on all technical and socio-economic aspects of coffee production and all stages in the coffee value chain. The reference groups brings together the stakeholders and experts in the coffee sector namely the producers, government ministries, research organizations, private sector (millers, marketing agents, extension agents) to work together in identifying the challenges facing the coffee sector, discussing and documenting sustainable solutions to the identified challenges.
- xi. Coffee Shade Tree Planting and Biogas Production Projects, Kenya Coffee Producers Association with technical and financial support from AgriCord through the Swedish Cooperative Centre implements the two projects among KCPA members. The projects involve coffee shed tree planting and production of biogas using coffee pulp and other bio-waste from the coffee farms. The main objective of these projects is to contribute to the management and mitigation of the impacts of climate change and hence help to improve the quantity and quality of coffee production in Kenya.
- xii. COOPWORKS Project. The CoopWorks project is funded by Agriterro to pilot the development of a computer system for recording all the activities that are performed in the office. This makes it easier to keep records and production of reports will be done instantly. The selected cooperative societies to pilot the work are Kikima Farmers Cooperative Society in Mbooni where there is an early crop and Kamacharia Farmers Cooperative Society in Muranga (Mugama Union) where there is a late crop. This project is implemented with partners such as the Ministry of Agriculture (Coffee Desk), Ministry of Cooperative Development and Marketing, the Coffee Board, KENFAP, FAO, representatives from the cooperative societies, etc.

5.10 Summary of difficulties encountered by producers and buyers, and support needed

5.10.1 Strengths and obstacles encountered by producers

The selected VCs offer strength, opportunities, threats and weaknesses as detailed in the table 25.

Table 21: SWOT Analysis for coffee value chain

Coffee VC			
Strengths	Weakness	Opportunities	Threats
Strengths Increasing domestic consumption Recognized quality Global market Two optionfor sale (Direct sale or NCE) Ideal climatic conditions Pool of coffee knowledge Renowned coffee variety - Blue Mountain Availability of Renown coffee research facility Availability of superior coffee varieties (New / Improved) Devolution of functions Good will from the County government A good asset base at the union	Ageing farmers and old technologies High risk for farmers Low domestic value addition Low yields due to low use of inputs and droughts Small and Uneconomical units at the farm and society levels Old and obsolete processing technologies Capacity bottlenecks and mismatch especially at processing, warehousing and level. Poor keeping and management of records Limited value addition of coffee Inappropriate policy framework - There is a conflict in the line ministries that deal with coffee and other related bodies Weak regulatory framework leading to weak regulation- the activities of CBK are not visible on the ground Multiplicity of players leading to duplication and poor coordination Lack of brand identity	Government recognition Rising domestic consumption Exporting roasted coffee Generating revenue from coffee pulp Liberalization of sector allowing farmers to market their coffee directly Value addition	Environmental challenges Coffee sector is losing competitiveness Drop in international prices Pest and disease Climate change effects Competition from other enterprises Changing consumer preferences

5.10.1.1 Difficulties encountered by buyers to access the best products and reach markets

1. Lack of transparency by cooperative officials on market trends. Farmers lack feedback from the market on whether the prices were up or down at the time they sold their coffee and farmers are highly dissatisfied.
2. The lack of an enabling operational framework that continue to challenge the livelihoods of coffee farmers. Coffee farmers has no say over coffee prices once it is out of their farm.
3. Corrupt cooperative officials who maintain engagement with marketing agents to their own benefit without considering the coffee producers.

4. The cooperatives have less bargaining power over coffee prices at the NCE. As a result, many smallholders had opted out of the cooperative societies and others completely coffee production for more profitable businesses¹²⁷. However, with government intervention, The NCE is introducing a Direct Settlement System (DSS) to facilitate efficient payment of growers' proceeds as well as recovery of any other commitments owed by the grower to service providers. The DSS will ensure more transparency in payments, a positive development that will benefit farmers.
5. Price fluctuation & unreliable incomes are also a major challenge facing the sector. Due to increased inflation in the country and the decreasing value of the Kenyan shilling against the dollar, costs of coffee production are high and yet the farm gate price per kilogram of coffee remains low. This is affecting both commodity coffee and specialty coffee producers.
6. Poor access to quality coffee seedlings.
7. Poor access to markets and profitability of climate smart, low carbon sustainable agricultural products.
8. The market incentives to sustain climate resilient, low-carbon production are insufficient. Farmers are not certain they will obtain price premiums or other adequate market incentives for their commodities produced using climate resilient and low-carbon technologies and practices.
9. Farmers do not know if adopting climate resilient, low-carbon practises will lead to increased benefits. There is no data tracking the sales of commodities produced using a set of climate resilient, low-carbon practises or another. Very few cooperatives work with third-party certification such as Fair Trade and Rain Forest Alliance, and even though many follow Good Agricultural Practices (GAP), few are labelled as such.
10. Farmers have limited knowledge on certification schemes – and the advantages thereof – and of GAP among smallholder farmers.
11. For the coffee value chain, market access for climate resilient, low-carbon produce must contend with practices and norms among market intermediaries (e.g. Nairobi Coffee exchange), which may not be harmonized with the standards of climate resilience or climate smart agriculture. Among all actors in the coffee value chain, none is dedicated to ensuring environmental or climate sustainability of the produce.
12. Data on certified farmers and cooperatives is scarce. Most of these are found in the central region of Kenya, indicating that most coffee cooperatives in the LREB region do not have Fairtrade certification, underlining the need for support. Despite this, market trends for the coffee value chain continually demand for high quality, high-value products.

5.10.2 Existing financial services in the project Counties

Table 22: Existing financial services in Coffee VC¹²⁸

Institution	Financial service	Specifications
CFC StanbicBank	Agricultural Production Loan (APL) is	A short-term credit that lets you pay for your agricultural input costs. This product is suitable for grain farmers cultivating on either dry land or on an irrigation basis. Loans are provided to individual farmers, groups and legal entities in the agricultural sector, including commercial farmers and agribusinesses. Input costs that qualify for production credit include: Seeds and fertilizer; Fuel, oil and lubricants; Herbicides and pesticides; Repairs and maintenance; Crop insurance premiums
Co-operative Bank of Kenya	Loans and advance payments	They offer different solutions for coffee farmers for advance payment, working capital loans and overdrafts.
	Large Scale Loans	Loan offered to large scale farmers to enable them access farm inputs, working capital, farm equipment and other social needs e.g. school fees,

¹²⁷ Mwangi, R. W. (2018). Value Addition Practices in Coffee Cooperative Societies and Sustainability Of The Coffee Industry In Kenya (Doctoral dissertation).

¹²⁸ <https://www.canr.msu.edu/hrt/research/usaid/Appendix%20-%20List%20Financial%20Institutions%20in%20Agriculture.pdf>

		medical bills, furniture etc.
Family bank	Commercial Crop Loans	This product offers credit facilities for qualifying farmers to access production requirements such as land preparation, certified seed, fertilizer, chemical applications and appropriate post-harvest handling & storage.
Agri finance Corporation	Cash crop loans	The credit facility for cash production of tea, coffee, Sugarcane, pyrethrum, cashew nuts, citrus, mango trees, bananas, stevia and other cash crops
Kenya government	Coffee Revitalization Project	Provision of subsidized fertilizer and propagation of seeds and distribution of coffee planting materials
	coffee cherry advance revolving fund	The fund is advanced to coffee growers at a modest rate of three per cent by the New Kenya Planters Cooperative Union (NKPCU)
	Commodities fund	Advances, Bulk Acquisition of Farm Inputs (BAFI), Water Development/Irrigation Loans, Infrastructure Loans, coffee Machinery and Equipment Loan, coffee Establishment Loan (CEL)

5.10.3 Barriers to access credit

- i. Sometimes farmers go into debt at exorbitant rates of interest of loans to buy inputs and if crops fail they have no way of paying back their loans.
- ii. The cost of borrowing is high. He adds that the requirement by the commercial banks for security has been a major impediment to accessing finance by the coffee growers
- iii. Most banks find the financing of agriculture as a very high-risk activity due to low profitability of the sector, high inflation rates, poor land markets and problems associated with collateral relating to the uncertainty of property rights.
- iv. There is a weak relationship between banks and farmers and as a result, farmers have often been made to provide long-term collateral as security for short-term loans.
- v. Farmers who need loans have difficulties in obtaining guarantors, a requirement at formal financial institutions; and thus posing a challenge for them to borrow funds from legal institutions.
- vi. The interest rates charged by banks on loans are a key impediment to the economy and were found to discourage local investors. The local small-scale farmers may not afford the high-interest rates and so may opt not to take the loan thus affecting their choices of finance.
- vii. Risk associated with borrowing, high interest rates and unavailability of credit financial institutions in coffee value chain is the major constraints smallholder farmers face
- viii. The banks have refused to use rural land as collateral for loans.
- ix. Majority of rural coffee farmers do not have title deeds or log book to secure loans.
- x. Smallholder coffee farmers cannot get a guarantor to secure a loan.
- xi. Interests charged on loans are quite high
- xii. Majority of farmers indicated that they do not have a solid financial relationship with lenders.

5.11 Opportunities for the CRLCSA program

1. The project could consider working with both the national and county government should consider coming up with a preferential rural coffee credit that can be administered through existing financial intermediaries.

2. Development of sustainable certifications that include climate adaptation standards. Coffee farmers and cooperatives should be supported to access these certifications and to meet the costly processes of certification and high fees levied by certification bodies.
3. Ensure equitable access to information to value chain actors; Monitor activities to improve performance of cooperatives.
4. Promote coffee processing and market opportunities, organization through cooperatives.
5. Support farmers' access to and use of real-time weather forecasts, extreme rainfall and flooding advisory tailored to coffee value chain actors.
6. Promote Utilization of renewable energy resources such as biogas, solar and wind across the coffee value chain could help build resiliency within the industry. Solar photovoltaic conserves energy. Wind pumps enhances productivity by pumping water without fuel required. Biomass (coffee pellets and husks) eliminates pollution by turning coffee byproduct waste into energy. Biogas generates renewable energy from livestock manure and reduces farm emissions.
7. The farmer cooperatives should be facilitated for value addition of coffee through coffee roasting and packaging. Roasting the coffee before selling will fetch higher market prices and enhance the income of coffee growers.
8. Enhance farmers' participation in the value chain to increase knowledge sharing and farmers' capacity building to negotiate prices and contracts with middlemen, as well as requests for improved technologies and practices tailored to farmers' needs. Increase income opportunities for farmers taking up adding-value activities such as collection, grading, bulking, and transportation.
9. Promote adoption of improved coffee cultivars that are climate resilient and pest and disease resistant.
10. Promote farmers access to climate- and market-based information as well as subsidies to enable more informed decisions at the production site and improve the quality and quantity of coffee production.

6 THE TEA VALUE CHAIN

6.1 Performance

In Kenya, tea is grown in the highland areas with annual rainfall 1270-1397mm, soil PH of 4.5-5.8. In the LREB the main tea producing counties are Nandi, Kericho, Bomet, Kisii, Bungoma Nyamira, Kakamega, Vihiga, Narok, Nakuru, Elgeyo-Marakwet and Trans Nzoia¹²⁹. Kericho, Bomet and Nandi counties produce 46% of all the tea grown in Kenya¹³⁰.

National level performance

Data recorded for 11 years since 2000 indicates that the area (in hectares) under production by smallholder and larger estate producers in Kenya has been increasing. In the last 3 years, the area under production has remained the same, indicating that there may not have new producing farms in the period¹³¹. This finding is complemented by FAOSTAT that indicate that in 2019 and 2020 the total land under tea remained at 269,400¹³². Production has been relatively changing across the years due other production factors such as access to agro inputs such as fertilizer, climate change impacts such as unreliable rainfall etc. Below is the production trend for the last 11 years.

¹²⁹ KIPPRA 2017; Transforming agribusiness, trade, and leadership: A capacity needs Assessment of the tea Value chain in Kenya

¹³⁰ Kezia Biwott, 2022; Kericho County: Tea, Foods, and Shifting Weather Patterns

¹³¹ East Africa Tea Trade Association; Tea Production Statistics 1963-2021

¹³² <https://www.fao.org/faostat/en/#data>

Table 23: Tea production in Kenya 11 Year Trend

Year	Large Scale farmers Area (Hectares)	Small scale farmers Area (Hectares)	Grand Total (Hectares)	Large scale production (Tonnes)	Small scale production (Tonnes)	Total Production (Tonnes)
2000	35,313	85,083	120,396	90,740	145,546	236,286
2001	38,781	85,511	124,292	112,906	181,726	294,631
2002	44,399	85,941	130,340	111,197	175,905	287,102
2003	45,080	86,373	131,453	112,882	180,789	293,670
2004	48,754	87,954	136,708	132,056	192,552	324,609
2005	48,633	92,682	141,315	130,776	197,721	328,498
2006	51,297	95,779	147,076	119,401	191,177	310,578
2007	51,011	98,185	149,196	139,992	229,614	369,606
2008	50,605	107,115	157,720	134,963	210,854	345,817
2009	51,126	107,268	158,394	141,593	172,605	314,198
2010	56,893	115,023	171,916	174,026	224,981	399,006
2011	64,470	123,385	187,855	159,359	218,553	377,912
2012	65,732	124,985	190,717	150,982	218,580	369,562
2013	71,305	127,352	198,657	182,618	249,835	432,453
2014	74,385	128,621	203,006	182,686	262,419	445,105
2015	75,239	134,187	209,426	161,615	237,596	399,211
2016	89,796	138,382	228,178	207,402	265,609	473,011
2017	91,592	141,150	232,742	193,731	246,127	439,858
2018	94,939	139,239	234,178	220,666	272,333	492,999
2019	106,310	163,120	269,430	200,741	258,112	458,853
2020	106,310	163,120	269,430	246,914	322,621	569,535
2021 (Jan-Oct)	106,310	163,120	269,430	208,102	226,485	434,587

Source: East Africa Tea Trade Association, 2021

Performance in the Lake Region Economic Bloc

The LREB region consists of what is referred to as the west of the Rift tea producing areas/ counties. These are the counties of Nandi, Trans Nzoia, Elgeyo Marakwet, Kakamega, Vihiga, Kericho, Bomet, Kisii, Nyamira, Narok, and Nakuru. Data obtained from the Tea Board of Kenya indicate large and smallholder growers in January-September of 2021 and 2022 recorded a decrease in total production by 1.9% to 378,308 tons against 38,630 tons recorded in the same period (Jan-Sep) of the previous year. Further analysis for the month of September indicated a 11.6% decrease in production in the tea producing areas with the highest decrease recorded in the East Rift counties. In the LREB (West Rift counties), the drop is associated with the moderate rainfall experienced in some of the counties such as Kericho and Nandi and low rainfall experienced in Bomet, Nyamira and Kisii counties.

Table 24: Tea performance

Tea sub-sector	Counties	Sep-22 (tons)	Sep-21 (tons)	Var. (°/»)	Jan-Sept 2022 (tons)	Jan-Sept 2021 (tons)	%Variance
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Plantation	West of Rift (Nandi, Trans Nzoia, Elgeyo Marakwet, Kakamega, Vihiga, Kericho, Bomet, Kisii, Nyamira, Narok, and Nakuru)	18,221	19,440	-6.3%	171,850	172,051	-0.1%
	East of Rift (Nyeri, Kirinyaga, Embu, Tharaka Nithi and Meru)	1,118	1,516	-26.2%	12,012	12,971	-7.4%
	Total	19,340	20,956	-7.7%	183,862	185,021	-0.6%
Smallholder	West of Rift (Nandi, Trans Nzoia, Elgeyo Marakwet, Kakamega, Vihiga, Kericho, Bomet, Kisii, Nyamira, Narok, and Nakuru)	7,664	9,221	-16.9%	88,130	88,286	-0.2%
	East of Rift (Nyeri, Kirinyaga, Embu, Tharaka Nithi and Meru)	11,193	13,009	-14.0%	106,316	112,323	-5.3%
	Total	18,857	22,230	-15.2%	194,446	200,609	-3.1%
Grand Total (Small and Large Scale)	West of Rift (Nandi, Trans Nzoia, Elgeyo Marakwet, Kakamega, Vihiga, Kericho, Bomet, Kisii, Nyamira, Narok, and Nakuru)	25,885	28,661	-9.7%	259,980	260,337	-0.1%
	East of Rift (Nyeri, Kirinyaga, Embu, Tharaka Nithi and Meru)	12,311	14,525	-15.2%	118,328	125,293	-5.6%
	Total	38,196	43,185	-11.6%	378,308	385,630	-1.9%

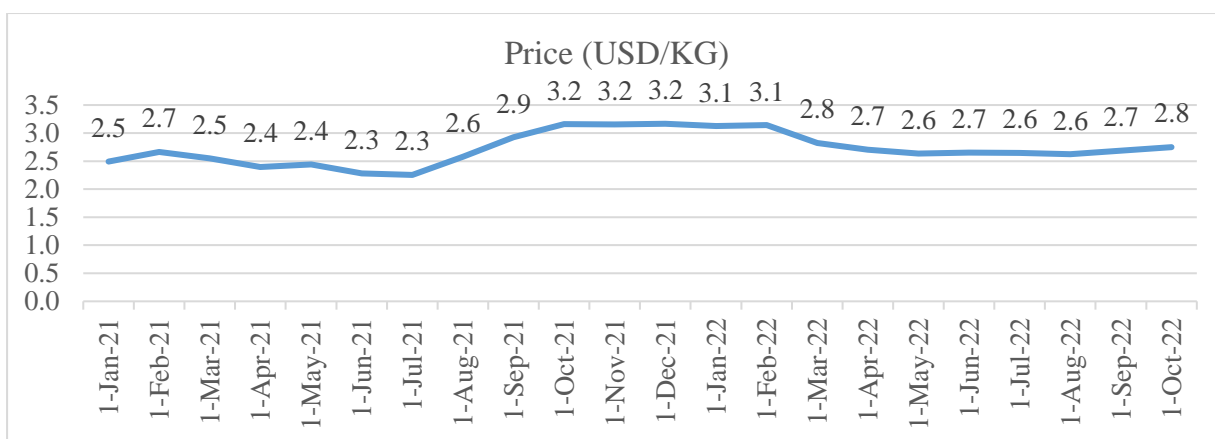
Source: Tea Board of Kenya, 2022¹³³

Data captured on monthly basis at the Mombasa Auction center indicates that the average price per kg of tea trades at 2.70 USD, with best prices (above 3 USD/Kg) recorded between October 2021 and February 2022. These findings indicate price fluctuations caused by different market dynamics¹³⁴

Figure 8 Average price per KG at Mombasa Auction Center

¹³³ Tea Board of Kenya 2022; Kenya Tea Industry Performance Highlights for September 2022

¹³⁴ https://ycharts.com/indicators/kenya_tea_auction_price



Source: Charts 2022

6.2 Estimated production costs¹³⁵

Table 25: Estimated production cost for tea VC

	Estimated production costs (USD or KES/ha/year)	Average yields (tons/ha/year)	Product prices (USD or KES/Kg)
Assumptions based on VC analyses	Total Variable costs = 68,400 KES/acre/Year (includes manual weeding, harvesting, transportation to buying centres and other miscellaneous expenses. Does not include fertilisation)	2.127-2.291 tonnes/Ha Green Leaf	Average price of Dried tea: 2.7 USD per kg . Highest price: above 3 USD per kg.
References	Tinderet Sub-County, Agricultural Office	KIPPRA, 2017; Transforming Agribusiness, Trade, and leadership: A capacity needs Assessment of the tea value chain in Kenya	https://ycharts.com/indicators/kenya_tea_auction_price

6.3 Average annual income per household for tea value chain

Table 26: Tea Gross margin analysis per acre

GROSS MARGIN ANALYSIS FOR SMALL HOLDER FARMERS INTINDERET, NANDI COUNTY

Enterprise: Tea (1 **acre**), 5620 Bushes

Cost Item	Unit of measure	No. of Units	Unit Cost (Kshs)	Total Cost
Weed Control (Manual)-3 times/year	Labour	3	3,000	9,000

¹³⁵ Tea Value Chain Analysis, FAO 2023

Fertilizers	NPK+S (25:5:5+5S)-50kg bags	4	5,500	22,000
Fertilizer Transpiration	Transport	4	100	400
Fertilizer application	Labour (Man days)	5	200	1,000
Harvesting (plucking)	Plucking (Labour Ksh. 8/kg)	5620	8.00	44,960
Transportation to buying centres	Transport (K.sh 1 per kg)	5620	1	5,620
Miscellaneous Expenses (10% of TVC)				8,860
Total Variable Costs				91,840
Gross Output (5620 kg of green leaf/Acre @kshs.31)		5,620	31	174,220
Gross Margin/Acre/Year				82,380

6.4 Analysis of the overall market demand for Tea

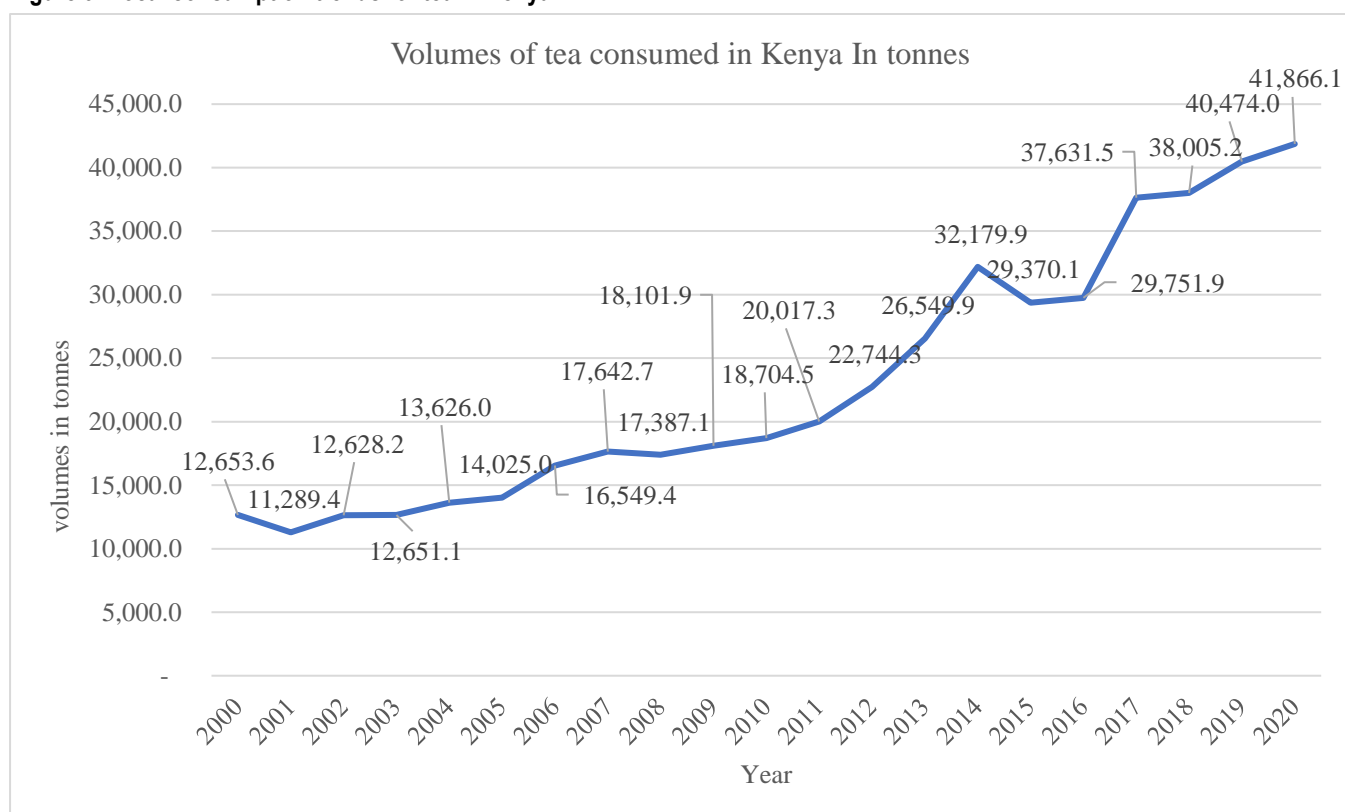
Tea in Kenya is sold in both domestic and international markets. Internationally, tea is sold through the auction in Mombasa in bulk of 50-70kg bags. For the domestic markets, tea is blended packaged and sold through local wholesale and retail channels while for international markets blending and packaging is done outside the country. Importing countries prefer different blends of tea- for instance, the United Kingdom, Egypt and Pakistan prefer black tea while others like France prefer green tea. The market entry barriers include quality and food safety requirements and consumer-driven standards¹³⁶.

Local demand

Local demand and consumption for tea in Kenya stands at 0.5 Kgs annually per capita. The local consumption stands at 6.7% of the produced volumes i.e for every 450 million kgs produced, only 30 million is consumed locally¹³⁷. This necessitates encouraging local consumption to decrease over reliance on international markets. Further analysis from 2000 to 2020 indicate an increasing rate- see *figure 2 below*.

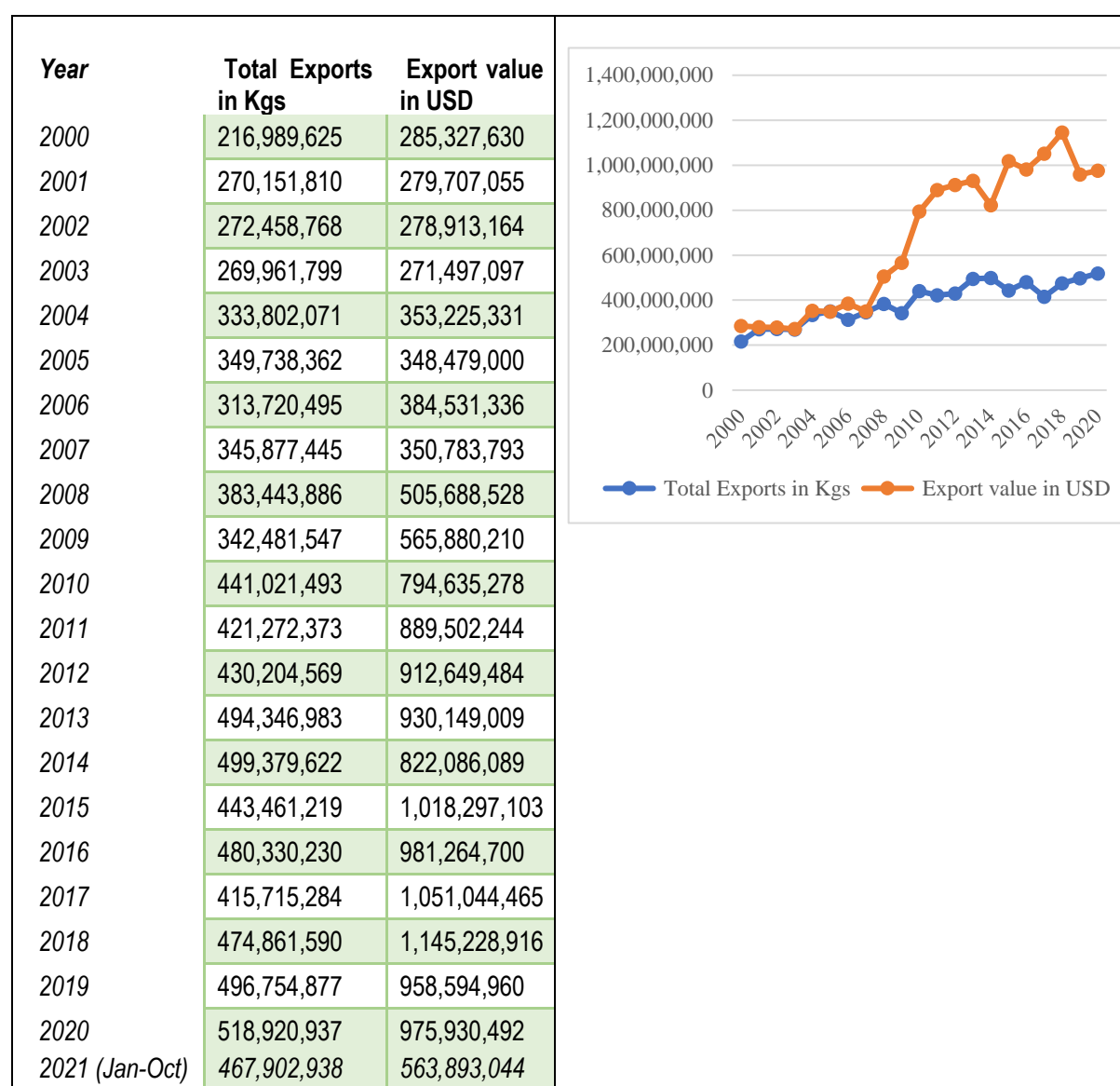
¹³⁶KIPPRA, 2017; Transforming Agribusiness, Trade, and leadership: A capacity needs Assessment of the tea value chain in Kenya

¹³⁷ Agricultural Food Authority, 2022; Kenya to encourage local tea consumption amid global oversupplies

Figure 9: Local consumption trends for tea in Kenya**International demand**

Kenya currently exports over 90% of its tea to international markets. The export trend indicates that volumes exported have been increasing over the period. Quite different, from the local scenario, for the value of the volumes consumed internationally is determined by different forces such as tea quality, competition from other countries, specialty, and pricing. Table 4 below shows tea exports from 2000 to 2021.

Table 27: Kenya Tea Export Volume and value 10 Year- trends¹³⁹



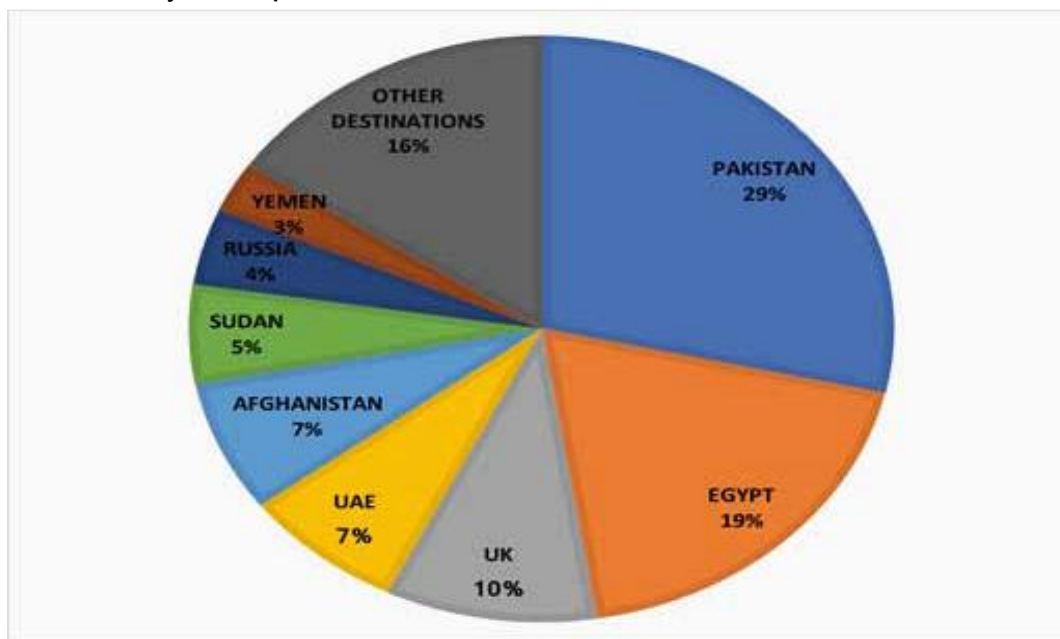
Source: East Africa Tea Trade Association; Tea Production Statistics 1963-2021

Pakistan, Egypt, and the United Kingdom buy over 65% of the Kenya tea. Notably, Pakistan in 2020 imported tea worth USD 495 Million, Egypt USD 148 Million, United Kingdom USD 141 Million, United Arab Emirates USD 62.7 Million and Russia USD 43.4 Million.

At the same time, Kenya stands as the 36th largest importer for tea with major imports from Rwanda, India, and Tanzania. In the year 2020 alone, tea worth USD 59 Million (OECD, 2022) was imported into the country. The small internal tea consumption relative to its production, added to the highly concentrated exports, makes the Kenya tea sector extremely dependent on international markets.

¹³⁹ East Africa Tea Trade Association ;Tea Production Statistics 1963-2021

Figure 10: Main Kenyan tea export destination and their share



Source: Agriculture Food Authority, 2016

Potential markets: Key alternative and emerging markets (which are yet to be fully exploited) include United Arab Emirates, Australia and Sudan¹⁴⁰. There are a number of other potential seasonal markets in the region and globally (AFA, 2021).

Effects of climate change: A feasibility study conducted by FAO, CRLCSA 2023 showed under rainfed conditions, declining trends are detected in all LREB counties by end-century. Yields are projected to decrease in the LREB by up to 10% compared to the historical period, both in the mid-term (2031-2060) and long-term (2061-2090) future. The FS report also demonstrates that counties with low-medium historical yield potential in the southern and westernmost areas of the LREB, with an overall low elevation will experience highest climate impacts on potential yield reductions by up to 20% in the mid-term, and up to 30% in the long-term. These climate effects will affect the available of tea to satisfy market demand¹⁴¹.

6.5 Strategies for connecting producers with buyers in Tea value chain

The smallholder tea farmers mainly sell their green leaf to brokers and processors. A study in Kericho confirmed that tea distribution channels begin from a smallholder and large-scale farms where tea is plucked in line with the plucking quality standards guidelines prescribed by the Kenya Tea Development Agency (KTDA). The green leaf is then transported to factories for processing. After being processed, tea is taken to the auction center, where prices are determined on a day-to-day basis¹⁴². Therefore, farmers have no control over prices as they are dictated to them through KTDA.

Unlike other value chains, tea marketing is strictly done by KTDA as provided by KTDA order under the Agricultural Act (cap 318) of the laws of Kenya¹⁴³. Although KTDA still dominates the provision of services (production,

¹⁴⁰ Christian Development Agency, 2008 ; report on small-scale tea sector in Kenya

¹⁴¹ [Transforming Livelihoods through Climate Resilient, Low Carbon, Sustainable Agricultural Value Chains in the Lake Region Economic Bloc, Kenya \(CRLCSA\). Feasibility Study – Part A. FAO, 2023](#)

¹⁴² Kirui Harrizon 1 Mutai K. Benjamin1 Kibet K. Lawrence2 Kibet R. Patrick1 Macharia Anthony1 Department of Agricultural Economics and Agribusiness Management, Egerton University; Determinants of Tea Marketing Channel Choice and Sales Intensity among Smallholder Farmers in Kericho District, Kenya.

¹⁴³ Kirui Harrizon 1 Mutai K. Benjamin1 Kibet K. Lawrence2 Kibet R. Patrick1 Macharia Anthony1 Department of Agricultural Economics and Agribusiness Management, Egerton University; Determinants of Tea Marketing Channel Choice and Sales Intensity among Smallholder Farmers in Kericho District, Kenya.

distribution, extension and marketing) to smallholder farmers, a parallel system has emerged where farmers sell green leaf directly to private companies or intermediaries for immediate payments (17-20Kshs per kg. Notably, 35% of tea is sold through intermediaries who then sell to multinational companies and private factories in Kericho and Bomet counties¹⁴⁴. Outstandingly, some farmers use both systems while others continue to sell through KTDA. The sector also operates with several value chain actors who play major roles in tea broking, buying and exporting and consumption. These actors include producers, brokers, packers, buyers/exporters, warehouse operators who are grouped as the East Africa Tea Trade Association (EATTA). On the other hand, the sector operates with numerous stakeholders who include government regulatory bodies Tea Board of Kenya, Kenya Tea Growers Association, and the Mombasa Tea Auction¹⁴⁵.

To facilitate international Trade, Kenya has signed multilateral and bilateral trade agreements as part of its trade policy¹⁴⁶. These are:

- World Trade Organization (WTO): Grants Kenya at a 90% access to world agricultural markets.
- ACP-EU Trade Agreement : Signed in 2000 between the European Community and the African, Caribbean, and Pacific states (ACP), gives Kenya a no-reciprocal market access to the European Union
- Common Market of Eastern and Southern Africa (COMESA): The member states agreed to form a Free Trade Area and have been working in reducing the imports tariffs for goods produced within its members.
- East African Community (EAC): The partner states (Burundi, Democratic Republic of Congo, Kenya, Rwanda, South Sudan, Tanzania, and Uganda) signed a treaty to *widen and deepen economic, political, social, and cultural integration to improve the quality of life of the people of East Africa through increased competitiveness, value added production, trade, and investments.*

KTDA still dominates the buying of the green leaf from farmers in the smallholding category. However, some farmers are also selling their green leaf to intermediaries who sell to multinational companies and private factories.

Processed tea is sold through private contracts or tea auctions through which it is assessed according to the taste, quality grade, as well as sustainability certifications and carbon offset labels¹⁴⁷. Here the main actors include the East Africa Tea Trade Association which is responsible for connecting producers with warehouses, processors, and buyers, and the Kenya Tea Packers Association, which is a private institution managing tea packaging and domestic product marketing. Tea factories are part of the association and send processed tea for repackaging. Packaging for international markets instead is managed by multinational companies.

While most of KTDA and KTGA tea is auctioned at the EATTA's Mombasa auction, KTDA factories can also choose to sell to other buyers, and about 20% of KTDA tea is sold on a bilateral basis outside the auction. These non-EATTA sales are mostly specialty teas for expanding fair trade, environmental, ethical, and organic markets.

6.6 Communication strategies between the producers and the buyers in Tea value chain

Small scale tea producers are members of tea producer cooperatives. The current roles of cooperatives in the tea value chain beyond federating farmers is to :

- Providing market linkages to farmers, cushioning farmers against brokers and advocating for better prices for farmers

¹⁴⁴ <https://stir-tea-coffee.com/features/kenya-small-growers-opt-for-private-buyers/#:~:text=Nearly%2035%25%20of%20tea%20production,in%20Kericho%20and%20Bomet%20counties>.

¹⁴⁵ Monroy L., Mulinge W., Witwer M., 2012. Analysis of incentives and disincentives for tea in Kenya. Technical notes series, MAFAP, FAO, Rome

¹⁴⁶ https://www.wto.org/english/tratop_e/tpr_e/tp124_e.htm

¹⁴⁷ <https://stir-tea-coffee.com/features/kenya-small-growers-opt-for-private-buyers/#:~:text=Nearly%2035%25%20of%20tea%20production,in%20Kericho%20and%20Bomet%20counties>.

- Facilitating affordable access to inputs to farmers through bulking and negotiating inputs' (e.g., fertilizer, tea seedlings etc.) prices.
- Acting as entry point/ development hub extension services, business development support, agronomic and other technical support to members
- Bringing farmers together to not only benefit from shared resources (such as aggregation facilities, pooled transport arrangements, collective bargaining etc.) but also improve in their economic, social and cultural needs.

The large-scale estates are represented by the Kenya Tea Growers Association¹⁴⁸. The main players - James Finlay Company Limited, Eastern Produce Company Limited, Williamson Tea Company Limited, Sasini Tea¹⁴⁹ among others, contribute up to 8% of the tea produced in Kenya

KTDA still dominates the buying of the green leaf from farmers in the smallholding category who are part of tea producer cooperatives. However, some farmers are also selling their green leaf to intermediaries who sell to multinational companies and private factories. Processed tea is sold through private contracts or tea auctions through which it is assessed according to the taste, quality grade, as well as sustainability certifications and carbon offset labels¹⁵⁰. KTDA factories can also choose to sell to other buyers, and about 20% of KTDA tea is sold on a bilateral basis outside the auction.

6.7 Terms of payment at the end of the sale of the Tea

Consumer taste and preferences are a major determinant. Consumer demand is also determined by brand elements and familiarity, price of the tea, and effects from other consumers, quality, Processed tea which is sold through private contracts or tea auctions is assessed according to the taste, quality grade, as well as sustainability certifications and carbon offset labels.

KTDA has partnered with several multinational companies to enhance sustainable and climate-resilient agriculture which affect tea payments. The partnership with Unilever for example, enables farmers to adopt certification standards developed by the Sustainable Agriculture Network¹⁵¹, through Farmer Field Schools training to obtain Rainforest Alliance certifications¹⁵².

The Fairtrade certification uses a market-based approach that aims to help producers in developing countries to make better trading conditions and promote sustainability. It advocates for the payment of a higher price to exporters as well as higher social and environmental standards. Fairtrade works closely with stakeholders and advocates to reinforce workers' knowledge of their rights. For example, the Ethical Trading Initiative and the Ethical Tea Partnership brings together companies and NGOs, certification schemes and producers themselves, to improve things like wages and working conditions across the sector¹⁵³.

6.8 Reasons for product price movement between buyers

According to the interviews conducted, the price of products in all the study value chains varies according to the buyers' preference, market demand, and availability of produce. Several parameters explain this state of affairs. First, the quality of the product and its cleanliness play a role in the bargaining process. Some affect the price, given the cost of transport. Nevertheless, it should be noted that tea, are not mostly subject to this situation, since the price is set by the state agencies such as Tea directorate.

¹⁴⁸ KIPRA, 2017; Transforming Agribusiness, Trade, and leadership: A capacity needs Assessment of the tea value chain in Kenya

¹⁴⁹ <https://www.teaboard.or.ke/dealers/manufacturers>

¹⁵⁰ <https://stir-tea-coffee.com/features/kenya-small-growers-opt-for-private-buyers/#:~:text=Nearly%2035%25%20of%20tea%20production,in%20Kericho%20and%20Bomet%20counties.>

¹⁵¹ https://link.springer.com/content/pdf/10.1007/978-3-030-42091-8_70-1.pdf

¹⁵² Rainforest Alliance certification addresses whole-farm sustainability, which means that once farmers meet the certification standards, they can sell all eligible crops as Rainforest Alliance Certified.

¹⁵³ <https://www.fairtradenederland.nl/app/uploads/2019/09/276351.pdf>

6.9 Government intervention in the tea value chain

The government through the MoALF formulates policies and regulations in agriculture that creates an enabling environment for the promotion of the value chain. Under the ministry is the Agriculture Food Authority (AFA)- Tea Directorate that promotes best practices and regulates the production, processing, marketing, grading, storage, collection, transportation, and warehousing of tea. The directorate sets research priorities via linkages with relevant research institutions, including KALRO, the Tea Research Institute and others ; promotes Kenyan tea in the local and international markets and advises national government and the county governments on tea fees, levies, and other charges for purposes of planning, enhancing harmony and equity in the sector. The Kenya Bureau of Standards (KEBS) plays the role of developing and reviewing of tea standards in collaboration with AFA-Tea Directorate and other international standards development bodies.

The Ministry of agriculture in December 2021, reviewed the Cooperative Act in a bid to tighten the policy framework. But stricter supervision and punishment for those abusing position of trust, can improve appeal of the societies.

The bulk of extension services costs are spent on staff remuneration leaving a small proportion for facilitation and infrastructure development. The staff to farmer ratio (1 :5000) is also very low. This inequitable resource allocation affects basic extension services such as travel, transport, communication, demonstrations, tools to seek new information and/or adopt new technologies from research. The result has been limited follow-up of extension and advisory services leading to low adoption of new dairy technologies and productivity. In addition to the extension services provided for by the government, there are other extension service providers mainly from the research institutions, universities, development partners, NGOs, private companies among others.

6.9.1 Direct government and project/program interventions

Government projects in the Tea value chain :

- In Kericho county, the Ministry of Health in partnership with KTDA Foundation has trained 75 Community Health Volunteers (CHVs) in Tegat, Kapkatet, Toror and Tebesonik tea factories. One of the expected outcomes of the training is to create demand for safe and nutritious foods through Behavior Change Communication (BCC) among tea growers
- The Litien Sewer project being implemented by the County Government of Kericho in partnership with German Development Bank and the Government of Kenya is improving water and sanitation standards in the county including tea buying centers and factories.
- TRI and KARLO collaborates with KTDA to research and investigate problems related to tea including the productivity, quality, and suitability of land in relation to tea planting, e.g., the development of tea clones.
- Tea factories are collaborating with the National Environmental Management Authority (NEMA) on the implementation of all policies relating to the environment to ensure that tea factories comply with waste disposal policy, tree cutting policy (as some factories rely heavily on wood fuel for energy) and other policies.
- In Bomet, the Ndarwetta Springs Water Project supported by the Ethical Tea Partnership (ETP), Taylors of Harrogate (ToH) and Kapkoros Tea Factory partnership has involved economic participation of the youth in the maintenance of the project, as well as the provision of clean water to the community, among them tea growers.
- The Gender Empowerment Platform in partnership with IDH the Sustainable Trade Initiative and Ethical Tea Partnership (ETP) has reached 600,000 tea growers with awareness on gender-based violence and Covid-19 awareness through radio campaigns using vernacular languages in tea growing regions. A designated toll-free phone number is in place to address Gender Based Violence spread on social media and tea buying centers

- The TEAFAM (tea families) Project funded by various global tea buyers through their umbrella public sector (Dutch Government & Unilever) has promoted healthy diets among smallholder tea farmers in Kenya in partnership with the Global Alliance for Improved Nutrition.
- FAO Kenya in collaboration with the Tea Research Institute, Sida Kenya and the Ministry of Agriculture carried out a climate change impact assessment of tea production including evaluation of the links between climate variables and tea productivity trends in Kenya ; tea carbon footprint and environmental impact assessment, and socioeconomic analysis that examined tea producers' perceived vulnerabilities to climate variability and the options for adaptation and for technological change. This led to the formulation of the road map and determination of the required framework for undertaking an integrated impact assessment of climate change on the tea industry in Kenya.

6.9.2 Policies and regulations in the Tea value chain:

The policy and regulatory framework guiding the tea sector is discussed below:

- Crops Act (2013): The Act covers all agricultural and cash crops, including tea. It makes the regulations for the tea industry more consistent with the rest of the agricultural sector.
- The Crops (Tea Industry) Regulations (2020) regulate the production, marketing, and trade in tea, as well as registration and licensing matters. These regulations have been effective in bringing the tea sector under one umbrella- reducing duplicative/ overlapping and multi-regulation burden. It is now easy for the industry to comply and the government to enforce.
- The Agriculture Act: The Act provides the legal framework for a stable agricultural sector, by regulating for good management and husbandry practices. This is a general guiding policy and has no specific reference to tea.
- Companies Act (1978, revised 2015): The Act establishes smallholder tea factories as limited liability companies under the Companies Act (1978, revised 2015). This helps them professionalize their operations and gives them leeway to set their own policies and strategies not only for tea growing, processing, and marketing, but also for their sourcing and use of energy.
- Tea Act (2020): The Act has re-established the Tea Board of Kenya which will, among other duties monitor and license agencies involved in the buying and selling of tea. The Tea Board of Kenya will develop, promote, and regulate the development of the tea industry and promote accountability in the tea sector by promptly paying tea farmers and by giving them more power in the running of the tea factories. by the Act, tea factories must pay tea growers, within thirty days, fifty percent of the payment due for green leaf delivered every month and the balance due to the tea grower within three months from the end of the financial year. The Act establishes Tea Research Foundation – see 9 below.
- In 2021, a review of the tea policies by the East Africa Tea Trade Association reveals that there are key areas that require examining afresh and anchoring in policy. These include low productivity, negative impacts of climate change on tea production, insufficient development, transfer of technology, high cost of inputs and multiple taxation regimes, insufficient targeted value addition and product diversification. For example:
 - There are about 45 taxes levied on tea in the country and that the EATTA had been forced to go to court to challenge some of them, including the re-introduced ad valorem levy charged on quantum (charging a farmer 1 per cent of the value of tea as opposed to charging it based on the quantity of production).
 - There are no financial (or other) incentives for using bioenergy (such as briquettes etc.) which are proven to have less emissions, in tea processing.
 - Imported machinery for briquetting, or for pyrolyzing biomass or for using solid forms of bioenergy attracts import duty. Paradoxically, imported solar PV, wind and small hydropower equipment enjoys reduced or zero import duties.
 - Sale of fuelwood from commercial plantations is subject to VAT.
 - There is growing tension that the minimum reserve price (\$2.43 (Sh 296.5) smallholder factories managed by KTDA is distortionary. It has been contested by several stakeholders as a creation of an artificial price

that is not dictated by the forces of demand supply. The argument against the minimum reserve price is that “if the cause of the low price is oversupply, a minimum price encourages more production due to better pay, creating a surplus”. In 2021, KTDA withdrew tea worth Sh 1 billion, following a government directive to do so because the prices at the auction were less than the minimum reserve price set for smallholder farmers.

6.10 Summary of difficulties encountered by producers and buyers, and support needed

6.10.1 Strengths and obstacles encountered in the VC

The selected VCs offer strength, opportunities, threats and weaknesses as detailed in the table 25.

Table 28: VCs SWOT analysis

Tea VC			
Strengths	Weaknesses	Opportunities	Threats
<p>Well established industry structures, institutions and comprehensive policy and regulatory framework- KTDA, TRI, Tea Directorate in AFA etc.</p> <p>Availability of financial service providers for smallholder farmers such as SACCO's, Greenland fedha and banks</p> <p>Many employment opportunities for men, youths and women</p> <p>Favourable weather in the tea growing areas for production all around the year.</p> <p>Availability of new tea varieties such as the Purple clones</p> <p>High demand (70%) of the product is consumed locally</p> <p>Existence of ready labour experience and knowledge in tea plucking and other operations</p>	<p>Initial establishment cost is high.</p> <p>Low value addition practices</p> <p>Low yields among smallholder farmers due to impacts of climate change</p> <p>Labor intensive and costly – manual plucking</p> <p>Inadequate technologies and innovations to combat climate change impacts</p> <p>Over reliance on export market with low domestic demand</p> <p>Competition from other related drinks such as coffee</p> <p>Tea hawking affecting prices</p>	<p>Emerging preferences for other tea varieties such as purple tea</p> <p>Existence of high value specialty markets internationally and the improved legal environment locally for developing cottage factories for specialty tea production.</p> <p>Possibility of increased returns from tea by reducing bulk exports and increasing sale of value added or green leaf sale.</p> <p>Existence of labor saving technologies – Plucking machines</p> <p>COMESA and EAC elimination of trade barriers which increases tea local and international demand</p> <p>High productivity (82,380 Kshs/Acre</p>	<p>Climate change effects- low rainfall, high temperatures soil degradation etc.</p> <p>High cost of production particularly cost of labor, fertilizers, electricity, furnace oil and other fuels used for transport and in running factories.</p> <p>Competition from other producing countries hence the need to ensure competitive brands</p> <p>Poor infrastructure affecting transportation</p> <p>Political and economic instability in the destination markets such as Pakistan, Russia etc</p>

6.10.2 Difficulties encountered by buyers to access the best products and reach markets

- Failure by the sector has failed to provide incentives to smallholder farmers to produce quality tea¹⁵⁴

¹⁵⁴ Kirui Harrizon 1 Mutai K. Benjamin1 Kibet K. Lawrence2 Kibet R. Patrick1 Macharia Anthony1 1. Department of Agricultural Economics and Agribusiness Management, Egerton University; Determinants of Tea Marketing Channel Choice and Sales Intensity among Smallholder Farmers in Kericho District, Kenya

- ii. Inconsistency in use of a particular market outlet greatly affects smallholder farmers' access to related services such as inputs and extension services hence poor production and low profits realized¹⁵⁵.
- iii. Farmers have no control over pricing as this the preserve of KTDA.
- iv. Hinderances exist between Kenya tea and certification schemes owing to the informal nodes of the tea value chain between smallholder farmers and collectors-buyers, resulting in uncertainties in the origin of the product, repackaging and rebranding needs in importing countries rather than directly in Kenya, thus reducing the value of tea and excluding the country from key portions of the market¹⁵⁶.
- v. In addition, harvest volumes remain unpredictable, thanks climate change and extreme weather conditions that, at times, lead to reduced yields.

6.10.3 Existing financial services in the project Counties

Table 29: Existing financial services in the tea VC¹⁵⁷

Institution	Financial services	Specifications
CFC StanbicBank	Agricultural Production Loan (APL)	A short-term credit that lets you pay for your agricultural input costs. This product is suitable for grain farmers cultivating on either dry land or on an irrigation basis. Loans are provided to individual farmers, groups and legal entities in the agricultural sector, including commercial farmers and agri- businesses. Input costs that qualify for production credit include: Seeds and fertilizer; Fuel, oil and lubricants; Herbicides and pesticides; Repairs and maintenance; Crop insurance premiums
Family Bank	Commercial Crop Loans	This product offers credit facilities for qualifying farmers to access production requirements such as land preparation, certified seed, fertilizer, chemical applications and appropriate post-harvest handling & storage.
Kenya Commercial Bank (KCB)	Mavuno Tea Loans	This loan is specifically designed to give tea farmers seasonal credit for farm inputs, working capital or farm development.
Equity Bank	Kilimo Biashara (input loan)/ Kilimo Kisasa (asset loan)	- Loans backed by Kenyan Govt in 2008 (in collaboration with Ifad and AGRA. Loans for tea and dairy farmers
Vision FundKenya	Mkopo Sokoni.	PURPOSE & DESCRIPTION Loans that are advanced to VisionFund Kenya clients that have regular remittances from institutions they sell their products such as milk, tea, horticultural produce etc. (max.12 Months)
Agri finance Corporation	Cash crop loans:	The credit facility for cash production of tea, coffee, Sugarcane, pyrethrum, cashew nuts, citrus, mango trees, bananas, stevia and other cash crops.
Tea cooperatives	Credit	Provision of member tailored financial services to purchase inputs.
Greenland Fedha	Credit	A new subsidiary company of KTDA called Greenland Fedha has recently been established and offers KTDA members cheaper credit interest rates at 8% as opposed to 21% charged by most institutions (SACCOs).

¹⁵⁵ Kirui Harrizon 1 Mutai K. Benjamin1 Kibet K. Lawrence2 Kibet R. Patrick1 Macharia Anthony1 1. Department of Agricultural Economics and Agribusiness Management, Egerton University; Determinants of Tea Marketing Channel Choice and Sales Intensity among Smallholder Farmers in Kericho District, Kenya

¹⁵⁶ <https://open.unido.org/api/documents/5239228/download/2.Value%20chain%20vulnerability-Kenya%20country%20report.pdf>

¹⁵⁷ <https://www.canr.msu.edu/hrt/research/usa/Appendix%201%20-%20List%20Financial%20Institutions%20in%20Agriculture.pdf>

6.10.4 Barriers to access credit

1. Hinderances exist between Kenya tea and certification schemes owing to the informal nodes of the tea value chain between smallholder farmers and collectors-buyers, resulting in uncertainties in the origin of the product, repackaging and rebranding needs in importing countries rather than directly in Kenya, thus reducing the value of tea and excluding the country from key portions of the market.
2. A scrutiny at working and living conditions for workers and their families across certified tea estates and small grower groups in Kenya paints a grim picture. High production costs and low market prices for black tea point to difficult times for the livelihoods of the nearly 5 million people in Kenya who depend on tea for employment or income. In addition, harvest volumes remain unpredictable, thanks to climate change and extreme weather conditions that, at times, lead to reduced yields.
3. Not all financial institutions are active in the LREB and the conditions for access are difficult. Also requirements for collateral and security are important and often above capacity of smallholder farmers.
4. Poor access to rural finance among smallholders especially women who mainly source finance for agricultural operations from non-prudential sources and informal sources such as family and friends as they lack of control over assets that could be used as collateral in accessing credit from formal sources.
5. Most of the lending goes to larger clients, and most smallholders are not yet accessing any finance due to high costs, complicated procedures or heavy collateral requirements.
6. Unfavourable banking policies.
7. Very high interest rates ranging from 7% to 11% depending on risk levels, a rate that is unaffordable for many smallholder farmers, particularly given climate risks facing agriculture.
8. The collateral requirements are often too burdensome for individual borrowers and house or vehicle ownership is low in rural areas, and land titles sometimes unavailable. Also land holdings are small (or too small to warrant large debt) and Borrowers and lenders are risk averse, given the impacts of climate variability and change.
9. There is a lack of suitable business plans and business cases, which limits the ability of smallholder cooperatives to lend with reasonable risks. Despite guarantees and other mechanisms designed to reduce the cost of borrowing, funds are not reaching smallholders.

6.11 Opportunities for the CRLCSA program

- i. Promote crop diversification in low production areas.
- ii. Facilitate farmers shift to drought, heat and frost, hailstorm, pests and disease resistant tea clones (e.g., purple tea).
- iii. Improve farmers' access to drought Early Warning Systems and climate information
- iv. Enhance tea extension services to promote efficient irrigation technologies.
- v. Increase farmer collaboration and linkages to promote use of drought-tolerant varieties.
- vi. Capacity-building on post-harvest technologies and techniques for tea value-adding practices.
- vii. Support strategic processing plants to maximize capacity to process tea and provide value addition products.
- viii. Promotion of value addition activities (e.g., processing) for tea to counteract low availability of green leaf tea.
- ix. Promote new tea marketing channels (e.g., e-marketing).
- x. Facilitate establishment of new tea processing plants to process excess tea and sell/market during period of low product availability.
- xi. Strengthen market networks and farmer linkages.

- xii. Encourage adoption of LED bulbs for lighting, replacing the old fans that use up to 40% of electricity in the withering process with the current ones that produce the required airflow, and which require up to 10% of the electricity requirement and adopting other energy sources such as solar and wind energy¹⁵⁸
- xiii. Investments in water harvesting and cost-effective irrigation projects will cushion farmers against unpredictable rainfall patterns and droughts that lead to crop failure. Innovative insurance schemes will underwrite the risks associated with crop failure.
- xiv. Diversification of smallholder farmer household economies, by introducing food crops alongside tea (especially in areas of low tea production) will strengthen the long-term resilience of the household economy.
- xv. Federate smallholder farmers into cooperatives. Encourage smallholder farmers to form/ join cooperatives. Cooperative societies have been useful in aggregating members' input requirements, pooled/ central purchasing to create economies of scale and save costs to individual members. Secondly cooperatives can also be used as avenues to source inputs. Further the cooperative set up could be strengthened to build the capacity of members to invest in low carbon and climate change resilient production, train farmer-based climate-smart lead farmers and be repository for climate-related technology, management, and innovations.
- xvi. Develop newer and promote existing high-yielding clones for increased production. Reduce over-reliance on traditional/ moribund black tea variety and invest more in development and promotion of high yielding clones such as KTRI 914/28, KTRI 914/39 and KTRI 895/7.
- xvii. Adopt energy options that reduce emissions and operating costs. Uptake of cleaner energy can result in low carbon and reduced climate change and vulnerability. Factories could adopt innovations for reduction of energy cost by shifting to energy efficient technologies that reduce of carbon emissions. Considerations here include using heat exchanges (at the factory) to recover heat during primary drying, switching to alternative renewable energy sources, such as solar and wind. For instance, in tea drying, the inefficient fixed bed coal fired furnace and air heater can be replaced by solar air heating technology.
- xviii. Promote use of modern technology. Use of modern technologies is a major strategy towards reducing cost of production and maximizing profits. Major costs in the sector include labor supply especially in plucking hence the need to innovate, promote and adopt labor saving technologies. This will require collaborative approach with the country governments to additionally create other employment opportunities since automation will replace human labor.
- xix. Pursue new potential markets internationally. The sector requires to apply development skills in market research and product branding to sustain the current markets and break into new markets such as Russia, United Arab Emirates and Australia, as well as in regional markets like Morocco and Nigeria. This will require bilateral trade agreements with governments and other trading blocks
- xx. Promote local demand. Kenya has over-reliance on export demand for tea which is a big risk especially when international supply chains are disrupted by war, economic crisis, or pandemics e.g., covid-19 pandemic. There is therefore a need to promote tea drinking culture for example encourage the consumption of black and specialty tea in all government institutions, companies and learning institutions to create more local demand.
- xxi. Reduce emissions by diversifying energy supply. With the logging ban and drive to reduce pressure on forests, energy supply should be diversified. Both KTDA and KTGA should accelerate sustainably produced bioenergy fuel wood substitutes (especially sustainably produced agriculture and forestry residues). KTDA factories and individual tea farmers should be encouraged to undertake more planting and investment in commercial woodlots, to boost incomes and to ensure the wood supplies to tea factories are sourced sustainably and used

¹⁵⁸ CR Muoki 2020; Combating Climate Change in the Kenyan Tea Industry

efficiently ; for example, through better access to quality growing stock, extension support and financial incentives such as co-funding grant schemes. Tax breaks and other fiscal incentives should be introduced to stimulate the switch to cleaner energy.