

Tea Value Chain Study



January 2023

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1. Introduction

1.1 Background and objectives of the value chain analysis

The tea value chain analysis is a key deliverable of the Transforming Livelihoods through Climate Resilient, Low Carbon, Sustainable Agricultural Value Chains in the Lake Region Economic Bloc, Kenya (CRLCSA) Project. CRLCSA focuses on the Lake Victoria Region (LREB) for various reasons including that it exhibits moderate to high levels of vulnerability and houses a high number of people.

Tea is a cash crop of national economic importance with high growth and upscaling potential; and benefits from continued levels of agricultural suitability (with adaptation measures). Finally, tea carries ecological importance both nationally and regionally throughout the bloc, and it is part of a pipeline of projects in other regions that are currently underway through other partners and the Government of Kenya.

CRLCSA's main objective is to implement a deep transformation of agricultural production, processing and marketing towards low-carbon, climate resilient pathways with a focus on six value chains (dairy, poultry, coffee, tea, fruit tree and indigenous vegetables) with the aim to transfer both adaptation and mitigation technologies at each value chain's production, harvesting, processing and marketing stages.

The project builds on the private sector and the strength of the cooperative movement in Kenya and creates a mechanism for North-South and South-South technology transfer, leveraging the knowledge and expertise that exists in national and international farming networks.

It is against this background that a value chain analysis on tea was carried out to understand the current status of the value chain and identify gaps for development initiatives.

1.1.1 Global, National and County overview of the value chain

The top 10 tea producing countries in the world are China, India, Kenya, Sri Lanka, Vietnam, Turkey, Indonesia, Myanmar, Iran, and Bangladesh.

The cash crop began its commercialization in Kenya in 1904 and has since been produced for local, regional, international, and global consumption. Kenya is the third largest producer worldwide after India and China¹. The table below shows the area under production (in thousands of hectares) for the top 5 global tea producers and the quantities (in thousands of tons) produced in the 5 years- period (2016-2020). Findings indicated that the country with more area under production also reported more production² volumes.

¹ KIPPRA, 2017; Transforming agribusiness, Trade, and leadership: A capacity needs Assessment of the tea Value chain in Kenya

² <https://www.fao.org/faostat/en/#data>

Table 1: Global comparison on tea production

Country	Year	Area Harvested (000'Hactres)	Total Quantity Produced (000'Tons)
China	2016	2,381,766	2,326,018
	2017	2,860,120	2,473,843
	2018	2,997,460	2,625,138
	2019	3,197,086	2,791,837
	2020	3,365,697	2,984,341
India	2016	577,480	1,250,490
	2017	621,610	1,325,050
	2018	622,617	1,338,630
	2019	627,899	1,390,080
	2020	629,778	1,424,662
Kenya	2016	218,500	473,000
	2017	232,700	439,857
	2018	236,200	492,990
	2019	269,400	458,850
	2020	269,400	569,500
Sri Lanka	2016	216,515	292,574
	2017	202,540	307,720
	2018	202,540	303,840
	2019	264,688	300,120
	2020	264,688	278,489
Viet Nam	2016	118,824	240,000
	2017	123,188	260,000
	2018	116,633	270,000
	2019	107,878	234,052
	2020	107,366	240,493

Source: FAOSTAT, 2022)

In Africa, the main producing countries include Kenya, Malawi, Tanzania, Zimbabwe, and South Africa. Africa produces 30% of world's exports amounting to some 514,742 tons of made tea³. Kenya's tea is among the leading foreign exchange earners (23%) and contributes 2% of the agricultural Gross Domestic Product. Annual trade is valued at over Kshs120 billion in export and Ksh 22 billion on domestic sales⁴.

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 Nzoia⁵. Kericho, Bomet and Nandi counties produce 46% of all the tea grown in Kenya⁶.

³ UK Tea Association & Infusion; Teas from Kenya, Malawi & Zimbabwe

⁴ <https://www.agricultureauthority.go.ke/tea/index.php/sectors/overview#:~:text=The%20highlands%20are%20spread%20across,Tharaka%2DNithi%2C%20and%20Meru.>

⁵ KIPPRA 2017; Transforming agribusiness, trade, and leadership: A capacity needs Assessment of the tea Value chain in Kenya

⁶ Kezia Biwott, 2022; Kericho County: Tea, Foods, and Shifting Weather Patterns

1.1.2 Key statistics on value chain performance

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 period⁷. This finding is complemented by FAOSTAT that indicate that in 2019 and 2020 the total land under tea remained at 269,400⁸. 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.

Table 2: 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

⁷ East Africa Tea Trade Association; Tea Production Statistics 1963-2021

⁸ <https://www.fao.org/faostat/en/#data>

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 3: Tea performance compared

Tea sub-sector	Counties	Sep-22 (tons)	Sep-21 (tons)	Var. (%)	Jan- Sept 2022 (tons)	Jan-Sept 2021 (tons)	% Variance
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, 2022⁹

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 dynamics¹⁰

⁹ Tea Board of Kenya 2022; Kenya Tea Industry Performance Highlights for September 2022

¹⁰ https://ycharts.com/indicators/kenya_tea_auction_price

Figure 1 Average price per KG at Mombasa Auction Center



Source: Charts 2022

1.2 Methodology

1.2.2 Mixed methods approach (qualitative and quantitative methods)

The study analyzed the status of the value chain in production, distribution and marketing, value addition; and identified the existing gaps and areas of intervention. Desk research was the main method used in generating data. The results of the desk research were thereafter validated and complimented through primary data collection using; Key Informant Interviews, (KII) Focus Group Discussions (FGD) and field observations in Trans Nzoia and Nandi counties.

1.2.3 Desk Research

This involved review of available secondary data to provide preliminary information regarding the value chain in line with study objectives. A compendium of literature reviewed included previous research reports on tea, project documents, County Integrated Development Plans, Climate Risk Assessment Framework, national policies and strategies on sustainable food and nutrition security, Economic Survey Reports and others. The review identified data gaps that were addressed during the primary data collection with the relevant respondent categories.

1.2.4 Key Informant Interviews

Key Informant Interviews were conducted to collect information from various chain actors. KIIs were administered face-to-face to targeted input suppliers i.e. those dealing with fertilizers and cultivars, financial service providers such as SACCOS, county government officers in the departments of agriculture and trade, seed multipliers and research organizations.

1.2.5 Focus Group Discussions

To obtain richer and in-depth information, data was collected through Focus Group Discussions (FGD) with 10-12 participants (cooperatives members, individual tea growers and estate staff) who included men, women and youth – playing different roles in the value chain such as production, distribution and marketing of tea.

1.2.6 Data data processing and analyses

Quantitative data obtained from desk review was analyzed using Microsoft Excel. The analysis involved descriptive statistics with outputs presented in tables and charts. Qualitative data was

analyzed using thematic and content analysis and presented in prose form. Using the analysis, a comprehensive report was delivered based on a set outline.

1.3 History of the Value Chain

1.3.1 Brief history of the sector/ commodity

Tea is believed to have been first discovered in China by Emperor Shen Nung around 2750 BC when leaves from a wild tree blew into his pot with boiling water and he was curious of the pleasant scent of the brewed drink which he later named Ch'a¹¹. It then took over 3,000 years for the value chain to become a popular drink throughout Chinese empire.

The first trial in Africa was done in the Cape in 1687 although there was no significant progress until the 19th century. In the 20th century tea production spread in African countries notably Kenya, Malawi and Tanzania.¹²

The first production in Kenya began in Limuru¹³ in Kiambu County. As early as 1903/4, the Caine brothers in Limuru established tea gardens in Limuru and Kericho marking the genesis of what is now Unilever's Mabroukie Tea Estate. In 1924, Flyers Bell was sent out by Brooke Bonds to start the first commercial estates in Kenya.

1.3.2 Previous development activities –

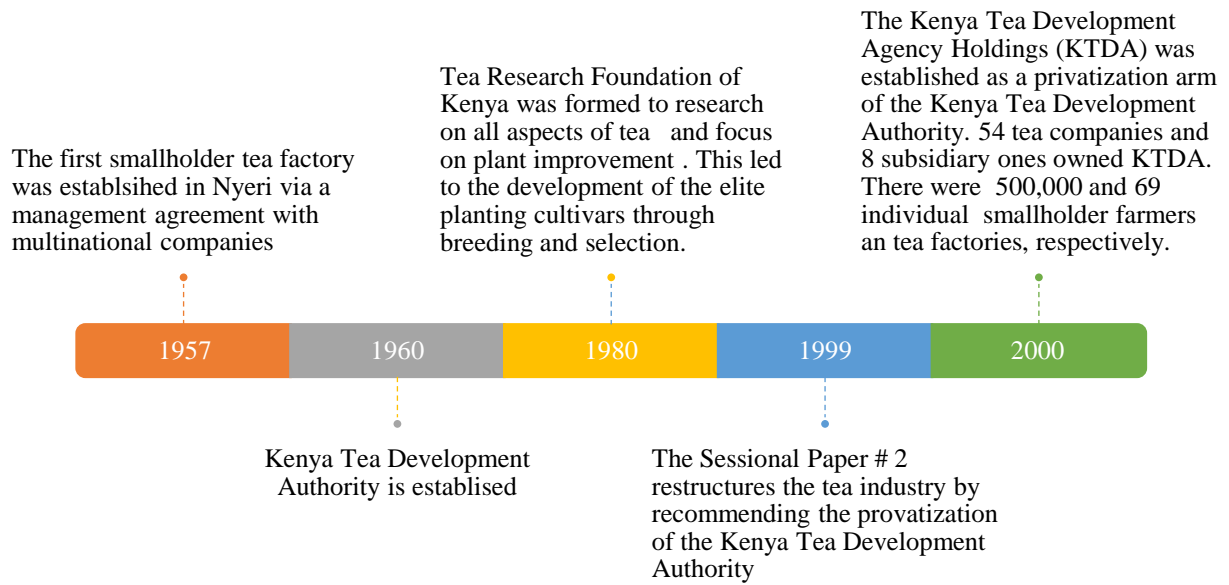
The table below outlines a summary of the development of the value chain in the past 50 years in Kenya.

¹¹ <https://www.tea.co.uk/history-of-tea>

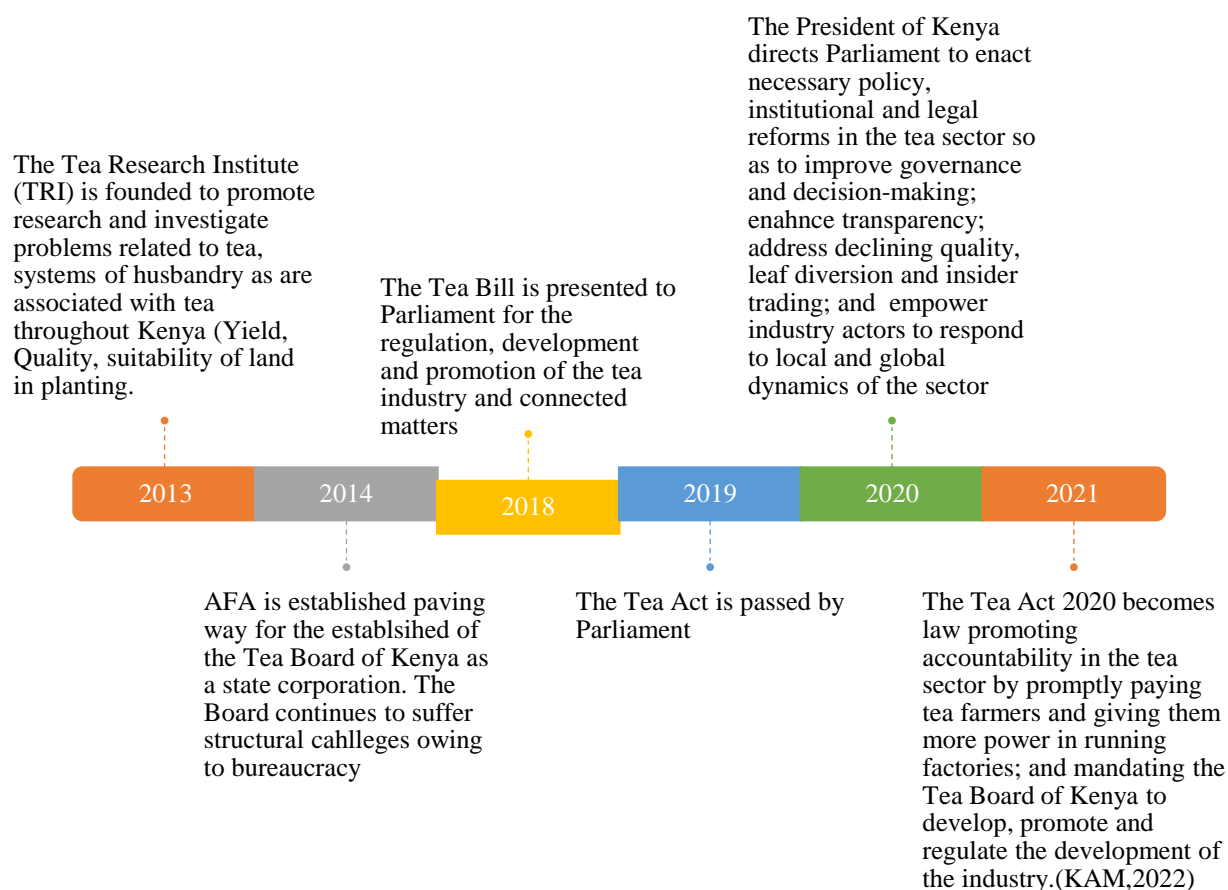
¹² Tea culture of the world, 2020; The Tale of Tea: Where Did It All Begin?

¹³ https://en.wikipedia.org/wiki/Tea_production_in_Kenya#:~:text=Tea%20was%20first%20introduced%20in,major%20producer%20of%20black%20tea

1950-2000



2001-2022



Source: Author's compilation, 2020 and <https://www.teaboard.or.ke/>

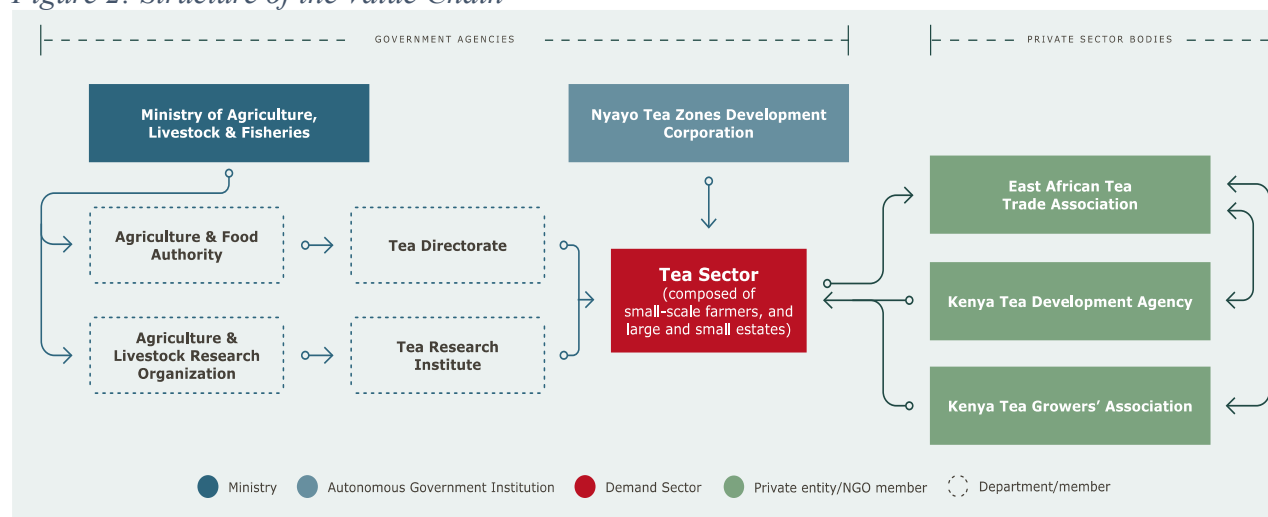
1.3.3 Current structure of the value chain

The industry operates under technical and policy guidance of the Ministry of Agriculture, Livestock and Fisheries (MALF). It is structured right from the apex regulatory body the Agriculture and Food Authority- Tea Directorate, the Tea Research Institute, the Nyayo Tea Zones Development Cooperation, and the respective county governments¹⁴, through to the producers, tea manufacturing factories, the trade and the blending and packing establishments¹⁵. Below is an illustration of institutional framework:

¹⁴ Josiah M. Ateka, Perez Onono and Martin Etyang, 2018; Productivity and Its Determinants in Smallholder Tea Production in Kenya: Evidence from Bomet and Nyamira Counties of Kenya.

¹⁵ Government of Kenya; The Tea Industry in Kenya. <http://www.kenyarep-jp.com/en/business/tea/>

Figure 2: Structure of the Value Chain



Source: NIRAS LTS International¹⁶

The tea value chain in Kenya is highly formalized. There are policies such as the Tea Act 2020 that promote accountability in the sector. The Act also provides farmers with greater autonomy in running factories. There are institutions such as the Tea Directorate that develops, promotes and regulates the development of the industry. The Kenya Tea Growers Association (KTGA) representing the interest of the large scale farmers, while the Kenya Tea Development Agency (KTDA) manages the over 500,000 smallholder tea farmers. The formal structure is also buttressed by the existence of the Tea Research Institute that carries out research on tea and advice farmers on control of pests and diseases, improvement of planting material, general husbandry, yields and quality.

The sector has 12 registered broker companies registered and operating as Tea brokers at the Mombasa Tea Auction ¹⁷. Finally, there exists a strong financial sector made of commercial banks and tea SACCOs that provide financial services such as loans, savings, and credits to tea growers.

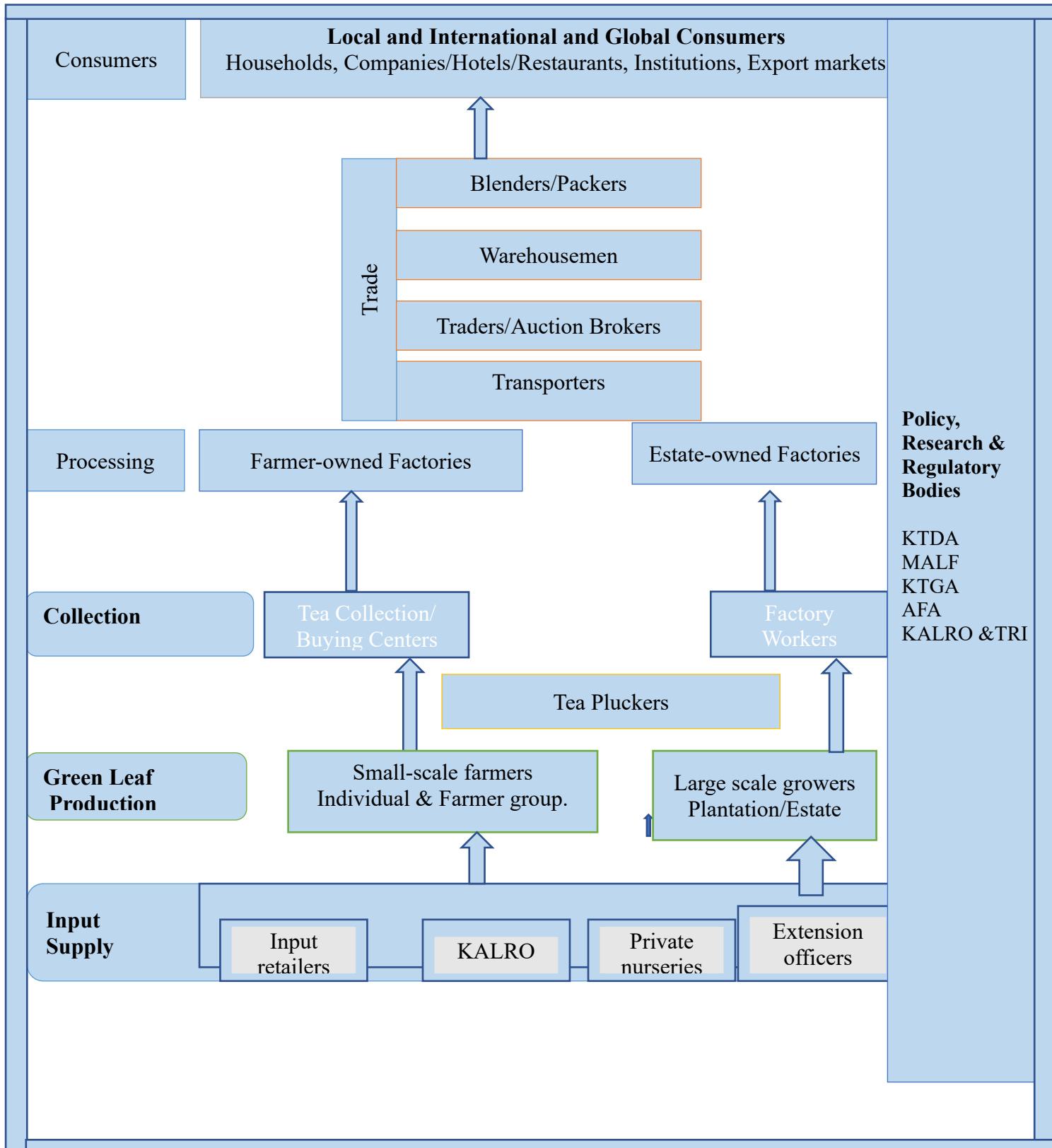
¹⁶ https://tea.carbontrust.com/wp-content/uploads/2021/09/BSEAA2_Bioenergy-in-tea-processing-sector_Policy-Brief.pdf

¹⁷ Christian Development Agency, 20028; report on small-scale tea sector in Kenya

2. Functional Analysis

2.1 Value chain map

Figure 3: Value Chain Map



1.4 End-market Analysis

The demand, market structure, drivers and value chain actors are outlined in the following subsections:

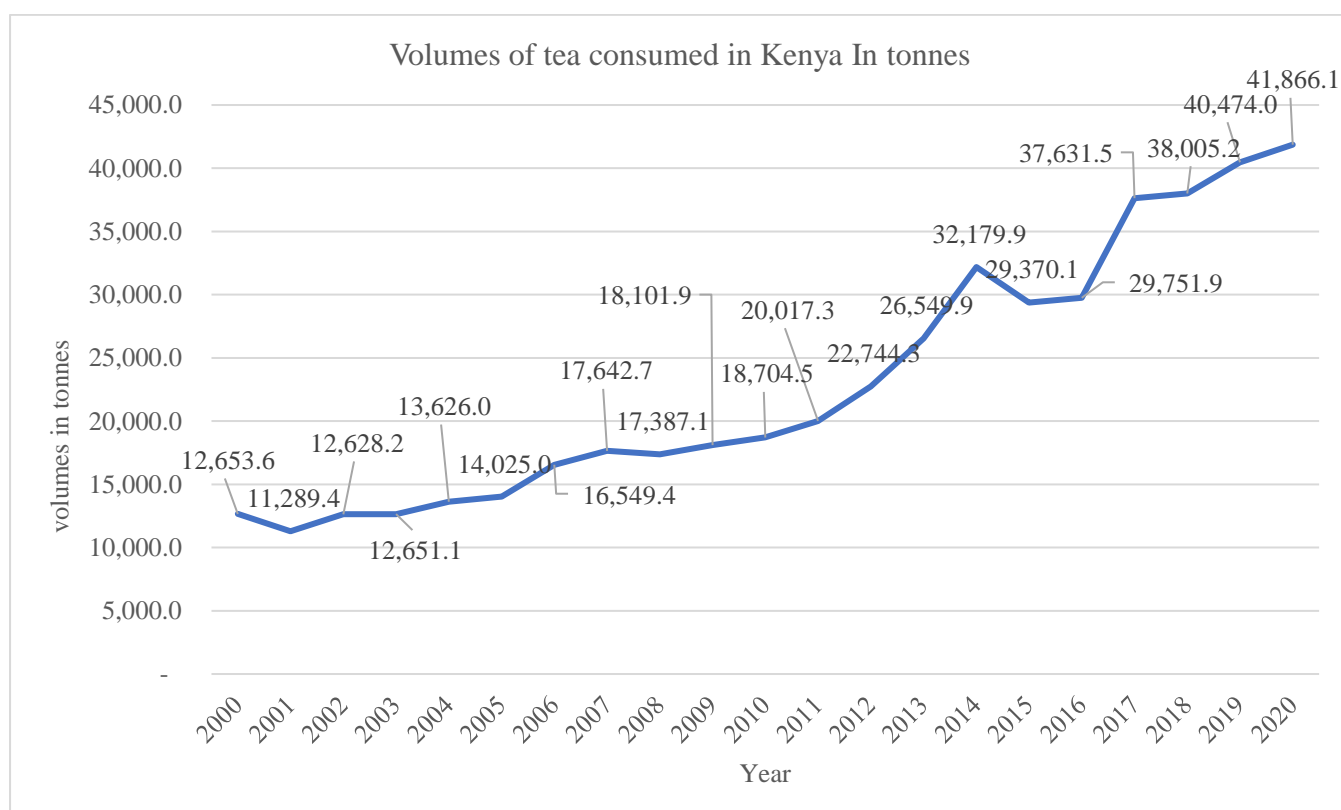
2.2.1 Demand

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 standards¹⁸.

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 locally¹⁹. 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.

Figure 4: Local consumption trends for tea in Kenya²⁰



¹⁸KIPPRA, 2017; Transforming Agribusiness, Trade, and leadership: A capacity needs Assessment of the tea value chain in Kenya

¹⁹ Agricultural Food Authority, 2022; Kenya to encourage local tea consumption amid global oversupplies

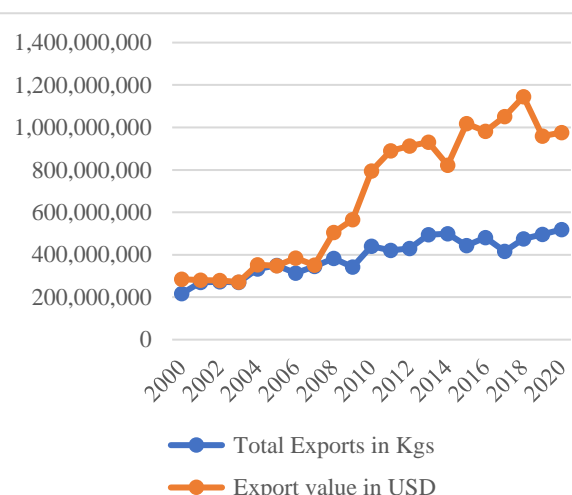
²⁰ East Africa Tea Trade Association ;Tea Production Statistics 1963-2021

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 4: Kenya Tea Export Volume and value 10 Year- trends²¹

Year	Total Exports in Kgs	Export value in USD
2000	216,989,625	285,327,630
2001	270,151,810	279,707,055
2002	272,458,768	278,913,164
2003	269,961,799	271,497,097
2004	333,802,071	353,225,331
2005	349,738,362	348,479,000
2006	313,720,495	384,531,336
2007	345,877,445	350,783,793
2008	383,443,886	505,688,528
2009	342,481,547	565,880,210
2010	441,021,493	794,635,278
2011	421,272,373	889,502,244
2012	430,204,569	912,649,484
2013	494,346,983	930,149,009
2014	499,379,622	822,086,089
2015	443,461,219	1,018,297,103
2016	480,330,230	981,264,700
2017	415,715,284	1,051,044,465
2018	474,861,590	1,145,228,916
2019	496,754,877	958,594,960
2020	518,920,937	975,930,492
2021 (Jan-Oct)	467,902,938	563,893,044



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

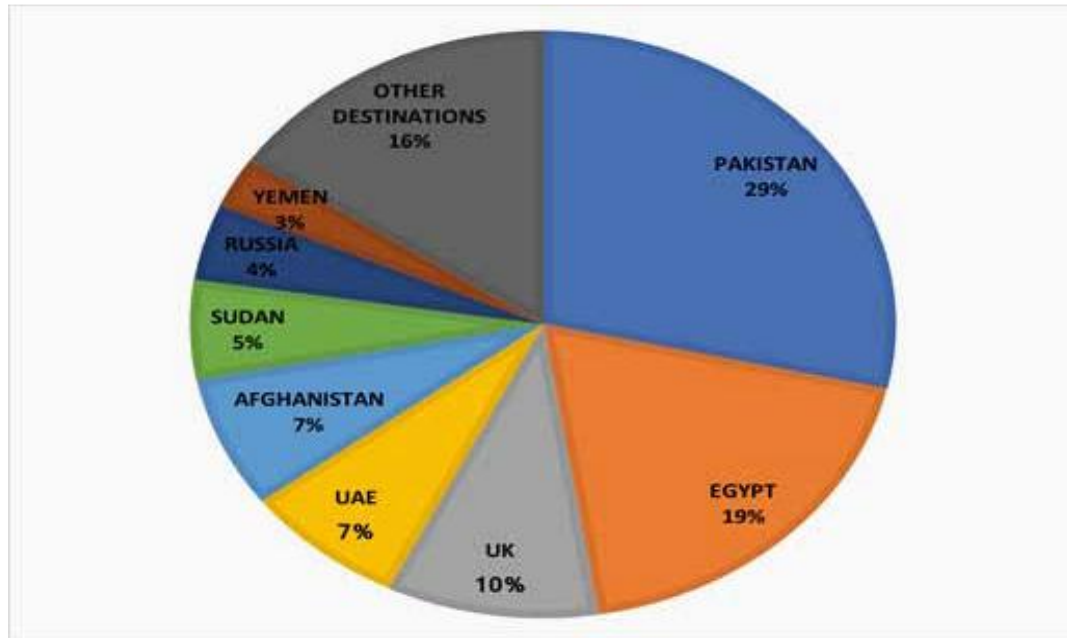
Pakistan, Egypt, and the United Kingdom buy over 65% of the Kenya tea. Notably, Pakistan in 2020 imported tea worth USD 495 Million, Egypt USD 148 Million, United Kingdom USD 141 Million, United Arab Emirates USD 62.7 Million and Russia USD 43.4 Million.

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)

²¹ East Africa Tea Trade Association ;Tea Production Statistics 1963-2021

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.

Figure 5: 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 Sudan²². There are a number of other potential seasonal markets in the region and globally (AFA, 2021).

2.2.2 Market structure

The smallholder tea farmers mainly sell their green leaf to brokers and processors. Initial processing done includes withering, Crush, Tear, and Curl (CTC), fermentation, drying which takes place in the factories located near producing areas²³. Large estates (plantations) are more often integrated in large companies and have their packaging done abroad.

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 basis²⁴. Therefore, farmers have no control over prices as they are dictated to them through KTDA.

²² Christian Development Agency, 20028; report on small-scale tea sector in Kenya

²³ Christian Development Agency, 20028; report on small-scale tea sector in Kenya

²⁴ 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.

Producers affiliated to KTDA are paid on monthly basis at an average price of 20 Kshs/kg as of 2021 for Bomet, Kericho, Trans-Nzoia, and Kisii and Nyamira counties. There has been an increase in price at the Mombasa auction - rising from an average of USD 1.90 per kilo to USD 2.43 due to the introduction of the minimum reserve price²⁵. In 2021, the government introduced a USD2.43 (Sh294) as the minimum tea price for a kilo for all the Kenya Tea Development Agency (KTDA) to safeguard farmers' earnings. Currently, a tea plucker gets between Sh12-13 pay for every kilo of tea plucked leaving the farmer with 7-8 Kshs for every kilo of green leaf profit. This means that when a farmer factors in the cost of production such as weeding and pruning, they are left with low or no profits.

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 Kenya²⁶. Although KTDA still dominates the provision of services (production, 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 counties²⁷. 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 Auction²⁸.

To facilitate international Trade, Kenya has signed multilateral and bilateral trade agreements as part of its trade policy²⁹. These are:

- World Trade Organization (WTO): Grants Kenyan 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.

²⁵ AFA, Kenya tea industry performance highlights for february 2021

²⁶ Kirui Harrizon I Mutai K. Benjamin I Kibet K. Lawrence I Kibet R. Patrick I Macharia Anthony I 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.

²⁷ <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.>

²⁸ Monroy L., Mulinge W., Witwer M., 2012. Analysis of incentives and disincentives for tea in Kenya. Technical notes series, MAFAP, FAO, Rome

²⁹ https://www.wto.org/english/tratop_e/tpr_e/tp124_e.htm

- 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.

2.2.3 Drivers

(who initiates changes in the market) can be private sector, government)

The market drivers for the tea value chain include quality, diverse market outlets and consumer preferences. These are discussed below in turn:

1. Quality:

- Export markets access is mainly driven by the ability of the producers to produce quality products.
- With the large private sector companies and government solely determining processing, marketing and distribution of profits, the sector has failed to provide incentives to smallholder farmers to produce quality tea³⁰.

2. Diverse market outlets:

- Tea is sold to multiple market outlets. In addition to formal market outlets such as KTDA, there are informal outlets which include tea hawking. The field mission confirmed that in Kericho farmers sell to the KTDA managed factories, middlemen and private processors.
- 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 realized³¹. In Bomet county farmers mainly produce for KTDA factories such as Kapset, Mogogosiek, Kapkoros and Rororok factory. Additionally, they also produce for the multinational tea companies there, such as Unilever, Williamson Tea, and James Finlay³².
- Still, farmers have no control over pricing as this the preserve of KTDA.

3. Consumer preferences:

- Consumer tastes and preferences are a major demand determinant. Consumer demand is also determined by brand elements and familiarity, price of the tea, and effects from other consumers, quality³³.

³⁰ 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

³¹ 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

³² County government of Bomet, 2018

³³ Factors Affecting Tea; 5th International Conference on Business and Economics Studies New York At: USA, New York

2.2 Analysis of Value Chain Elements -Value Chain Nodes, Actors & Activities

2.3.1 Value Chain Actors

The tea value chain in Kenya involves activities and actors on the farm, factory and market places³⁴. Other activities include policy, research, and regulation. These are discussed below, in detail:

1. Production

- Production involves land preparation, planting, plant husbandry. Mulching and fertilizing are required during land preparation and tea growth to achieve and maintain adequately acidic soils and moisture. Tea plantations are perennial and healthy growth is maintained through consistent application of various pruning techniques.
- Producers consist of
 - Smallholding
 - Smallholding consists of individual smallholder farmers (farming as individual farmers or organized in farmer cooperatives) and large-scale farmers. These number over 500,000 (71%) of the total farmers) and are farming an average of 0.2 hectares and below. They are managed by Kenya Tea Development Agency (KTDA).
 - A field mission established that in Nandi County, smallholder tea holding averages at 2 acres and is dominated by adult males (80%)³⁵.
 - There are several cooperatives in the LREB that the study found. While some cooperatives focus on tea as the main value chain; others focus on tea alongside other value chains such as dairy, coffee etc.
 - Cooperatives such as Sindet Multipurpose are still at their nascent stages, while others are at different stages of growth.
 - The tables below characterize the surveyed cooperatives in terms of membership, energy source, market outlet and access to climate information:

Table 5(a) Examples of cooperatives focussing on tea as the main value chain

Examples of cooperatives focussing on tea as the main value chain						
County	Name	# Of members	# Of Active members	Energy source	Access to climate information	Main Buyers
Kericho	Sinendet Multipurpose	18000	0	Electricity	Yes	James Finlays

³⁴ <https://open.unido.org/api/documents/5239228/download/2.Value%20chain%20vulnerability-Kenya%20country%20report.pdf>

³⁵ Focus Group Discussion at Tinderet Tea Outgrowers Cooperative Scheme, Dec 2022

	Ainamoi Outgrowers	6841	4500	Electricity, Solar LPG	yes	Kaisugu Tea Factory
	Mau Tea Multipurpose	48000	33600	Electricity, Firewood, Solar	Yes	Unilever, Finlays, Global Tea Commodities
Bomet	Bemiat	60	40	Solar	Yes	KTDA, Finlays, Kipsigis Highlands
	Uswet Tea	800	800	Electricity	No	KTDA
	Kapkap Outgrowers	2000	1500	Electricity	No	James Finlays
	Chepcheb Outgrowers	2503	2503	Electricity, Solar	Yes	James Finlays Locally
	Kitambo	89	66	Solar	No	KTDA
	Cheseteka Outgrowers	616	105	Electricity	Yes	James Finlays
	Kimolwet Tea	130	130	Solar	Yes	KTDA
Migori	Awendo Sugarbelt Multipurpose	7000	500	Electricity	No	Tea Factories
Nandi	Tinderet Tea FCS	1150	976	Electricity, LPG	No	Tinderet Tea Estate
	Kipchabo Marketing	1762	1387	Electricity, Firewood, Kerosine	Yes	Kipchabo Tea Factory

Source: Author's compilation and Agriterra data

Table 5(b) Examples of cooperatives focussing on tea as a minor value chain

Examples of cooperatives focussing on tea as a minor value chain						
County	Name	# Of members	# Of Active members	Energy source	Access to climate information	Main Buyers
Kisii	Gakero	5027	800	Kerosine	Yes	Foreign Market
	Nyamarambe	6761	2061	Electricity, Kerosine	Yes	Foreign Market
	Nyamosongo	4498	3000	Kerosine	Yes	Foreign Market
	Gesarara	5600	3000	Kerosine	Yes	Foreign Market
	Nyamonya	9370	3000	Kerosine	Yes	Foreign Market
	Riasuta	7255	4000	Kerosine	No	Tropical farm management
	Nyaigwa	6615	4896	Kerosine	Yes	Foreign Market
	Nyambunde	15000	6000	Kerosine	Yes	Foreign Market
Bomet	Kitambo	89	66	Solar	No	KTDA
Nyamira	Manga Farmers	300	270	Solar	Yes	KTDA
Kakamega	Isukha Ivugwi farmers	370	216	Solar	Yes	Tropical
Nandi	Chepkoiyo famers	31	13	Electricity	Yes	None

Source: Author's compilation and Agriterra data

- Several the cooperatives have adopted green energy technologies such as solar to reduce costs, while others still use electricity, kerosene, and wood fuel. The cooperatives mainly sell their tea to KTDA and multinational companies such as James Finlay's and Unilever.
- Majority of the cooperatives indicated that they access information on climate hence could be entry points for climate resilience interventions through knowledge transfer.
- The current roles of cooperatives in the value chain beyond federating farmers is to:

- Providing market linkages to farmers, cushioning farmers against brokers and advocating for better prices for farmers
 - 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.
 - Provision of member tailored-financial services to members to purchase inputs, equipment etc. and providing a platform for members to accumulate savings.
- Large-scale holding
 - Large scale tea holding is averagely farming 10 hectares and above. The large-scale estates are managed and owned by corporations in addition to owning 39 factories.
 - The large-scale estates are represented by the Kenya Tea Growers Association³⁶. The main players - James Finlay Company Limited, Eastern Produce Company Limited, Williamson Tea Company Limited, Sasini Tea³⁷ among others, contribute up to 8% of the tea produced in Kenya.
 - Below is a tabulation of the large-scale plantations (multinationals) and associated factories in the LREB.

Table 6: Tea Multinationals tea companies in the LREB

County	Multinational company	Associated Tea Factories
Kericho	Finlays Kenya Limited	Changana Tea Factory
		Chomogonday Tea Factory
		Kitumbe Tea Factory
		Koros Tea Factory
		Kymulot Tea Factory
		Saosa Tea Factory
	Ekaterra Tea Kenya PLC	Chagaik Tea Factory
		Jamji Tea Factory
		Kericho Tea Factory
		Kimari Tea Factory
		Kimugu Tea Factory
		Koruma Tea Factory
		Tagabi Tea Factory
Nandi	Williamson Tea Kenya Ltd	Kapchorua Tea Co. Ltd
		Kaimosi Tea Estates Ltd
		Tinderet Tea Estate
	Eastern Produce Kenya Ltd	Chemomi Tea Factory
		Kapsumbeiwa Tea Factory
		Kepchomo Tea Factory

³⁶ KIPPRA, 2017; Transforming Agribusiness, Trade, and leadership: A capacity needs Assessment of the tea value chain in Kenya

³⁷ <https://www.teaboard.or.ke/dealers/manufacturers>

		Kibwari Tea Factory
		Kipkoimet Tea Factory
		Savani Tea Factory
		Siret Tea Factory
Bomet	Williamson Tea Kenya Ltd	Changoi tea factory

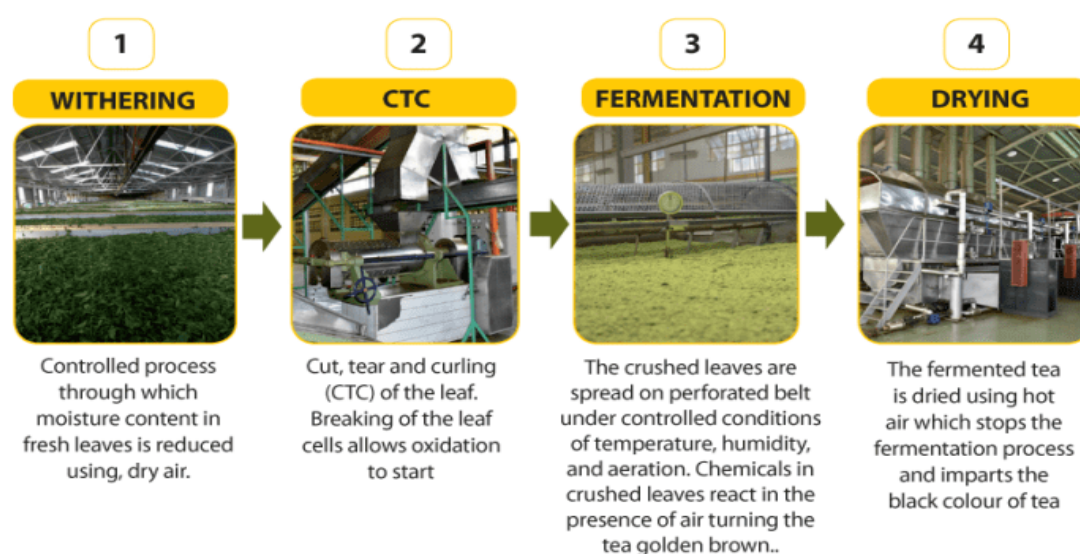
- Tea is also grown as a buffer belt around the forests under the Nyayo Tea Zones Development Corporation Limited (NTZC) operating under 3,488 hectares and 2 factories³⁸. Other tea zones that buffer forest include Mt. Elgon tea zones in Trans Nzoia, Ekaterra tea zones in Kericho, Mau tea zones in Kericho and Nakuru
 - NTZC has put 4,046 hectares of land under tea production and produce over 29 million kgs of green leaf, to date. In addition to planting trees and tea production, NTZC is also working with to replenish and sustainably benefit from forest resources adjacent to their habitations³⁹.
- Plucking (harvesting) is mainly manual, although tea plucking machines have been introduced in Bomet and Kericho. Although labor-intensive, manual harvesting is preferred as it is more precise and ensures the highest quality harvest, supports the health and productivity of the tea plants, and minimizes post-harvest losses.
2. Collection
- This stage involves players such as transporters, loaders and off-loaders, factory and buying centers workers. At this stage tea is transported to the tea buying centers where it is weighed and packaged in properly aerated bags to maintain freshness before it is transported to the factories for processing.
3. Processing
- At the factory, activities include withering, drying, grading, and packaging mainly done by the factory workers. The leaves are left to wilt for 14-20 hours to begin the biochemical reaction for tea processing and reduce leaf moisture content to 71%; then macerated with a rotor vane that crushes, tears, and mixes the leaf. Drying takes a period of between 15-20 minutes, where fluidized bed dryers blow a stream of hot air (115-120 °C) on the tea particles until the leaf moisture content is reduced from between 67-69% to 2.8-3.2%. The cut tea is passed into Continuous Fermenting Units (CFUs) for a duration of 110-150 minutes, allowing optimal fermentation. The leaf is cooled and mechanically sorted using a fiber extractor and sorting machine to clean, grade and winnow the tea; and finally packaged for storage or sale as black tea.⁴⁰. Below is an illustration of the process:

³⁸ KIPPRA 2017; Transforming agribusiness, trade, and leadership: A capacity needs Assessment of the tea Value chain in Kenya

³⁹ <https://teazones.co.ke/conservation/>

⁴⁰ <https://open.unido.org/api/documents/5239228/download/2.Value%20chain%20vulnerability-Kenya%20country%20report.pdf>

Figure 6: Tea processing



Source: KTDA, 2020

4. Transportation and warehousing

- This stage involves actors such as transporters who move the fresh green leaf from the farms to the factories and from the factories to the auction centers e.g., the Mombasa Auction Center.
- Warehouse operators are involved at this stage for storage of the tea before it is exported. Blending and packaging also takes place at this point as well.
- Packaging depends on the target destination and customer preference. In most cases, dispatch of packed teas to the market is contracted to private transporters.

5. Trading

- 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 labels⁴¹. 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. Certification

- KTDA has partnered with several multinational companies to enhance sustainable and climate-resilient agriculture. The partnership with Unilever for example, enables

⁴¹ <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.>

farmers to adopt certification standards developed by the Sustainable Agriculture Network⁴², through Farmer Field Schools training to obtain Rainforest Alliance certifications⁴³.

- 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 advocates 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 sector⁴⁴.
- The study reveals differences between certified and non-certified tea suppliers. These are partly rooted in a longer history of the certified farmers. The study shows that certified farms have a better economic performance and produce ecological and social benefits.
- However,
 - 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 market⁴⁵.
 - A scrutiny at working and living conditions for workers and their families across certified tea estates and small grower groups in Kenya paints a glimpse 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 climate change and extreme weather conditions that, at times, lead to reduced yields.

7. Consumption

- Consumers are both international and national, with the international (mainly Pakistan, Egypt, and the United Kingdom) accounting for 70% of the consumption. The local consumption units include household consumers, companies, hotels, and institutions such as schools and hospitals.

8. Policy and regulatory framework

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

- a. 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.
- b. The Crops (Tea Industry) Regulations (2020) regulate the production, marketing, and trade in tea, as well as registration and licensing matters. These

⁴² https://link.springer.com/content/pdf/10.1007/978-3-030-42091-8_70-1.pdf

⁴³ 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.

⁴⁴ <https://www.fairtradenederland.nl/app/uploads/2019/09/276351.pdf>

⁴⁵ <https://open.unido.org/api/documents/5239228/download/2.Value%20chain%20vulnerability-Kenya%20country%20report.pdf>

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.

- c. 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.
- d. 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.
- e. Tea Act (2020)⁴⁶:
 - i. 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.
 - ii. 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.
 - iii. The Act establishes Tea Research Foundation – see 9 below.
- f. 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 diversification⁴⁷. 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 volerem* 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.
- g. 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

⁴⁶ <https://www.teaboard.or.ke/resources/legislation-and-policy/the-tea-act-2020>

⁴⁷ <https://www.standardmedia.co.ke/business/opinion/article/2001461101/review-tea-reforms-to-save-farmers-from-heavy-losses>

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 to a government directive to do so because the prices at the auction were less than the minimum reserve price set for smallholder farmers⁴⁸.

9. Research

- The Tea Research Institute under KARLO carries out research on tea and advice farmers on control of pests and diseases improvement of planting material, general husbandry, yields, quality. The institute also provides advisory services to the growers on specific problems encountered in tea growing through organized field visits, demonstrations, and publication of research findings and reports⁴⁹.
- The Tea Act has established the Tea Research Foundation to promote, co-ordinate and regulate research in tea and tea diseases; and expedite equitable access to research information, resources and technology and promote the application of research findings and technology in the development of tea.

2.3.1.1 Technologies used in each node

Use of modern technologies (including automation) is a major strategy toward reducing cost of production and maximizing profits. Major costs in the sector include labor supply especially in plucking and transportation hence the need to innovate, promote and adopt labor-saving technologies.

The most recent changes in the sector is the introduction of the Continuous Fermentation Units (CFUs) at the factories which has transformed the manufacturing process of tea by eliminating human intervention in the fermentation stage⁵⁰. Kericho county has adopted tea clones (approved by Kenya Plant Health Inspectorate Service (KEPHIS)) with higher yields and resistant to pests and diseases⁵¹. These technologies and others are discussed below:

Table 7: Technologies in place

Value chain Node	Technology	Advantages
Inputs supply	Developing and promoting high yielding varieties. E.g. KTRI 914/11, KTRI 914/28, KTRI 914/39, KTRI 895/17, TRFK 704/2, KTRI 704/2, KTRFK 597/1	<ul style="list-style-type: none"> • High yielding variety–up to 6000 kgs per acre • Resistant to pest and diseases • Adaptable and suitable for the specific growing areas.
	Use of organic fertilizer	<ul style="list-style-type: none"> • Increases productivity
Production	Tea plucking machines introduced in Kericho and Bomet.	<ul style="list-style-type: none"> • Saves the farmer up to 10 Kshs/kg of the 15 Kshs/kg used to pay human labor. • Increased production to 400 kgs per laborer per day from 45 kgs per laborer per day

⁴⁸ <https://www.kenyanews.go.ke/government-assures-tea-farmers-of-payment-despite-minor-hitches/>

⁴⁹ Government of Kenya; The Tea Industry in Kenya. <http://www.kenyarep-jp.com/en/business/tea/>

⁵⁰ Kimotho Francis Wanjau, Elizabeth Nambuswa Makokha: effects of technology on tea factories project performance: a case of trans Nzoia county, Kenya

⁵¹ Nikko Tanui |,2021; Hope for farmers as researchers release high-yielding tea varieties

	Computerization of collection at the tea buying centers	<ul style="list-style-type: none"> Enhanced accountability and accuracy of records as a way of reducing operational costs, and enhancing information sharing among all stakeholders
Processing	Continuous Fermentation Units (CFUs) Boilers replaced furnace fuel steam boilers to fire steam wood boilers. Introduction of Continuous Chemical Withering (CCW) machines	<ul style="list-style-type: none"> Greater consistency in the quality of made tea. Efficient production and a lowering of labor costs.
Distribution	Aerated bags and trucks are used for transportation	<ul style="list-style-type: none"> Maintaining fresh tea minimalizing post-harvest loss
Trade	Systems Applications and Products (SAP) technology to centralize data sharing	<ul style="list-style-type: none"> Provision of analytical tools that are used for better decision making. Improved payment processing by 80% and end to end visibility for better safeguard

Source: Authors compilation, 2022

2.3 Support services in the extended value chain

2.3.1 Suppliers of physical inputs

Agro-inputs (such as planting cultivars, fertilizer, and pesticides) used vary from small to large scale farms with production corresponding the same way (2.127-2.291 tonnes/Ha for small scale and between 2.834- 3.412 tonnes/Ha for large scale⁵²).

The main suppliers for the major agro-input include private and public institutions. Private nursery owners supply planting cultivars to farmers. The Kenya Agricultural Livestock Research (KARLO) supplies plays research-driven productivity improvement inputs such as the Novel tea cultivars. The vegetatively propagated material or cutting for own nursery propagation is also sourced from KALRO- Tea Research Institute in Kericho. Some of the clones developed and promoted by the institute include the following:

Table 8: KARLO clones

Cultivator	Characteristics
TRFK 597/1	<ul style="list-style-type: none"> Suitable for attitudes of 1600-2500 Meters above the sea level. Matures between 3-4 years. Average yields of 14-28 tons per hectare per annum. Suitable for high quality black tea. Low in caffeine, is drought, frost, disease, and pest tolerant.
TRFK 704/2	<ul style="list-style-type: none"> Suitable for areas of altitude between 1600-2500 meters above the seal level Maturity period of 3-4 years Average yield of 14-28 tons per hectare per year Good for high quality green tea with low caffeine and catechin content
KTRI 895/17	<ul style="list-style-type: none"> Suitable foe areas with altitudes of between 1,800 - 2,500 meters Maturity period of 3-4 years Drought, frost, disease, and pest tolerant. Wide adaptability thus designated for high tea growing regions Suitable for high quality green orthodox tea Yield of 14-28 tons per hectare per annum
KTRI 914/11	<ul style="list-style-type: none"> Suitable for altitudes between 1800-2500 meters above sea level

⁵² KIPPRA, 2017; Transforming Agribusiness, Trade, and leadership: A capacity needs Assessment of the tea value chain in Kenya

	<ul style="list-style-type: none"> • Matures 3-4 years • Average yields of 14-28 tons per hectare per year • Drought, frost, disease, and pest tolerant. • Suitable for high quality green orthodox tea
KTRI 914/28	<ul style="list-style-type: none"> • Suitable for areas 1800-2500 meters above the sea level. • Maturity period of 3-5 years • drought, frost, disease, and pest tolerant • Yield level 14-28 tons
KTRI 914/39	<ul style="list-style-type: none"> • Grown in altitudes between 1800-2500 meters above sea level • Matures in 3-4 years • Yield average of 14-27 tons per hectare per annum
KTRI 895/7	<ul style="list-style-type: none"> • Suitable for areas 1800-2500 meters above the sea level. • Matures between 3-4 years • Yield level of 14-27 tons per hectare per annum

Source: Nation Media Group November 15th 2021⁵³

2.3.2 Support services provided to actors along the VC

(e.g. financial, storage, extension, etc.), including info on the current providers, quality, and costs. (Who are the key players and to what extent? What are the related gaps)

Extension

- Agricultural officers from the departments of agriculture at county level, provide extension services (on demand) to farmers. For example, in Bomet county the Agriculture Training Center (ATC) is enhancing farmer capacity through tea demonstration plots. This is the same for Kericho county⁵⁴.
- Even in counties where there are no training centers extension services are provided. In Trans Nzoia County there is existing collaboration between the county and the Tea Research Institute and KALRO crop institutes based in Kitale to support farmers⁵⁵. In Nyamira County, the department of agriculture has deployed 70 extension officers on permanent basis and 40 motorcycles to support logistics on delivery of agricultural extension services to farmers, including tea farmers⁵⁶.

Financial services

- Tea farmers have been able to access loans through banks and SACCOs for some time. The currently high tea prices are said to make lending institutions more willing to lend to tea farmers. 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). However, the farmers still enjoy financial services from other SACCO's, banks and microfinance for other products that Greenland Fedha may not provide⁵⁷.

⁵³ <https://nation.africa/kenya/news/explainers/revealed-the-7-tea-varieties-that-hold-promise-3619306>

⁵⁴ County government of Kericho

⁵⁵ County Government of Trans Nzoia; Trans Nzoia CIDP 2018-2022

⁵⁶ County Government of Nyamira; Nyamira CIDP 2018-2022

⁵⁷ <https://kilimoneews.co.ke/general-news/kt-da-reduces-interest-rates-on-loans/>

1.5 Societal enabling environment

2.3.3 Societal environment

The efficiency of the tea value chain is largely determined by roles and functions of the institutions that support its development.

As mentioned earlier, 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 tea producing counties (Nandi, Kericho, Bomet, Kisii, Bungoma Nyamira, Kakamega, Vihiga, Narok, Nakuru, Elgeyo-Marakwet and Trans Nzoia⁵⁸.) have formulated development plans that enable operations along tea value chain and have also determined intercountry taxes and levies.

The private sector institutions represent players from the large-scale estates. The Kenya Tea Development Agency is a key institution in this regard. It emerged from the privatization of the Kenya Tea Development Authority to support smallholder farmers via inputs and agri-extension, transportation, warehousing, processing, marketing, financing and transfer and dissemination of developed tea technologies.

The East Africa Tea Trade Association (EATTA) promotes, fosters and ensure the orderly sale of tea and the centralization of the tea trade in East Africa. It has established facilities for the conduct of sale of tea by auction or otherwise and facilitates the settlement of disputes within the trade.

What is the organizations and cooperation of the value chain with government and donor projects (past, on-going and planned projects) ?

The value chain has benefitted from the cooperation with government and donor projects. Below are examples of such cooperation across some tea-growing counties:

- 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

⁵⁸ KIPPRA, 2017; Transforming agribusiness, trade, and leadership: A capacity needs Assessment of the tea Value chain in Kenya

- 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 relay 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.

What is the current state infrastructural elements (e.g. roads, markets, etc.) ? How these elements affect the VC operations?

Infrastructure is a key enabling factor in production, distribution and marketing of the highly perishable commodities such as as tea. The value chain requires high efficiency and effectiveness in plucking, access to agro-inputs, transportation before processing so as to maintain its quality and freshness. In addition, improved communication networks and energy

sources are key in tea processing and distribution. The infrastructure state in the respective counties is as highlighted below:

Kericho

- Large multinationals such as James Finlay and Unilever Kenya have diversified to green energy. They are now generating their own power to supplement what the Kenya Power Company supplies them. However, there is still potential for harnessing solar energy, wind, and biogas energy⁵⁹.
- With water being a key resource in the tea value chain, 3 of the 10 small irrigation schemes in the country are operational and supplying water to tea factories and buying centers⁶⁰.
- The county has opened 2,417 kms of rural road networks and maintained 35.2 kms of existing roads as well as built 9 road bridges and 4-foot bridges. This infrastructure has enhanced efficiency in the transportation of tea reducing post-harvest losses.

Nyamira

- Road conditions in Nyamira County are generally fair with 1,574.59 kms of classified and unclassified roads⁶¹.

Bomet

- The county infrastructure is mainly gravel and earth roads (1,804 K\kms). These get impassable during rainy seasons and makes it difficult to transport tea.
- There are 69 kms of class B6 roads Kisii-Keroka-Sotik-Litein-Chemosit-A12 Kericho) and class B7 road (B6 Kaplong-Bomet-Narok-A8 Mai Mahiu).
- There is need for the county to invest in road construction to enhance value chain efficiency in transportation for quality and freshness maintenance⁶².

Though women constitute the majority population in the agricultural sector, in the tea growing areas land is mainly owned by men due to the patriarchal settings in all communities in Kenya and kinship is patrilineal.

Women in tea growing areas mainly provide labour on most of the on-farm activities especially at the plucking stage while men are engaged in land preparation, tea marketing and decision making on the use of income gained from the tea sales. A previous study revealed that in Kericho County, women were not licenced by KTDA to grow tea while those that obtained licences had inherited them from their parents or husbands⁶³.

⁵⁹ County Government of Kericho; Second Generation County Integrated Development Plan 2018 -2022

⁶⁰ Kericho CIDP,2028-2022

⁶¹ County government of Nyamira; County Integrated Development Plan (2018-2023

⁶² County Government of Bomet; County Integrated Development Plan, 2018-2022

⁶³ Grace Atieno Ongile, 1998; Gender and Agricultural supply responses to structural adjustments programmes; A case of small holder tea producers in Kericho, Kenya

2.3.4 Natural environment

How is the value chain related/ linked/ depended on water, biodiversity, and climate? What is the impact of the value chain operations in terms of competitive advantages or weaknesses? Example if the soil is fertile, enough rains etc

Altitude

- Tea is a perennial crop and is grown in highland areas (East Rift and West Rift) of altitude between 4,500 (1500m) and 6750 feet (2250m) above sea level on tropical, red loam soil and decomposed volcanic deposits. The soils are well drained and have a pH in the range of 4.5 to 6.5. This altitude makes the highlands and hilly slopes relatively competitive in the production of the crop, to poorly drained lowlands. This explains why large and commercially managed plantations are in the highlands and on hilly slopes. It is important to note that the hilly landscapes have been prone to erosion, and thus has affected production.

Rainfall

- Tea producing regions experience an ample supply of sunlight and an even distribution of rain throughout the year, providing optimal conditions for tea growing. Rainfall in the highland areas is in the range of 1200 mm to 2500 mm annually while temperature ranges between 12°C and 28°C⁶⁴. These conditions fit tea production which requires an average rainfall of 1150 mm-1400 mm per year. Although tea production in Kenya occurs all year round the highest yields are in the rainy seasons in March–June and October–December⁶⁵.

Pest and Diseases

- Major tea pest and diseases include aphids, tea scales (where the leaves turn yellow spots and drop prematurely) and mites. Farmers have controlled these through interventions such as timely pruning, spraying with oil and strong jet of water.
- Common diseases include armillaria root rot, hypoxylon wood and stem canker. These are prevalent in both small- and large-scale tea farms in the west of the rift valley counties (such as Bomet, Busia, Nyamira, Kericho and Bungoma)⁶⁶. Through the advice of KARLO through TRI, farmers have controlled these diseases by proper and timely pruning, optimal use of fertilizers, removing infested plants to avoid spreading and use of disease resistant clones⁶⁷.

Climate change

- Climate change-related impacts such as prolonged drought, inadequate rainfall, and high temperatures experienced in agricultural value chains as well as in tea affects tea quality and yields. Findings reveal that farmers may lose up to 30% earnings due to climate change impacts⁶⁸. The low tea production experienced recently is associated to the inadequate rainfall because of unpredictable patterns. Drought for example, reduces tea yields by an average of 12-20% annually resulting to low-income levels at the farm

⁶⁴ Hiller, S., D.D. Onduru and A. de Jager 2009; Sustainable tea production in Kenya Impact assessment of Rainforest Alliance and Farmer Field School training

⁶⁵ Alice Nyawira Karuri, Adaptation of Small-Scale Tea and Coffee Farmers in Kenya to Climate Change

⁶⁶ KALRO Information Brochure Series No. 2017/029; Common Diseases Of Tea In Kenya

⁶⁷ KALRO Information Brochure Series No. 2017/029; Common Diseases Of Tea In Kenya

⁶⁸ FAO, Climate Change and Tea in Kenya: Impact Assessment and Policy Response

levels⁶⁹. While extreme rainfall events can damage tea bushes and affect the fertility of soil through water erosion, fluctuations in the soil water availability affects the quality of the tea⁷⁰.

- The strategies adopted by tea producers in Kenya to adapt to climate change include use of adaptive clones of improved varieties such as the purple tea and timing of tea husbandry activities such as pruning and fertilizer application.
- Other strategies include selection of the most suitable areas for tea growing, avoiding expansion of new planting, or replanting in low producing areas, crop diversification in low production areas, efficient management of soil and water resources, catchment protection, riverbank protection, soil water conservation, crop insurance, use of drought tolerant cultivars, rainwater harvesting, and establishment of shade trees⁷¹. In Nandi County producers have planted trees around the farms to act as wind breakers as well as control water and soil erosion.
- This study has used data on Kericho county, (being highest producer of tea in Kenya) to illustrate the climate hazards, impacts, and climate resilient practices that are being implemented/ or have a potential of being implemented through the project.

⁶⁹ United Nations Industrial Development Organization, 2017: Adaptation and mitigation in the Kenyan tea industry

⁷⁰ United Nations Industrial Development Organization, 2017: Adaptation and mitigation in the Kenyan tea industry

⁷¹ Alice Nyawira Karuri, Adaptation of Small-Scale Tea and Coffee Farmers in Kenya to Climate Change

Table 9: Climate hazards, impacts, and climate resilient practices for the Tea value chain ⁷²

VALUE CHAIN STEP	CLIMATE HAZARD	CLIMATE IMPACTS	IMPLEMENTED PRACTICES	ADAPTATION RECOMMENDATIONS
Input supply	Heavy rainfall/hailstorms	Ineffective fertilizer application: reduced mother bushes' capacity to generate new planting material for nurseries; poor soil nutrients.	Purchasing of fertilizers from tea processors; use of insurance schemes	Optimization of fertilizer application according to climate conditions (e.g., higher K+ to reduce drought stress); reutilization of residues for mulching, green manure, compost tea application
Input supply	Droughts / reduced moisture	Increased costs of nurseries maintenance; reduced effectiveness of fertilizers application and labour	Water harvesting techniques (e.g., shallow wells); establishing shade trees in nurseries to minimize moisture loss; soil erosion and fertility controls; use of drought resistant tea varieties; application of plant residues from pruning on the soil to increase fertility; labour stability management	Establish water-harvesting and irrigation systems for nurseries; use of drought-tolerant and high-yielding varieties; develop policy frameworks for labour stability and diversification
	Heavy rainfall/hailstorms/frost	Crop damage and failure over three consecutive months after occurrence; destroyed green leaves; leaf drying; fungal diseases and pests; poor drainage; soil erosion; poor bud break and shoot growth.	Pruning; use of chemical herbicides	Shift to drought, heat and frost, hailstorm, pests and disease resistant tea clones (e.g., purple tea); tea pruning; conservation agriculture (crop cover, mulching, double digging); promote crop diversification in low production areas; agroforestry practices (e.g., grevilleas plantation); rainwater harvesting; preventative frost monitoring and forecasting and risk insurance schemes; planting of indigenous trees.
Production	High temperatures and droughts / reduced moisture	Increased weeding; reduced green leaf production and harvest; water loss and evapotranspiration; increased need for pruning; poor bud break; bud scorch; leaf and bark desiccation	Use of early warning systems to inform tea pruning and weeding management before moisture stress; use of soil and water conservation measures; planting of drought-tolerant varieties e.g., purple tea	Improve farmers' access to drought Early Warning Systems and climate information; introduction of drought-tolerant varieties; use of herbicides for weeding management; enhance tea extension services to promote efficient irrigation technologies; increase farmer collaboration and linkages to promote use of drought-tolerant varieties
	Heavy rainfall/hailstorms	impediments to harvesting; damaged infrastructure and packaging processes; reduced grading of tea leaves damaged by hailstorms	Increasing prices of lower-quality tea; increasing cost of sorting	Use of insurance schemes; small-scale processing; road maintenance

⁷² MoALF. 2017. Climate Risk Profile for Kericho County. Kenya County Climate Risk Profile Series. The Ministry of Agriculture, Livestock and Fisheries (MoALF), Nairobi, Kenya.

Harvesting, storage, and processing	Droughts / reduced moisture	Reduced yields; reduced green leaves production, collection, and transportation; delays in fermentation; reduced performance of withering; reduced tea quality and flavour; deterioration of leaves	Introduce agronomic practices to enhance yield and resistance to drought; product aggregation for transportation to minimize costs; establishment of new tea processing plants to process excess tea and sell/market during period of low product availability	Capacity-building on post-harvest technologies and techniques for tea value-adding practices; ensure optimal air temperatures for withering, fermentation, and processing; provide financial and technical resources to processors; improve tea transport system management through use of energy-efficient trucks and vehicles, and increased access to weather advisory for transportation; promote establishment of drought-tolerant tea varieties; support strategic processing plants to maximize capacity to process tea and provide value addition products; use of electronic machineries for temperature regulation and tea drying; solar air heating technologies.
Trade	Droughts / reduced moisture	Increased costs and prices; reduced quantity available for markets	Transportation and selling of other products e.g., wood fuel used in tea processing during periods of low product availability; establishment of new tea processing plants to process excess tea and sell/market during period of low product availability	Promotion of value addition activities (e.g., processing) for tea to counteract low availability of green leaf tea; Promote new tea marketing channels (e.g., e-marketing); establishment of new tea processing plants to process excess tea and sell/market during period of low product availability; transportation and selling of other products; strengthen market networks and farmer linkages

Source: Ministry of Agriculture, Livestock and Fisheries, 2017

3. Sustainability Assessment

3.1 Economic Analysis

3.1.1 Profitability (What is the Gross Margin?)

Review of secondary data on gross profitability obtained from the Tinderet sub-county agricultural office was corroborated by an FGD session with Tinderet Tea Outgrowers Cooperative.

The major production costs comprise of harvesting (plucking) (49%) and fertilizer purchase (24%) of the total variable costs. Other costs include weeding and transportation. The study holds that tea production is profitable with a positive gross margin per acre of 82,380 Kshs per year. Farmers indicated that to realize these profits, harvesting needs to be done at least 3 times in a month. Below is a tabulation of the gross margin analysis/ acre for a smallholder farmer per year.

Table 10 Tea Gross margin analysis per acre

GROSS MARGIN ANALYSIS FOR SMALL HOLDER FARMERS IN TINDERET, 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
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

Source: Tinderet Sub-County, Agricultural Office

3.1.2 Value Added

(What are the current and potential opportunities for transformation from current raw form?). Value addition, example blending , drying, washing

There is no value addition done at the smallholder level as tea is sold at the tea buying centers while still fresh. Value addition starts at the factories where processing and grading is done. After grading tea is sold in bulk quantities directly or through auction centers. Blending and packaging is also done mainly done in foreign markets where factories and other private companies blend and add taste to the preferred consumer brands⁷³.

3.1.3 Effects in the county and national economy

Kenya is the 3rd largest producer and exporter of tea worldwide after China and India, hence a *cash cow* and a prime agricultural mover of the economy. High production and export to international markets, underscores the importance of the value. In 2019, tea contributed to 25% of Kenya's foreign earnings and 15 % of Kenya's Gross Domestic Product.⁷⁴ .

However, it is challenged by low domestic consumption, low yields, declining prices, multiplicity of taxes and levies (15 types of taxes and levies charged directly and indirectly), reliance on few export markets (75% of Kenya's tea is only exported to 5 key markets Pakistan, Egypt, UK, Sudan, and Afghanistan). Improvement of the value chain will be beneficial in positioning Kenyans in new international markets, increasing foreign exchange earnings and income for the tea producers and creating new jobs for exporters, processors, and other value chain actors⁷⁵.

Broadly, tea production and processing contribute to the Sustainable Development Goals achievement which directly feed into economic growth of the country. The specific goals it contributes to include, the reduction of extreme poverty (Goal 1), the fight against hunger (Goal 2), the empowerment of women (Goal 5) and the sustainable use of terrestrial ecosystems (Goal 15).⁷⁶

3.1.4 International competitiveness

Out of its raw form (90% of exported value) that is used in blending other teas, Kenya's tea is facing competition from other countries e.g., Sri Lanka. Changing buyer preferences for value added tea from other countries have affected the international pricing of Kenyan tea. In 2018, Kenya exported 476 million kilograms of tea, earning Kshs 140 billion. Sri Lanka, exported 288 million kilograms (equivalent of 60 per cent of total exports in 2018), and earning Kshs 150 billion. Therefore, Kenya must invest in value addition of exported tea as well as introduction/ enforcement of policies (such as the Tea Act 2020 which is critical on quality enhancement as well as export regulation issues) that ensures value addition before export in order to gain a higher bargaining power for better prices at the international markets⁷⁷.

Different tea growing nations engage in trade to take advantage of differences among them in terms of factor endowments and technology and that the competitiveness of a country for a precise export product is based on the concept of comparative advantage. In 2016, Kenya's comparative advantage (measured through Revealed Comparative Advantage (RCA)⁷⁸ and

⁷³ Christian Partners Development Agency (CPDA),2008; report on small-scale tea sector In Kenya

⁷⁴ KIPPRA, 2020 Fluctuations in market earnings for tea in Kenya: What could be the cause and remedy?

⁷⁵ Ngumo, D.M.; My experience in the tea sector

⁷⁶ United Nations International Tea Day May 21 St 2022

⁷⁷ KIPPRA, 2020 Fluctuations in market earnings for tea in Kenya: What could be the cause and remedy

⁷⁸ RCA measures normalized export shares, with respect to the exports of the same industry in a group of reference countries

Comparative Export Performance (CEP)⁷⁹ indices) against its rivals the CEP of Kenya was higher⁸⁰. China, India and Vietnam, have witnessed a decline in their competitiveness⁸¹, owing to increased tea consumption by an expanding population – effectively reducing their exportable surplus - leading to a decline in their competitive advantage in the international markets.

Overall, in relation to the world, Kenya has been competitive in the international market in terms of tea exports as its market share has been consistent and stable over the period. However, its competitiveness may be threatened by apparent competition from South Asian countries such as Sri Lanka that recently signed a Free Trade Area agreement with Pakistan and India.⁸²

3.1.5 Value for end-consumers

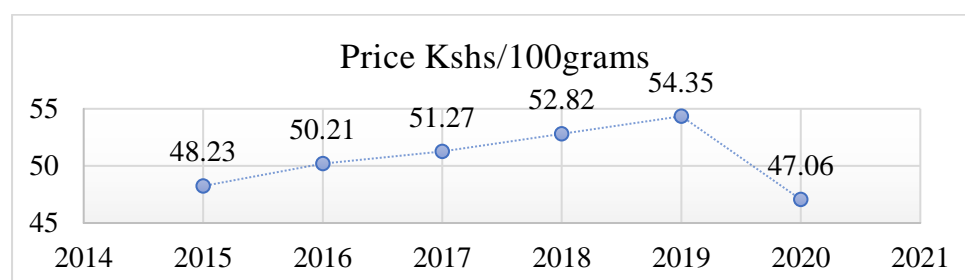
Nutrition

- In Kenya drinking tea is considered healthy. The cancer preventive effects of green tea are a recent, but welcome discovery. Tea has also been shown to be of medicinal use including maintenance of cardiovascular and metabolic health due to the polyphenolic compounds present in green and black tea. Tea is also rich in anti-aging, antidiabetic as well as catechins and theaflavins, which are the main polyphenolic compounds of green and black tea, respectively, and are responsible for most of the physiological effects of tea. Therefore, development of the value chain is important in nutritional security and promotion of a healthy nation⁸³.

Availability and affordability

- Local consumption of tea is becoming increasingly diverse and accounts for around 70% of tea consumption. Consumers readily access tea leaves from shops, kiosks, supermarkets and⁸⁴. Tea leaves is generally affordable as the average retail price of 100 grams of tea leaves being 50.6 Kshs for the last 5 years⁸⁵. The figure below illustrates this analysis:

Figure 8: Local consumption



Source: Statista, 2022

⁷⁹ CE is an RCA specialization focusing on export specialization of a nation for export produce

⁸⁰ Journal of Economics, 2016 Revealed Comparative Advantage And Export Competitiveness: A Case of Kenyan Tea Exports

⁸¹ Journal of Economics, 2016 Revealed Comparative Advantage And Export Competitiveness: A Case Of Kenyan Tea Exports

⁸² Researchjournal's Journal of Economics, 2016 Revealed Comparative Advantage And Export Competitiveness: A Case Of Kenyan Tea Exports

⁸³ Khan N, Mukhtar H. Tea and health: studies in humans.

⁸⁴ CBI, Ministry of foreign affairs; Trade structure and channels for Kenyan tea packed at origin

⁸⁵ <https://www.statista.com/statistics/1185982/average-retail-price-for-tea-leaves-in-kenya/>

3.2 Social Analysis (4 pages)

3.2.1 Inclusiveness & Gender Equality

(How is income, nutrition and employment distribution, poverty and vulnerability and discrimination handled?) (is income benefiting certain genders ? does it contribute to the household economy? Are there discrimination e.g for vulnerable people?

(What is the level of women's economic involvement, gendered division of labor, gendered access to productive resources, women's decision-making and leadership)?

In Kenya's agricultural sector women provide a substantial amount of farm labor even though only below 2 % of them own and control land. Income from the agricultural enterprises is mainly controlled by men.

The field mission confirmed that culture plays an important role in determining the nature of involvement of men and women in the value chains. In general, men control the productive assets and income while women participate more in the production/management while the youth dominate transport. In cash crops such as tea, land is owned by men. The land itself is rarely subdivided hence the youth are unlikely to have a say on how it is used⁸⁶.

Division of labor in tea value chain is gendered with women providing 60% of farm labor and their male spouses making decisions on use and distribution of the tea proceeds. Women are directly involved in the resources such as land in cash crops, but they do not own the land. According to Sustainable trade initiative findings 31.7% of women are engaged in tea production but very few own land⁸⁷.

There exist gender disparities in the tea sector at the household, factory, marketplace (i.e., tea value chain) and macro policy levels which necessitates laws, policies and regulations that protect women rights to ownership and decision making processes in the value chain involvement⁸⁸.

In further development of the tea value chain, projects need to incorporate gender inclusive projects to ensure the benefit of men and women in tea value chains. These interventions will be successful when implementation is done in collaboration with government, community members and county stakeholders working in the respective counties. For example, in Kericho, James Finlay Kenya has collaborated with Fairtrade Labeling Organization to put in place policies and structures that support social justice and inclusion in all its tea estates.

3.2.2 Food Security

(How does the value chain address/ contribute to the availability of food, accessibility of food, utilization of food (nutrition), stability of food (trends).

In tea producing areas, a huge proportion of land is occupied by tea rather than food crops resulting to low production of food. This threatens food security in the tea growing counties

⁸⁶ Field mission report, December 2022

⁸⁷ <https://www.idhsustainabletrade.com/news/addressing-economic-empowerment-of-kenyan-smallholder-tea-farming-families/>

⁸⁸ <https://www.idhsustainabletrade.com/news/addressing-economic-empowerment-of-kenyan-smallholder-tea-farming-families/>

such as Bomet, where production of maize, beans and potatoes shifted to tea production in the 21st century. Here, smallholder farmers use income gained from tea sales to buy foods to address household food insecurity, however, sometimes the income has not been sufficient to buy other foods leading to high levels of malnourishment⁸⁹.

3.2.3 Employment- Opportunities and Labor Rights

(What is the current and potential direct and indirect job opportunities – including for the youth? (who is employed ?, direct beneficiary like labor supplier , indirectly like input supplier , loaders)

(How does the value chain address the respect of labor rights, child and forced labor, job safety and security, attractiveness)

Opportunities

Tea production, processing and marketing provides employment opportunities for a number of people as producers, transporters, loaders and off loaders, input suppliers as well as farm laborers among other opportunities. Farm employees offer unique skills from unskilled to skilled labor. The value chain is labor-intensive and its commercialization will increase job opportunities for youth and women who comprise the majority population in agricultural sector comprising of 59% as at 2019⁹⁰. Below is a discussion of the employment aspects in production, processing, and marketing activities, that comprise the bulk of the overall value chain labor requirements.

- Production
 - The value chain is labor-intensive with employment opportunities for tea plucking, field crop management workers, tea freight handlers, research officers, agronomists, and extension support.
 - A study carried in 2015 indicated that labor cost accounted for 68% of the variable costs with tea plucking accounting for 82% of the variable costs. Owing to the high labor costs, some producers have adopted a mechanized tea picking regime to enhance efficiency and increase profitability. This has however been challenged by workers' unions citing job losses and quality decline due to non-selective picking⁹¹.
- Processing and marketing
 - Employment opportunities exist for skilled and unskilled persons. These include machine operators, quality assurance officers, mechanical engineers, financial officers, accountants, marketing agents engaged in both domestic and international trade, drivers who distribute the tea across the country and to the points of exit, auction brokers, warehousemen, distributors, and persons

⁸⁹ 1 Augustine K. Korir 2 Prof. Peter Omboto 3 Prof. Richard Musebe; Effect of Tea Factory Management on Food Security among Smallholder Tea Farmers in Bomet County

⁹⁰ <https://data.worldbank.org/indicator/SL.AGR.EMPL.FE.ZS>

⁹¹ KIPPRA 2020 Assessing the employment creation potential of the tea sector in Kenya

employed in other activities that link directly and indirectly to tea processing and marketing⁹².

All these opportunities do not discriminate women and young people and upgrading of the value chain will empower them through increased incomes from increased production and job creation.

Labor Rights

- Fairness in compensation
 - Kenya tea workers are generally fairly paid. In Kericho County for example, a large percentage of people who work in the multinational companies such as tea factories get their dues in terms of wages⁹³.
 - Following the increasing demand for sustainable tea production tea industry in Kenya has had to comply with the requirements such as fair wages as a criterion for certification. Fair trade sets minimum price for its products preventing exploitations while farmer field schools equip farmers with knowledge on production and fair compensation⁹⁴.
 - Even with the minimum price, the difficult situation that sector is facing (unpredictable and at times low yields due to climate change and extreme weather conditions) will ultimately constraint wage growth for workers and their families across certified tea estates and small grower groups in Kenya⁹⁵.
- Child and forced labor
 - There is no child labor in tea productions as it has been eliminated by a combination of government policies (e.g., Labor Act of 2003) and social activism. Some certification standards have re-emphasized the importance of prohibiting child labor making it difficult for the involvement of children forced labor⁹⁶.
 - As per Kenyan law, children under the age of 18 are in school most of the time. Where there is involvement of children is during holiday seasons. Here they are engaged in the farms to offer helping hands to their parents (child work) as opposed to forced labor. Child labor education sessions are covered during farmer's training programs to ensure that farmers are aware of the legal requirement.⁹⁷

⁹² KIPPRA, 2020; Assessing the employment creation potential of the tea sector in Kenya

⁹³ Kericho County Government Second Generation County Integrated Plan 2018-2022

⁹⁴ Sally Millet; 2021; Growing Tea Sustainably Examples from Kenya India and Sri Lanka

⁹⁵ https://ergonassociates.net/wp-content/uploads/2022/07/Ergon_Rainforest_Alliance-Report-July-2022.pdf

⁹⁶ Tanya Stathers, Charity Gathuthi, 2013; Poverty Impact Of Social And Environmental Voluntary Standard Systems In Kenyan Tea

⁹⁷ Tanya Stathers, Charity Gathuthi, 2013; Poverty Impact Of Social And Environmental Voluntary Standard Systems In Kenyan Tea

3.2.4 Social and cultural capital

(What is the action, coordination of transactions, social cohesion, cultural traditions, in building social capital?)

Generally, as a norm, farmers in Kenya work in groups because it eases access to information, inputs, and different kinds of support from government, development partners and even the private sector. The farmer groups also pool their resources to undertake agricultural activities. Tea farmers are not an exception as they are members of cooperatives such as Growers Co-operative Union Ltd (Fintea) which is a union of five tea cooperatives bulking their green leaf for onward sale to nearby Finlay's tea factories in Bomet and Kericho counties⁹⁸.

Social capital benefits also manifest in farmers wielding a stronger negotiating position and selling their produce at a higher price; simplifying administrative arrangements enables them benefit from economies of scale and improve productivity. Through cooperatives/ farmer groups, members jointly own the business, enabling them to share profits and improve their livelihoods. Additionally, the group's bulk purchase of inputs has assisted members to diversify their crops to cushion against unstable incomes⁹⁹. Through the cooperative groups farmers in Kericho have been Fairtrade-certified and are implementing the Global Gap standards required for international markets such as European markets access.

The group members of the Fintea in Kericho and Bomet accrue benefits from the group premiums such as financial access and support, social functions support, education and training, environmental protection and conservation knowledge transfer, healthcare services and improved infrastructure such as community roads and bridges¹⁰⁰.

3.3 Environmental Analysis (Ecological Footprint)

3.3.1 Climate change

Impact of climate change on tea

- Climate change is mainly characterized by pest and diseases, extreme weathers (droughts, famine, and floods), hailstones and frosts which are more frequent nowadays globally and with a greater impact on agricultural activities¹⁰¹. As observed earlier tea requires rainfall 1150mm-1400mm and optimum temperatures of 18-30°C¹⁰².
- As mentioned earlier, tea encounters a larger number of environmental stresses such as hotter days, reduced rainfall and reduced annual hours of sunshine. KALRO –TRI research observes that temperatures have been rising by 0.016°C per year and rainfall decreasing by 4.82mm per year – resulting in Soil Water Deficit (SWD) over time. On an annual basis, a large SWD is reported in January through March leading to significant periodic variation in tea production annually. Drought for example accounts for 14–20% loss in yield and 6–19% plant mortality¹⁰³.

⁹⁸ <https://www.fairtrade.org.uk/farmers-and-workers/tea/fintea-growers-co-operative-union-ltd-kenya/>

⁹⁹ <https://www.fairtrade.org.uk/farmers-and-workers/tea/fintea-growers-co-operative-union-ltd-kenya/>

¹⁰⁰ <https://www.fairtrade.org.uk/farmers-and-workers/tea/fintea-growers-co-operative-union-ltd-kenya/>

¹⁰¹ CR Muoki 2020; Combating Climate Change in the Kenyan Tea Industry

¹⁰³ CR Muoki 2020; Combating Climate Change in the Kenyan Tea Industry

- Combined impacts of climate change are likely to reduce the tolerance of tea. These will negatively impact the smallholder tea farmers leading to loss of farm revenue, and increased vulnerability. example, rivers in Kericho such as Sambula, Chebilat and Tuyiobei have been drying up, reducing the water available for livestock and farming. Some tea farmers in the region are now uprooting their tea plantations that have been adversely affected by prolonged dry spells, hailstorms, frost, and crop diseases, opting instead to venture into real estate, dairy farming, and farming of crops that can withstand the changing climate¹⁰⁴.
- Future projections indicate that monthly and yearly rainfall and temperatures will intensify by 2050. This increase is likely to deteriorate and prevent growth - a decrease of 22.5 percent by 2075 - while, on the other hand, some land conditions will improve, increasing tea growth by 8 percent by 2025. Where the land becomes unsuitable to grow tea farmers (in Nandi, Kericho, Kisii), will need to adapt by identifying alternative crops to take the place of tea, compared to those areas that are expected to have improved conditions for tea growing¹⁰⁵.
- The impacts are summarized in the table below.

Table 11 Climate change impacts on tea value chain

Climate change problem	Current Impact on Tea
Increased temperatures	Drying of the soils causing reduced water content in the tea, decreasing yields and negative impacts on quality
	Drying of the soils causing increased soil erosion
	Arrival of new pests and diseases not previously present
	Changes in the suitability of existing tea growing areas
	Sun scorch damage decreasing yields and lowering tea quality
	Biodiversity loss (including tree loss)
Reduced water content	Decreases leaf quality
Changing rainfall patterns	Reduced resilience of tea crops
	Uncertainty in when to apply fertilizers
	Water scarcity and drought
Increase in extreme weather events such as droughts, hailstorms, floods, frosts, and land slides	Extreme rainfall events
	Crop damage and failure
	Increased financial vulnerability of tea farmers
	Soil fertility loss through erosion
Reduced productivity of subsistence crops for tea farmers	Damage caused by frost damage
	Increased vulnerability of tea farmers through food insecurity

Source: International Trade Centre (ITC), 2014¹⁰⁶

Electricity, Fuel Consumption and Renewable Energy Use.

- Tea processing requires significant quantities of thermal energy, which accounts for 90% of a typical factory's energy needs and up to 30% of costs¹⁰⁷. Energy cost lines include electricity for the powering of machinery (motors, fans etc.) and lighting; fuel wood for the

¹⁰⁴ <https://www.theelephant.info/op-eds/2022/09/16/kericho-county-tea-foods-and-shifting-weather-patterns/>

¹⁰⁵ FAO. 2015. Kenya's tea sector under climate change: An impact assessment and formulation of a climate smart strategy, by Elbehri, A., B. Cheserek, A. Azapagic, D. Raes, M. Mwale, J. Nyengena, P. Kiprono, and C. Ambasa. Rome, Italy

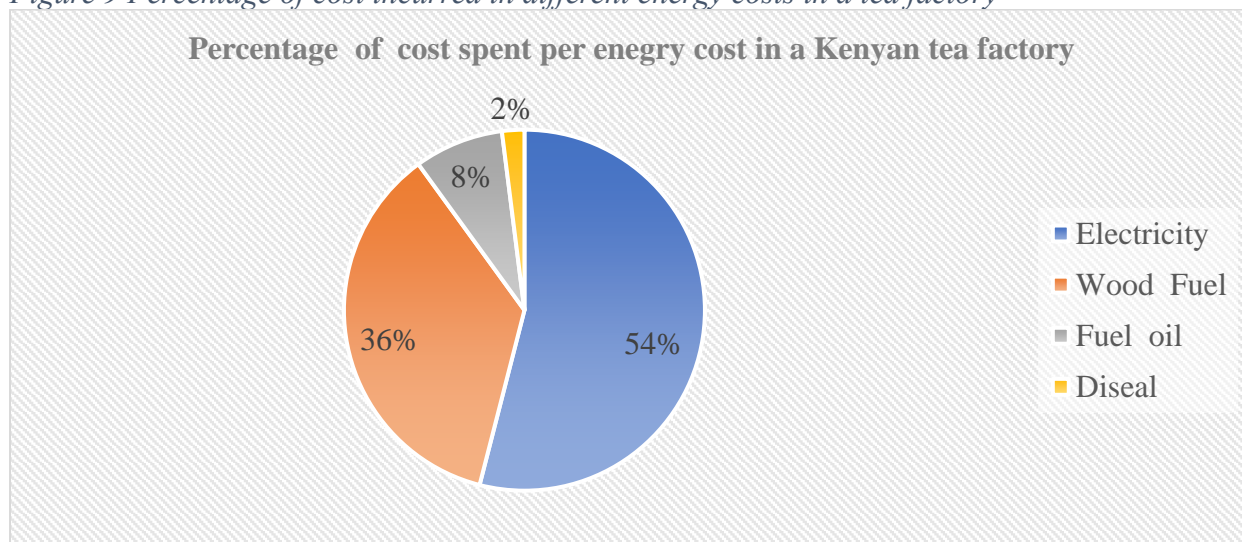
¹⁰⁶ International Trade Centre (ITC), 2014 Mitigating Climate Change in the Tea Sector

¹⁰⁷ https://tea.carbontrust.com/wp-content/uploads/2021/09/BSEAA2_Bioenergy-in-tea-processing-sector-report.pdf

running of boilers used in the tea drying process; diesel to operate tea collection vehicles; and oil to run backup generators or the boilers when fuel wood and electricity become unavailable.

- While there are piloted efforts by the large tea multinationals in Kericho to generate their own power to minimize commercial energy costs, electricity comprises the biggest annual energy cost followed by fuel wood for the boilers see figure below.

Figure 9 Percentage of cost incurred in different energy costs in a tea factory



To bring down the cost of energy, private tea estates typically set aside 20% of their land for growing fuelwood, primarily using *eucalyptus spp.* KTDA factories have now purchased and planted around 20,000 ha of woodlots/small plantations and procure fuelwood from farm woodlots owned by their members and neighbors. However, this only accounts for a fraction of their fuelwood needs.

- With this energy source becoming more difficult and expensive to obtain in some areas, some KTDA factories are using supplementary bioenergy residues, including coffee husks, macadamia shells and others, when these are available. The Mukomboki tea factory in Murang'a is an example how KTDA factories are substituting a portion of their fuelwood energy resource with alternative biomass resources for generating heat for tea processing. The Mukomboki bioenergy project explored the prospects for part-replacement of fuelwood with briquettes to provide heat for tea processing. Use of briquettes increases access to clean, modern energy services for people and enterprises in the tea sector
- There is need to 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 energy¹⁰⁸.

¹⁰⁸ CR Muoki 2020; Combating Climate Change in the Kenyan Tea Industry

- Solar air heating technology for example can be used for tea drying in place of inefficient fixed bed coal fired furnace and air heater¹⁰⁹. For example, a solar system has cut Williamson Tea's energy costs by around 30%, supplying clean electricity during the daytime to meet most of the tea processing factory's energy demand. Other adopters include the Chelal tea factory in Kericho.

Green House Gases Emissions

There are several opportunities for mitigating emission of greenhouse gases along the tea value chain as illustrated in the table below¹¹⁰.

Table 12 Greenhouse gas emissions

Level	Agricultural emission source	Proposed mitigation measure
Farm	Fertilizer use	• Improving the efficiency of fertilizer use
	Burning biomass	• Avoiding biomass burning
	Soils	• Composting, green manures, mulching and cover crops.
		• Improved soil management through adopting good agricultural practices
	Manure and livestock cultivation	• Manure management into a soil enhancer
Factory and farm	Vegetation cover	• Tree planting for shade trees and fuel wood, planting hedges for wind breaks and using cover crops
	Removal of biomass.	• Reforestation
	Land clearing.	• Agroforestry
	Tree cutting.	• Tree planting
	Combustion of fuel wood.	• Dry fuel wood to decrease use.
		• Install energy-saving stoves.
		• Install efficient boilers.
		• Use fuel wood from sustainably managed forests that do not reduce in area or density (e.g., set up fuel wood plantations and
		• Manage in a sustainable manner).
		• Reduced electricity use.
Factory	Use of electricity e.g., for factory lighting and powering pumps	• Adopting renewable or low carbon energy source
	And other electrical equipment.	
	Use of fossil fuels (gas, coal, oil)	• Reduce fossil fuels use
	e.g., for tea transportation	• Adopt renewable or low carbon energy sources
	Vehicles and boilers	
General	Forest – tree cutting	• Prevent deforestation through forest protection, planting new forests etc.
	Wastewater	• Low energy wastewater management system
	Environmental degradation	Organizing producers into producer organizations to act as avenues for training and capacity building tea farmers on climate smart technologies such as pest and disease control measures, riverbanks protection and access to and adoption of drought tolerant clones.

¹⁰⁹ UNIDO 2017; Adaptation and mitigation in the Kenyan tea industry

¹¹⁰ CR Muoki 2020; Combating Climate Change in the Kenyan Tea Industry

3.3.2 Water foot print

Water foot print is mainly measured in 3 components i.e. green water foot print – volume of rain water evaporated or incorporated into a product; blue water footprint –volume of surface or ground water evaporated or incorporated input product lost return flow and grey water foot print- volume of water needed to meet water quality standards¹¹¹.

The total annual green and blue water footprint of production in Kenya is 27.1 billion m³. 98% of this is green water footprint is used by plants or rainfall stored as soil moisture. The remaining 2% of the water footprint is the use of surface and groundwater for agriculture, industry and domestic water supply.

Tea production alone consumes 7 % of the green water footprint used in crop production while other crops such as maize and beans consume 36% and 16% respectively¹¹². Water saving techniques that can be adopted by tea farmers include use of water storage and harvesting and cost-effective drip irrigation¹¹³.

3.3.3 Biodiversity and ecosystems

Tea value chain is important in supporting biodiversity from native plants to wildlife and microorganisms. Although expansion of the plantations can be a threat to biodiversity, tea agroecosystems can align with conservation outside protected areas through traditional practices or organic farming, native shade trees and maintaining habitat diversity within monocultures¹¹⁴. The Nyayo Zones tea production is a powerful example on how tea can act a conservation buffer to forests.

3.3.4 Toxicity/ pollution

Environmental issues in the tea value chain are prominent in both production (i.e., the agricultural related impacts) and factory (i.e., during construction of factories and related infrastructure and manufacturing of tea) levels¹¹⁵. Ways in which operations at this level contribute to pollution include but are not limited to:

- Habitat destruction as a result land (forests, bushes, and other vegetation) clearing to pave way for farmland. A powerful example is how the development of Kiptangich tea estate led to the destruction of part of the Mau Forest.
- Discharge of factory wastewater (with possible toxic substances) into rivers.
- Increase in carbon dioxide emissions into the air due to use of wood fuel to steam boilers. This also causes habitat destruction as fuel wood is sought from the forests.
- Air pollution caused by improper disposal of solid wastes.
- Noise and dust pollution from factories and associated infrastructure from excavation, from movement of project vehicles, as well as from other dusty operations.

3.3.5 Food loss and waste

Food loss accounts for over USD 940 billion globally per year and 7.2 billion Kshs/year in Kenya hence reducing food loss and waste is a critical strategy for achieving sustainable

¹¹¹ waterfootprint.org/en/water-footprint/what-is-water-footprint/

¹¹² Water Footprint Network, 2016; Country water footprint profile Kenya

¹¹³ UNIDO 2017; Adaptation and mitigation in the Kenyan tea industry

¹¹⁴ <https://india.mongabay.com/2021/11/tea-plantations-support-biodiversity-when-managed-agroecologically/>

¹¹⁵ Macharia A; Environmental issues in the tea value chain

development goals in reducing poverty, improving nutrition, and taking climate change action¹¹⁶.

Tea is highly perishable and is usually handpicked/ plucked to maintain good quality and freshness. Some tea estates have introduced machine harvesting, inviting criticisms on quality of the produce. Food loss and wastage in the value chain is experienced during harvesting at the farm level, at the tea buying centers during inspection and weighing, transportation to factories, delayed delivery due to poor roads, and use of non-recommended trucking equipment, and at the factory during processing.

Improvement and development of infrastructure (roads, transportation trucks), use of proper harvesting baskets as well as staff training on post-harvest handling will be critical to curbing food losses and wastage in tea value chain.

¹¹⁶ <https://ccafs.cgiar.org/news/much-gain-reducing-food-loss-and-waste-kenya-nigeria-and-tanzania>

3.1 SWOT Analysis

The value chain's SWOT analysis is highlighted below:



4. Recommendations

1.6 What are the key recommendation for value chain upgrading ?

In line with the CRLCSA project aim will transfer both adaptation and mitigation technologies along the tea value chain, the study recommends the following considerations in tea value chain upgrading:

1. *Deploy soil and water conservation interventions/ technologies:* Interventions in soil and water management improve crop health and and quality and minimise water and soil loss. It is recommended that the existing technologies in practice that include construction of terraces and retention ditches to control erosion on sloppy landscapes, prevent runoff and increase infiltration should be upscaled. Other interventions to promote, particularly for smallholder farmers include, conservation farming techniques, such as cover crops and mulching, and increasing organic matter through use of compost and green manures.
2. *Strengthen long-term resilience for smallholder farmers:* The key to resilience for smallholder farmers is to reduce vulnerabilities associated with climate change and market shocks. 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. At the same time, 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.
3. *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.
4. *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.
5. *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.

6. *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.
7. *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
8. *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.
9. *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 encourage more planting and investment in commercial woodlots, to boost incomes and to ensure the wood supplies to tea factories are sourced sustainably and used 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.