

Kenya MARKUP - Market Access Upgrade Programme

Herbs and spices (Chillies and herbs) sub sector AS IS value chain analysis



ABOUT THIS REPORT

UNIDO commissioned export oriented herbs and chillies value chain analysis in Kenya under the Market Access Upgrade Programme. The study focused on chillies and herbs in 3 Kenyan counties: Busia and Kajiado for chili and Nakuru and Kajiado for herbs.

This report presents findings of the study on export oriented herbs and chillies value chain demand, supply, institutional arrangement & access to support services and proposes respective value chain upgrading strategies and recommendations. The study findings are aimed to among others inform MARKUP project interventions providing measurable performance indicators.

The study was undertaken by Tymax Agribusiness Solutions Ltd on behalf of UNIDO.

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TABLE OF CONTENTS

About this report.....	ii
LIST OF TABLES.....	v
LIST OF FIGURES.....	v
Acronyms and abbreviations.....	vi
EXECUTIVE SUMMARY.....	vii
Chillies Value chain.....	vii
Herbs Value chain.....	x
1.0 INTRODUCTION.....	1
1.1 Overview.....	1
1.2 Study background and objectives.....	1
1.3 Approach and methodology.....	1
1.4 Study area.....	1
2.0 CHILLIES VALUE CHAIN.....	2
2.1 Macro environment.....	2
2.1.1 Value chain description.....	2
2.1.2 Value chain actors and role.....	2
2.2 Demand analysis.....	3
2.2.1 Competitiveness of the value chain.....	3
2.2.2 Market requirements and operating environment.....	4
2.2.3 Competition.....	4
2.2.4 Marketing and trade.....	4
2.2.5 Key market growth potential; unmet market demand.....	5
2.3 Supply chain analysis.....	5
2.3.1 Demographic characteristics.....	5
2.3.2 Production.....	6
2.3.3 Harvest, yield and Post-harvest management.....	8
2.3.4 Processing.....	9
2.3.5 Exports operations.....	9
2.3.6 Institutional arrangement and access to support services.....	9
2.3.7 Environmental analysis.....	9
2.3.8 Gender analysis.....	10
2.4 Value chain upgrading strategy recommendations.....	11
3.0 HERBS VALUE CHAIN.....	14
3.1 Macro environment.....	14
3.1.1 Value chain description.....	14
3.1.2 Value chain actors and their role.....	14
3.2 Demand analysis.....	15

3.2.1 Competitiveness of the value chain	15
3.2.2 Market requirements and operating environment.....	16
3.2.3 Competition	16
3.2.4 Marketing and trade	16
3.2.4 Key market growth potential; unmet market demand	17
3.3 Supply chain analysis	17
3.3.1 Demographic characteristic.....	17
3.3.2 Production	17
3.3.3 Post harvest and logistics to pack house.....	18
3.3.4 Processing	18
3.3.5 Exports operations	18
3.4 Value chain upgrading strategy recommendations.	19
Annex.....	22
Data set.....	22

LIST OF TABLES

Table 1: Study areas.....	1
Table 2: Chillies value chain actors and their role	2
Table 3: Chillies yield and pricing	5
Table 4: Methods of land preparation	8
Table 5: Type of storage among chili farmers'	8
Table 6: Key Chili value chain opportunities and constraints	11
Table 7: Herbs value chain actors and their role	14
Table 8: Key herbs value chain opportunities and constraints	19

LIST OF FIGURES

Figure 1: Fresh chillies	2
Figure 2: List of importing markets for Kenyan Pepper	4
Figure 3: Export potential for Kenyan peppers	5
Figure 4: Gender distribution in labour provision	10
Figure 5: Basil	14
Figure 6: Planting programs guide for herbs	15
Figure 7: List of importing markets for Kenyan herbs	16
Figure 8: Markets with potential for Kenya's Export for Herbs	17

ACRONYMS AND ABBREVIATIONS

AFA	Agriculture and Food Authority
EAC	East African Community
EU	European Union
FPC	Fresh Produce Consortium
FPEAK	Fresh Produce Exporters Association of Kenya
GAP	Good Agricultural Practice
GHP	Good Hygiene Practices
HCD	Horticultural Crops Directorate
IPM	Integrated pest management
ISO	International Organization for Standardization
JKIA	Jomo Kenyatta International Airport
KAM	Kenya Association of Manufacturers
KEBS	Kenya Bureau of Standards
KEBS	Kenya Bureau of Standards
KEPHIS	Kenya Plant Health Inspectorate Service
KES	Kenya Shilling
ODK platform	Open Data Kit
SACCOs	Savings and Credit Co-Operative Society
SSPs	Spray service providers
UAE	United Kingdom and United Arab Emirates
UK	United Kingdom
UNIDO	United Nations Industrial Development Organization
USA	United States of America
WRMA	Water Resources Management Authority

EXECUTIVE SUMMARY

Chilies Value chain

Demand

Kenya produces relatively small amount of chilies compared to other countries with a world market share of 0.42%. In 2019, Kenya exported 787 tons of dried chilies valued at 1,619 thousand Euros and 333 tons of fresh chilies valued at 677 thousand Euros. Kenya exports most of its fresh chilies to the UK which accounts for 60% of Kenya's exports. Other markets for Kenyan chili includes; Germany at 22%, Somalia (10%), Republic of Korea (3%), Netherlands (2.4%) and Norway (1.7%). The UK, Germany and Italy are key market destination for the dried chilies. From the 2019, sales figures, Kenya exported more dried than fresh chilies. Trends in the international markets where there is escalating use of dried chillies in the pharmaceutical & cosmetics industries could have contributed to Kenya exporting more dried than fresh chillies.

Kenya exploits only half of its potential to produce chili. United States of America is the market with the highest demand potential for chilies of 0.89 million tonnes. Other countries with great potential for export of Kenyan chili (fresh and dried) include Netherlands, Germany, Russia, UK, Canada, France, UAE and Poland. Kenya has the closest export link with Somalia.

Among others challenges in management of the False Codling Moth management and limited GLOBAL GAP certifications where none of the interviewed farmers was certified could be contributing to Kenya not optimizing the market potential. The most popular market outlets for chilies were processors (52%) and aggregators/brokers (41%) as they account for about 93%. 7% of interviewed sold their chilies through producer groups. Directly working with processors is a step in the right direction that will contribute towards enhanced compliance to food safety standards and efficient and effective False Codling Moth management.

Supply

The analysis covered two counties namely Busia and Kajiado with a sample size of 33 and 21 respectively totalling to 54 farmers. Overall area under chilies per farmer is 1.2 acres out of 3.1 acres operated by the households. The overall yield is 3,120 Kgs against a potential of 5,500 Kgs per acre. Some of the key constraints leading to low yield and quality includes:

- Limited access to certified inputs.
- Low uptake of good agricultural practices negatively affecting productivity and food safety
- Limited land under crop
- False Codling Moth

On average 16% of chillies in Kajiado are lost at farm level compared to 2% in Busia as the latter dries their produce for the market. This indicates the need to upscale drying of chillies as the market is readily available.

Institutional arrangement & access to support services

Kajiado County chili farmers do not belong to any crop farmer organization. In Busia County however, 39.39% of the chili farmers have crop farmer organization membership; overall 79% of farmers individually source farm inputs. 42% of farmers have accessed finance mainly in Busia County at 60%. Working directly with a processor, contributed to Busia farmers accessing credit for procurement of farm inputs. On average farmers had 3.68 contacts with extension officers per annum.

Value chain upgrading strategy recommendations

Recommendations and activities	Key performance indicators (KPIs)	County specific priority areas
Certification and market linkages to increase quality and quantity.		
<ul style="list-style-type: none"> Support exporters to review and optimize new markets opportunities especially the dried chillies market in the USA, Netherlands, and Germany among others. Support exporters to enhance compliance and optimize production and processing capacity to competitively exploit the fresh chillies markets in the Netherlands, UK, Germany, USA and other markets 	<ul style="list-style-type: none"> Increase of regional, international trade volume for chillies of targeted farmers and enterprises. 	
<ul style="list-style-type: none"> Farmer trainings on GAP (GLOBAL GAP); Integrated Pest Management, Biological Control of Pests. Promote groups certification under GLOBAL GAP option 2. Link farmers to certifying agencies. Traceability: strengthen/upgrade the traceability system to reflect market needs. 	<ul style="list-style-type: none"> Percentage increase in number of GLOBAL GAP certified chillies farmers participating in the international markets 	
<ul style="list-style-type: none"> Strengthen direct linkages between farmers and exporters. Support formation and or strengthening of producer groups for produce aggregation and collective marketing to improve farmer bargaining power and compliance to market standards 	<ul style="list-style-type: none"> Percentage increase of farmers having signed supply agreements directly with exporters and complying to market standards Percentage increase in income per acre 	<ul style="list-style-type: none"> Kajiado (Price)
Productivity, quality and food safety; target to increase productivity (yield per acre) and food safety through:		
<ul style="list-style-type: none"> Accelerate uptake of good agricultural practices and improved access to, demand & effective use of certified inputs and smart farming technologies (through training in farmer field schools, extension services, collective input purchase by farmers & financial access as highlighted in 4 below). Build farmers' entrepreneurial capacity to run chillies production as a business adopting market driven production. Demand should guide development of planting calendars to support consistent production. 	<ul style="list-style-type: none"> Percentage increase in production of safe, quality chillies (yield) per acre 	<ul style="list-style-type: none"> Busia (Yield and quantities) Kajiado (yield & quantities)

<ul style="list-style-type: none"> • Work with competent authorities and county governments for policy/regulation formation and enforcement such food safety policy. • Work on efficient and effective False Codling Moth management 		
Effective and efficient post-harvest management		
<ul style="list-style-type: none"> • Identify & support drying technologies in while developing markets for the products (demand is readily available) • Trainings of exporters on GHP, FSSC22000, ISO 14001; ISO 45001:2018, traceability, packaging & labelling 	<ul style="list-style-type: none"> • Percentage reduction in post-harvest losses. 	
Support formation & strengthening of farmer organizations to facilitate farmers access to essential services		
<ul style="list-style-type: none"> • Encourage farmers to form groups for easier access to services and inputs capitalizing on their economies of scale. • Promote blended extension services e.g. Spray service providers (SSPs) providing market information. This could be through trainings by the competent authorities such as HCD. • Financial literacy & linkages (tripartite agreements e.g. among banks, farmers and exporters) and tailor made financial products (e.g. cold storage facilities asset financing) • Promote smart services e.g. digital financial services for example Digi Farm & Agri Wallet. 	Number of farmers consistently/easily accessing essential support services.	

Herbs Value chain

Demand

In 2019, Kenya exported approximately 17,054 tons of herbs valued at 50,728 thousand Euros. The UK, Netherlands, France, UAE and Somalia are key importers of Kenya's herbs. Kenya's share of world market for herbs is negligible as it only commanded 2% market share in 2019. Netherlands and UAE are major re-export and distribution centres. The growing interest in consumers for natural, healthy products as well as gastronomic experiences has enabled fresh herbs to gain popularity and Kenya has untapped market potential. According to ITC export potential data, Somalia, United Kingdom and United Arab Emirates have the greatest potential for Kenya's exports of herbs.

With the UK being the leading export destination for Kenyan herbs, compliance to standards such as GLOBAL GAP is critical to optimize such markets. However, out of the farmers interviewed only 29% were certified. There is need therefore to increase percentage of farmers certified which is highly possible due to close working relationship between the growers and exporters. The exporters contract the farmers to not only grow but to also process at source – farms. The overall average income per acre per month was KES 195,525.

Supply

The analysis covered two counties namely Kajiado and Nakuru with a sample size of 4 and 3 respectively totalling to 7 farmers. Average area under herbs per farmer is 1.5 acres out of 4.75 acres operated by the households. The overall yield is 650 Kgs per acre per month against a potential of 1,500 Kgs. Some of the key constraints leading to low yield and quality includes:

- Limited access to markets
- High capital investments on technologies such as greenhouses limiting production.
- Medium uptake of good agricultural practices due to farms technical teams' capacity.

On average 45% of herb are graded out at the farms. The percentage could be higher where there are not effective and efficient cold storage facilities.

Institutional arrangement & access to support services

The farmers operate individually and majority have contracted agronomists to manage the farms.

Recommendations and activities	Key performance indicators (KPIs)	County specific priority areas
Certification and market linkages to increase quality and quantity.		
<ul style="list-style-type: none">• Support exporters to review and optimize new markets opportunities including but not limited to processed herbs to mitigate against shocks like huge products losses as a result of COVID 19 restricting international freights.• Support exporters to enhance compliance and optimize production and processing capacity to competitively exploit the fresh herbs markets like in the UK.	<ul style="list-style-type: none">• Increase of regional, international trade volume for herbs of targeted farmers and enterprises.	

<ul style="list-style-type: none"> Farmer trainings on GAP (GLOBAL GAP); Integrated Pest Management, Biological Control of Pests. Promote certification Link farmers to certifying agencies. Traceability: strengthen/upgrade the traceability system to reflect market needs. 	<ul style="list-style-type: none"> Percentage increase in number of GLOBAL GAP certified herbs farmers participating in the international markets 	
<ul style="list-style-type: none"> Upscale herbs growers and exporters contractual arrangements 	<ul style="list-style-type: none"> Percentage increase of farmers having signed supply agreements directly with exporters and complying to market standards Percentage increase in income per acre 	
Productivity, quality and food safety; target to increase productivity (yield per acre) and food safety through:		
<ul style="list-style-type: none"> Accelerate uptake of good agricultural practices and improved access to, demand & effective use of certified inputs and smart farming technologies (through training of the herbs farmers' technical teams) Promote innovative technologies to reduce capital expenditure and growing costs Markets development as highlighted in 1 above 	<ul style="list-style-type: none"> Percentage increase in production of safe, quality herbs (yield) per acre 	<ul style="list-style-type: none"> Kajiado (Yield and quantities) Nakuru (yield & quantities)
Effective and efficient post-harvest management		
<ul style="list-style-type: none"> Identify & support innovative storage and packing facilities at the farms that would lead to extended shelf life of fresh herbs Trainings of exporters on GHP, FSSC22000, ISO 14001; ISO 45001:2018, traceability, packaging & labelling 	<ul style="list-style-type: none"> Percentage reduction in post-harvest losses. 	
Technical teams capacity development		
<ul style="list-style-type: none"> Build capacity of the agronomists contracted by farmers. Through upscaling contractual arrangements between exporters and farmers, the latter will be able to use the contracts to secure credit from financial institutions. 	<ul style="list-style-type: none"> Number of farmers consistently/easily accessing essential support services. 	

1.0 INTRODUCTION

1.1 Overview

UNIDO commissioned value chain analysis under the Market Access Upgrade Programme. The study focused on chillies and export oriented herbs in 4 counties in Kenya. These are Busia and Kajiado for chillies and; Nakuru and Kajiado for the herbs. The study was undertaken by Tymax Agribusiness Solutions Ltd.

1.2 Study background and objectives

The EU in partnership with the EAC launched the Market Access Upgrade Programme (MARKUP) to support member countries improve market access of agro-food products to the EU and regional markets. The MARKUP is structured around two intervention levels: the EAC Regional Window and the Partner States National Window with country specific projects. UNIDO is the implementation partner for the Kenya-Partner States Window.

The main purpose of this project is to contribute to the economic development of Kenya by increasing the value of both extra and intra-regional agricultural exports in selected horticulture sub sectors; (snow peas and peas, mangoes, passion fruit, chillies, herbs and spices, nuts). Recent studies have analysed the reasons for low productivity and competitiveness in these value chains such as the need of specialized extension services and a diffuse lack of knowledge on appropriate good agricultural practices. These value chains for exports are also lacking compliance with market requirements and standards. National quality infrastructure is at advanced development stage including for conformity assessment services; however, some conformity assessment services are not yet fully recognized by the targeted international markets.

This project addresses these challenges through an intervention, and aims to:

- Improve the institutional and regulatory framework for better conformity assessment services in Kenya's horticultural sector;
- Increase revenue and MARKUP for Kenya's smallholder producers and enterprises in export-oriented horticulture sectors.

1.3 Approach and methodology

The consultants undertook the analysis through embedding a participatory approach with the involvement of UNIDO MARKUP team and respective stakeholders. Desk exploratory methods were used to review various documents/reports and other necessary literature relating to the targeted commodity value chain activities. Field data collection and focus group discussions were carried out by enumerators based at the respective counties and guided by the county government officials. The enumerators were trained online prior to data collection. The data was captured using ODK platform for effective and efficient data management after which it was analysed.

1.4 Study area

The study areas were as presented in Table 1:

Table 1: Study areas

No.	Value chain	Producers	Exporters
1	Chillies	Busia and Kajiado	Target counties and Nairobi
2	Herbs	Nakuru and Kajiado	Target counties and Nairobi

2.0 CHILLIES VALUE CHAIN

2.1 Macro environment

2.1.1 Value chain description

Chillies are considered as one of the commercial crops. In daily life, chillies are integral in many different cuisines around the world. It adds pungency, flavour, taste, and colour to the dishes. India is the largest producer and contributes 25 per cent to the total production of chillies. In 2019, apart from India, major producers and exporters of chillies were China (24%), Spain (17%), Pakistan (7.2%) and Mexico (8%). The sowing cycle of chillies however varies from country to country. World trade in chillies accounts for an approximate 16% of the total spice trade, close only to black pepper.



Figure 1: Fresh chillies

In Kenya, chili farming not only does it offer excellent nutritional value as the source of vitamin, Vitamin B, Vitamin C, iron, potassium and magnesium, but also offers incomes to smallholder farms. Kenya has a number of chili varieties represented in the market. They include; African Birds Eye, Cayenne pepper, Serenade and Jalapeno among others. Chillies grow in high altitude areas of about 1500m above sea level and require a minimum rainfall of about 600-1200mm annually. Being warm seasoned crops, chillies require temperatures of around 20-30 degrees Celsius for its growth and setting. The optimum soil pH for chillies is 6.0- 6.5 however, soil pH of 4.3-9.7 can also work for other chillies varieties.

2.1.2 Value chain actors and role

The major actors in chillies value chain are input suppliers (including manufacturers, wholesalers and retailers), farmers, wholesalers, processors, retailers and the consumers. The key influencers are the county governments, A.F.A., the Kenya Bureau of Standards (KEBS), the Ministry of Industry and Trade, and the Ministry of Agriculture and Cooperatives, and the Kenya Plant Health Inspectorate Services (Table 2). The processing firms play a major role in the chillies value chain. They contract with farmers. Processing firms also procure chillies in the local market from intermediaries. The actors are tabulated in the table below.

Table 2: Chillies value chain actors and their role

	Value chain node	Actors	Role
Direct actors	Consumer	Consumers	<ul style="list-style-type: none">Buy from producers, local markets & supermarkets for consumption
	Wholesale & retailing	Traders, supermarkets, wholesale & retail stores, digital platforms	<ul style="list-style-type: none">Buy from producers & aggregators and sell to consumers
	Import	Importing agents (for the international markets)	<ul style="list-style-type: none">Imports from diverse regions and distributes to wholesalers and retailers

	Value chain node	Actors	Role
	Export	Freight agents & airlines	<ul style="list-style-type: none"> Exports logistics
	Processing	Exporters and processors	<ul style="list-style-type: none"> Source raw materials, process at either company owned or leased facilities and markets in the local, regional and international markets
	Aggregation & transportation	Aggregators/traders & producer organizations	<ul style="list-style-type: none"> Aggregates produce from producers, stores at collection centres and transports or distributes to exporters, wholesalers and retailers.
	Producers	Smallholder farmers and medium scale plantations	<ul style="list-style-type: none"> Production
	Input supply	Manufactures/importers, distributors, agro dealers/stockists	<ul style="list-style-type: none"> Sell inputs to producers and where possible provide advisory services.
Support system	Facilitators	National and county governments ministries and departments; competent authorities (A.F.A., KEPHIS, KEBS); Business associations (such as FPEAK, FPC, KAM); Financial institutions (Banks, SACCOs); Packaging materials suppliers; utility providers; research and learning institutions (Universities, ATVETs); private service providers (e.g. SOCCA); development organizations; certification bodies (GLOBAL GAP)	<ul style="list-style-type: none"> Regulation and policy making Support services to actors along the chain (such as extension services, financial access)

Source: Survey findings

2.2 Demand analysis

2.2.1 Competitiveness of the value chain

Kenya produces relatively small amount of chilies compared to other countries with a world market share of 0.42%. In 2019, Kenya exported 787 tons of dried chilies value at 1,619 thousand Euros and 333 tons of fresh chilies valued at 677 thousand Euros. The annual growth in quantity of fresh chilies exported in the past 5 years has decreased at a rate of 10% per annum.

Kenya exports most of its fresh chilies to the UK which accounts for 60% of Kenya's market share (Figure 2). Other markets for Kenyan chili includes; Germany at 22%, Somalia (10%), Republic of Korea (3%), Netherlands (2.4%) and Norway (1.7%). Kenya exploits only half of its potential to produce chili. The UK, Germany and Italy are key market destination for the dried chilies.

List of importing markets for a product exported by Kenya
Product: 0904 Pepper of the genus Piper; dried or crushed or ground fruits of the genus Capsicum or of the genus Pimenta

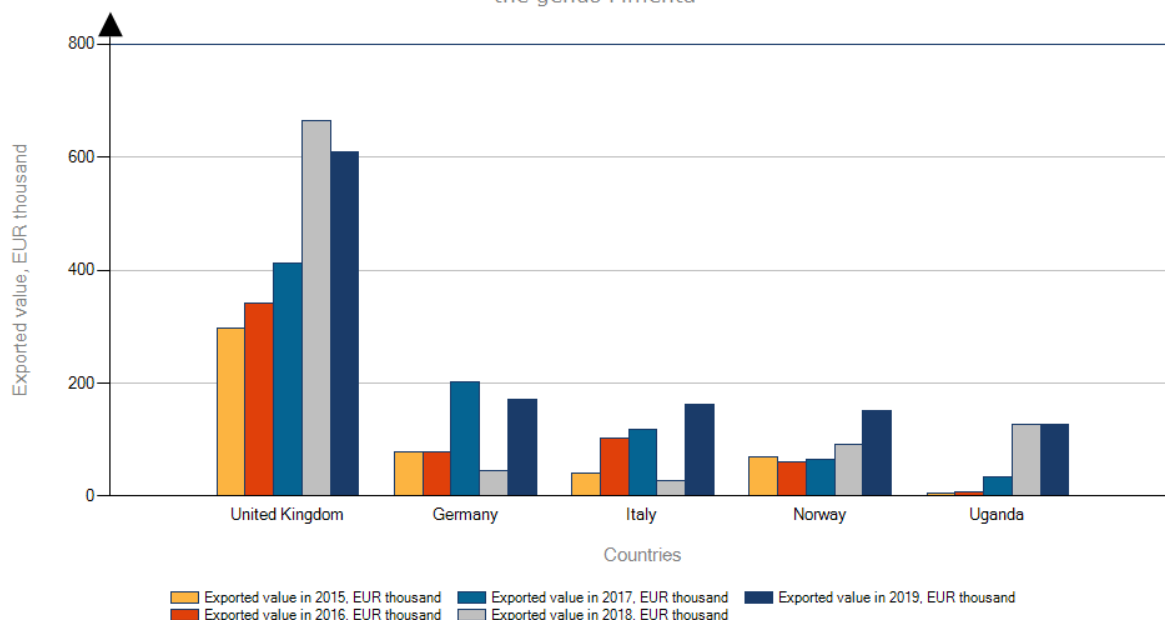


Figure 2: List of importing markets for Kenyan Pepper

Source: ITC

Consumption patterns

Chilies are mostly consumed and exported as fresh chillies, dried chillies, pickled chillies and chili oleoresins. There are multiple uses of chillies: food industry (Fresh & dried), pharmaceutical & cosmetics industry (dried).

2.2.2 Market requirements and operating environment

While there are multiple market requirements, the study focused on GLOBAL GAP certification which is a key export requirement. Of the farmers interviewed, none of the farmers was GLOBAL GAP certified limiting access to international markets. To improve export volumes, there is need to have more farmers GLOBAL GAP certified.

2.2.3 Competition

Kenya faces stiff competition in the chili market from countries such as Mexico that exports more than 1 million tons and has a world market share of 24%. Other competing countries include Spain with 23%, Netherlands (19%), Canada (7%) and USA (5%) among others. Locally, chili production is negatively affected by factors like inadequate access to quality inputs (use of certified seeds), climatic factors, markets and seasonality in production.

2.2.4 Marketing and trade

The most popular market outlets were processors (52%) and aggregators/brokers (41%) as they account for about 93%. 7% of interviewed sold their chillies through producer groups.

Chillies are sold in 2 forms (dried and fresh). In Kajiado farmers sold fresh chillies at KES 43 per Kg. In Busia, farmers dry their chillies and sell at an average price of KES 218 per Kg of dried (Table 3). Farmer's annual income varied significantly across the counties. Busia farmers reported the highest

average income per acre (KES 555,343). Kajiado farmers reported an average of KES 143,814 per acre.

Table 3: Chillies yield and pricing

	Kajiado (Fresh)	Busia (Dried)
Production (Kg per Acre)	3,976	2,608
Average selling price in KES per Kg	43	218
Average income per Acre in KES	143,814	555,343

Source: Survey findings

2.2.5 Key market growth potential; unmet market demand

United States of America is the market with the highest demand potential for chilies of 0.89 million tonnes. Other countries with great potential for chili demand include Netherlands, Germany, Russia, UK, Canada, France, UAE and Poland. Kenya has the closest export link with Somalia (Figure 3). Other countries with close export links include, Oman, Switzerland, Belarus, UK and Finland.

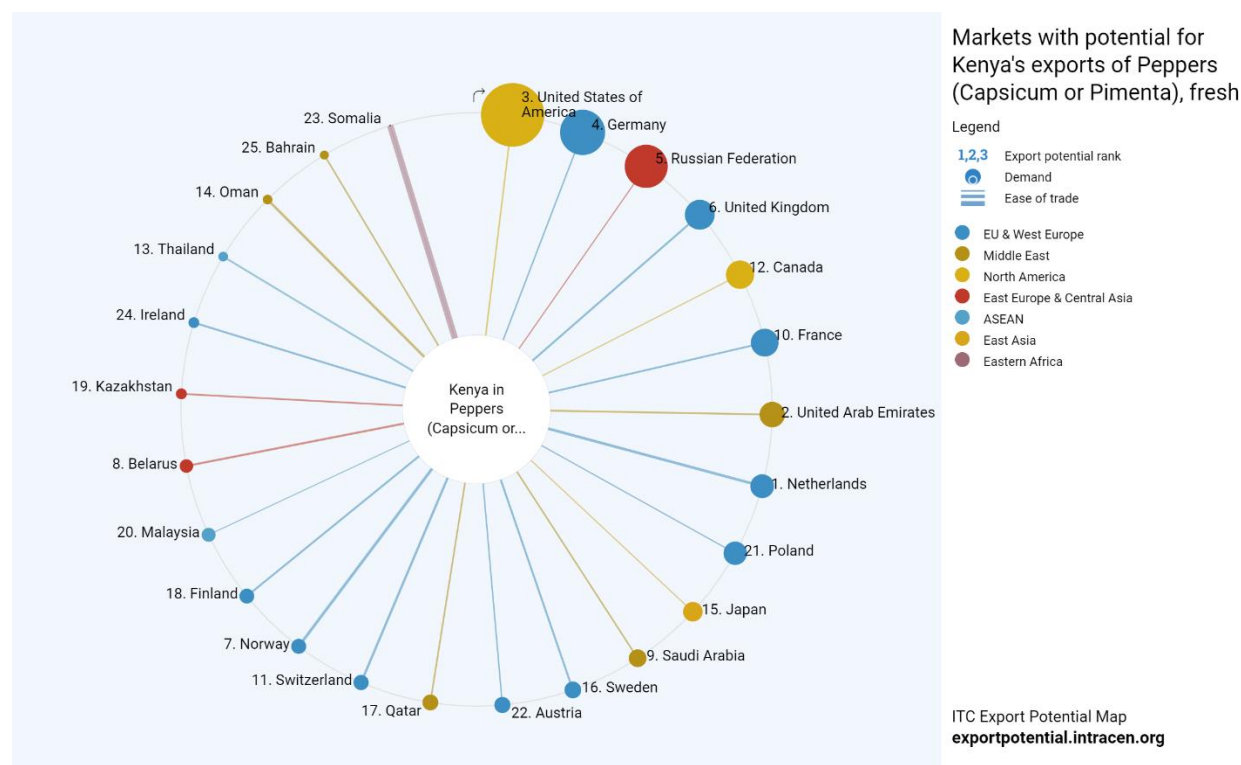


Figure 3: Export potential for Kenyan peppers

Source: ITC

2.3 Supply chain analysis

2.3.1 Demographic characteristics

Age

The average age of the household decision makers producing chili was 45 years. Chili decision makers in Kajiado had an average of 40 while Busia had an average of 48 years. The household sizes in both counties differed leading to an average of 3 members. In Kajiado, the average size of the household producing chilies is half (2) that of Busia (4). The study further divided the

household members into two major categories. That is those members under 18 years and those above 18 years. The distribution of the average number of children under the age of 18 in Kajiado and Busia counties are 1 and 2 respectively.

Main decision maker

The decision maker's main occupation was determined in terms of the time spent in a day. Farming was the main occupation in overall with the highest percentage of 70.37% compared to the other occupations. Kajiado County had the highest number of decision makers being farmers (95.24%) and the rest were employed in the public sector (4.76%). The analysis of Busia County shows the percentage distributions of occupations of the main decision makers broken down as casual workers (6.06%), those in self-employment are (6.06%), public and private sector employment at 3.03% and 6.45% respectively. The highest percentage (54.55%) represents farmers as the main decision maker's main occupation in Busia County. This distribution leaves a high percentage of farmers being the major decision makers.

Education level

The study findings reveal that the selected counties show different levels of education attained by the household decision makers. 50% of household decision makers in the two counties have completed form four, 11.11% college or higher, 11.11% primary or secondary, 14.81% reached standard 7 and 7% did not attend school at all. The highest percentage of respondents (24.42%) have studied to up to form 4. In Busia, those that have attained college education or higher represent 18.18%, primary up to class 7 represents 21.21% and those who studied up to class 8 or secondary are 15.15%. In Kajiado County, however, all the respondents have at least attained some levels of education with the highest percentage of respondents (90.48%) having studied to up to college or higher levels. Those that have studied up to secondary form four represent 4.76% and those who studied up to primary standard 7 and class 8 or secondary are both at 4.76%.

2.3.2 Production

There are so many varieties of chili planted in Kenya. The main varieties are African birds eye and Cayenne pepper. Being warm seasoned crop and given the tropical climatic conditions of Kenya, chilies farming is ideal. This study majorly focused on chili production in Kajiado County and Busia County.

Farmers interviewed had engaged in chili production for an average of 3.4 years at the time of this survey. Land ownership among the chili farmers was mixed tenure system. Farmers reported to grow chilies on rented in land and own land. This is indicated by the overall average percentage (50%) of individuals with title deeds. Households with title deeds in both Kajiado and Busia counties were 23.81% and 66.67% respectively. The overall average acreage of land owned by chili farmers in both Kajiado and Busia counties is 2.46. The average acreage of land owned by chili farmers sampled in Kajiado County is 5.17 and they rent in an average of 2 acres. In Busia County, the average acreage of land owned by chili farmers sampled is 1.75 acres and they rent in an average of 0.75 acres. The total land size operated by the chili farmers is approximately 3 acres in overall with 2 acres being used for agriculture and 2 acres under crop. The land size operated by the households in both Kajiado and Busia counties are 5.2 and 1.8 acres respectively. Land size under crop is less in proportion to that operated by the households with both Kajiado and Busia counties allocating 3.9 and 1.2 acres respectively. Kajiado County chili farmers are seen to allocate a bigger parcel of land (3.88 acres) to crop compared to Busia County (1.2 acres). Busia County, with an average of 1.39 acres of total land under chilies, leads Kajiado County (0.95).

Crop nutrition and protection

Very few chili farmers conducted soil testing before they plant. This is indicated by the low average percentage (31.48%) among the counties affiliated to the practice. Busia County has the highest percentage (51.52%) of the farmers doing the soil tests whereas chili farmers in Kajiado County do not test their soil at all before planting.

When spraying their chilies, an overall percentage of farmers (22.22%) in the two counties, use a dedicated knapsack. Most of the farmers in these counties use the general knapsack which they can use for other purposes with only 9.52% and 30.3% of farmers in Kajiado and Busia counties respectively using dedicated knapsack. When applying the chemicals, results show that both Kajiado (100%) and Busia county (78.79%) farmers mix different chemicals used in their farms.

Chemicals packed in sealed containers are embraced by the farmers. Most of them opt for the sealed ones as shown by a high percentage (85.19%) in overall. Kajiado and Busia counties have 90.48% and 81.82% of chili farmers buying chemicals packed in sealed containers. Whenever these chili farmers buy the chemicals, they first confirm that the chemicals bought are not expired. Most (87.88%) chili farmers in Busia County check on the expiry of the chemicals whereas all (100%) of chili farmers in Kajiado confirm that the chemicals bought are not expired.

On the decision to apply agrochemicals, 60.61% of chili farmers in Busia County use scouting to know when to apply. This is the most preferred technique to them compared to that of after time period (15.15%) and following a chart embraced by 24.24% of the farmers. All the farmers in Kajiado County (100%), prefer scouting to other techniques when making the decision to apply agrochemicals. After spraying, most farmers prefer to clean their pumps after every spraying jobs. This is represented with an overall percentage of farmers in the two counties at 85.28%. All the farmers in the two counties embrace manual spraying of the chilies. In Busia County, 87.88% of farmers use manual spraying whereas 12.12% have embraced the motorized spraying technique. In overall, when handling most production practices, most of the farmers have incomplete set of PPEs. Kajiado County farmers have a higher percentage of 100% of the chili farmers having incomplete sets of PPEs. In Busia County, the households with in complete set PPEs are 83.33%, which means that all chili farmers are not well protected.

Access to agricultural Inputs

The study revealed most (79.63%) of farmer's access to farm inputs was on individual basis, an indicator of low collective action amongst farmers. About 80.95% of Kajiado farmers and 78.79% of Busia chili farmers acquired farm inputs individually. Economically, it implies that farmers are not enjoying the benefits of pulling resources together and bargaining power for a bigger voice. About 21.21% of Busia and 19.05% of Kajiado farmers acquired farm inputs collectively representing the 20.37% of the overall farmers who access farm inputs collectively.

Access to labour

Labour challenges affect the chili farmers, with a relatively high percentage of 72% of the farmers experiencing these challenges. The most challenged set of chili farmers are those from Kajiado County with a 100% of them facing the labour challenges. Busia County (54.55%) farmers face these labour related challenges. Compared to Kajiado County, Busia County was labour abundant.

Use of farming technology

The land was prepared either manually (42.59%), tractor-drawn (37.04%) or animal-drawn (12.96%). Tractor drawn was most popular (90.48%) in Kajiado County (Table 4). A majority (63.64%) of farmers in Busia prepared their land manually while others (21.21%) used animal drawn.

Table 4: Methods of land preparation

Methods	Kajiado	Busia	Overall
Manual	9.52	63.64	42.59
Tractor drawn	90.48	3.03	37.04
Animal drawn	0.00	21.21	12.96

Source: Survey findings

Water management

Most of chili is produced under irrigation as reported by 74.07% of the farmers. Use of irrigation water was popular in Kajiado County (85.71%) as compared to Busia County (66.67%). Out of these, only 9.26% had obtained WRMA license. In addition to rain fed, other water sources included surface run-off rain water (16.67%), rooftop harvested rainwater (12.96%), well (3.7%), river/lake (14.81%), borehole (12.96%), water pan/reservoir (7.41%), spring (24.07%) and streams (1.85%). Kajiado County led in both adoption of irrigation technology (85.71%) followed by Busia County at 66.67%.

2.3.3 Harvest, yield and Post-harvest management

During harvesting, only 29.63% of the farmers across the counties use the harvest containers exclusively while the rest use other containers and means to harvest. None of farmers in Kajiado County embraces these harvest containers exclusively whereas a few chili farmers in Busia County (48.48%) embrace the exclusive use of the harvest containers.

Current yield per Acre

The average yield per chili farmer in Kajiado and Busia counties was 3,120 with the distribution among the two counties being; Kajiado with an average of 3,976 and Busia County with 2,608. Kajiado County experiences higher levels of post-harvest losses (16%) compared to Busia County at a percentage of 2%. The farmers experienced losses during harvesting due to spoilage. Some also were subject to bad weather (excess rainfall) and therefore, there was rot in some chillies leading to spoilage.

Table 5: Type of storage among chili farmers'

Type of storage	Kajiado	Busia	Overall
Open store	19.05	69.70	50.00
Close store	4.76	21.21	14.81
In the field (no store)	76.19	6.06	33.33
Cool room	0.00	3.03	1.85

Source: Survey findings

Among the contributors to post-harvest losses includes lack of proper storage facility. The study therefore sought to establish how farmers stored their chillies before selling (Table 5). Among storage facilities used are open and closed stores, cold room or left open in the field. Use of open store was the most common (50%) followed closely by leaving the produce in the field (no store)

at 33.33%. Use of cold room and closed stores were the most unpopular storage methods used by the farmers at 1.85% and 14.81% respectively. Open store was common in Busia (69.70%). Leaving chillies in the open field was mostly used in Kajiado (76.19%). Apart from using open stores, some of the Busia farmers (21.21%) also used closed stores for storage immediately after harvesting.

2.3.4 Processing

While fresh chillies are packaged at exporters pack houses, it was noted that the first step in the processing of dried chillies starts at farm level. Busia farmers dries chillies at their farms using simple technologies and supplies the processors with dried products. This explains the low (2%) post-harvest losses experienced by Busia farmers.

2.3.5 Exports operations

Exporters indicated they heavily rely on JKIA to export their consignments. While COVID 19 had at the onset of the pandemic led to sharp increment of freight costs, the freight costs are usually as high as an average of 40% of the sales price. This is an area that requires intervention.

2.3.6 Institutional arrangement and access to support services

Group Membership

Kajiado County chili farmers do not belong to any crop farmer organization. In Busia County however, 39.39% of the chili farmers have crop farmer organization membership. Most farmers across the two counties prefer to access their farm inputs individually. This is affirmed by the overall percentage of farmers accessing inputs individually at 79.63%. Those farmers that use a collective means when acquiring farm inputs are relatively few (20.37%).

Credit Access

Most of the farmers in all the two counties (77.78%) have active bank accounts. Some of them however, have other means of storing their money apart from the banks as illustrated by the percentage of those with active accounts in the counties. An average percentage (77.78%) of the farmers are able to access mobile banking services. Busia County had relatively fewer farmers accessing mobile banking services at 63.64%. Few chili farmers are able to access credit for chili production. An average of 42.59% of the farmers' access credit among the two counties in overall. Kajiado County has the least number of farmers who are able to access credit at 14.29% of the total chili producing households and Busia farmers who access credit amount to 60.61%. Working directly with a processor, contributed to Busia farmers accessing credit mainly for farm inputs.

Training and extension

Not all the farmers across the two counties had access to training services. Only 74.07% of them in overall access the training services. The distribution in percentage of the chili farmers who could access the training services in Kajiado and Busia counties were 100% and 57.58% respectively. Farmer trainings should be increased in Busia County since they are at an average. The average number of trainings that the chili farmers attended per annum were an overall average of seven. The number of extension contacts with the extension officer on average per year Kajiado and Busia counties per year were 1 and 3.7 respectively. This shows that the extension officers are not fully utilized by the chili farmers in these counties.

2.3.7 Environmental analysis

In awareness and use of IPM, both Kajiado and Busia counties have their farmers aware as indicated by an overall average percentage of 50% distributed among the two counties at 4.76% and 78.76% respectively. There is a sharp disparity between the two counties with Kajiado

experiencing least awareness and most of the farmers in Busia County are aware and apply the integrated pest management practices. This therefore calls for sensitization of farmers in Kajiado County to be trained on the importance of using IPM in their production of chillies.

In case most of the farmers do not make any changes in the way they farm in the way they farm over the next 20 years, the production levels for most of the farmers both Kajiado and Busia counties will highly decrease indicated by a relatively higher percentage of farmer responses at 72.22%.

2.3.8 Gender analysis

Females (both family members and hired) dominates the production of chillies across Kenya specifically. From the survey findings, women specifically are involved in production (planting, weeding, harvesting). On the other hand, chemical application was majorly pre-dominated by men both from the family and those hired (Figure 4). Both hired and family men were used almost in equal measures for all the activities except in chemical application where hired men were used more than the rest. Family female were also used in the production process but it was not the popular one.

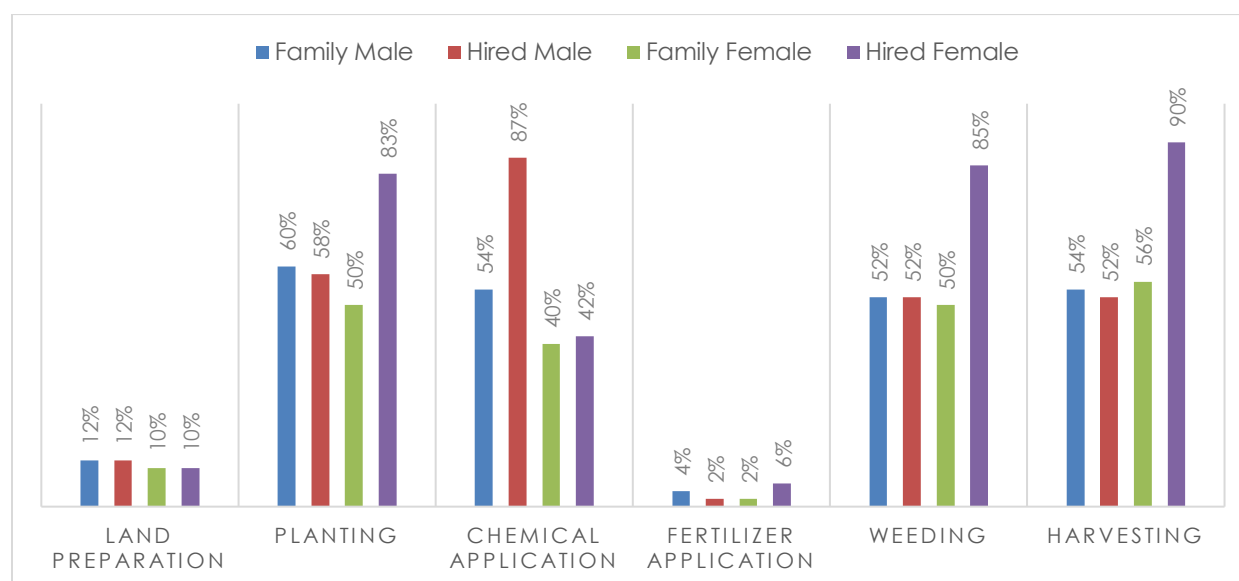


Figure 4: Gender distribution in labour provision

Source: Survey findings

2.4 Value chain upgrading strategy recommendations.

Table 6 summarizes key value chain opportunities and constraints with respective recommendations (inclusive of specific activities) and key performance indicators.

Table 6: Key Chili value chain opportunities and constraints

Opportunities and constraints	Recommendations and activities	Key performance indicators (KPIs)	County specific priority areas
<p>1. Marketing</p> <p>Untapped markets; with changing trends in use of chillies mainly dried in sectors such as the pharmaceutical & cosmetics industries, Kenya has untapped markets.</p> <p>The United States of America is the market with the highest demand potential for chillies of 0.89 million tonnes. Other countries with great potential for chili demand include Netherlands, Germany, Russia, UK, Canada, France, UAE and Poland. Kenya has the closest export link with Somalia.</p> <p>Compliance to market requirements (standards): none of the interviewed farmers were GLOBAL GAP certified limiting access to international markets.</p> <p>Marketing channels and income;</p> <p>The most popular market outlets for chillies were processors (52%) and aggregators/brokers (41%) as they account</p>	<p>Certification and market linkages to increase quality and quantity.</p> <ul style="list-style-type: none"> Support exporters to review and optimize new markets opportunities especially the dried chillies market in the USA, Netherlands, and Germany among others. Support exporters to enhance compliance and optimize production and processing capacity to competitively exploit the fresh chillies markets in the Netherlands, UK, Germany, USA and other markets 	<ul style="list-style-type: none"> Increase of regional, international trade volume for chillies of targeted farmers and enterprises. 	
	<ul style="list-style-type: none"> Farmer trainings on GAP (GLOBAL GAP); Integrated Pest Management, Biological Control of Pests. Promote groups certification under GLOBAL GAP option 2. Link farmers to certifying agencies. Traceability: strengthen/upgrade the traceability system to reflect market needs. 	<ul style="list-style-type: none"> Percentage increase in number of GLOBAL GAP certified chillies farmers participating in the international markets 	
	<ul style="list-style-type: none"> Strengthen direct linkages between farmers and exporters. Support formation and or strengthening of producer groups for produce 	<ul style="list-style-type: none"> Percentage increase of farmers having signed supply 	<ul style="list-style-type: none"> Kajiado (Price)

for about 93%. 7% of interviewed sold their chillies through producer groups. Directly working with processors is a step in the right direction that will contribute towards enhanced compliance to food safety standards.

Kajiado farmers sells fresh chillies at KES 43 per Kg with an average income of KES 143,814 per acre. In Busia, sells dried chillies at KES 218 per Kg with an average income of KES 555,343 per acre.

2. Production

The overall yield is 3,120 Kgs against a potential of 5,500 Kgs per acre. Overall area under chilies per farmer is 1.2 acres out of 3.1 acres operated by the households. Some of the key constraints leading to low yield and quality includes:

- Limited access to certified inputs.
- Low uptake of good agricultural practices negatively affecting productivity and food safety
- Limited land under crop
- False Codling Moth greatly affects production

aggregation and collective marketing to improve farmer bargaining power and compliance to market standards

agreements directly with exporters and complying to market standards

- Percentage increase in income per acre

Productivity, quality and food safety; target to increase productivity (yield per acre) and food safety through:

- Accelerate uptake of good agricultural practices and improved access to, demand & effective use of certified inputs and smart farming technologies (through training in farmer field schools, extension services, collective input purchase by farmers & financial access as highlighted in 4 below).
- Build farmers' entrepreneurial capacity to run chillies production as a business adopting market driven production. Demand should guide development of planting calendars to support consistent production.
- Work with competent authorities and county governments for policy/regulation formation and enforcement such food safety policy.
- Work on efficient and effective False Codling Moth management

- Percentage increase in production of safe, quality chillies (yield) per acre

- Busia (Yield and quantities)
- Kajiado (yield & quantities)

3. Harvesting, post-harvest management and processing

On average 16% of chillies in Kajiado are lost at farm level compared to 2% in Busia as the latter dries their produce for the market. This indicates the need to upscale drying of chillies as the market is readily available.

4. Institutional arrangement & access to support services

Kajiado County chili farmers do not belong to any crop farmer organization. In Busia County however, 39.39% of the chili farmers have crop farmer organization membership; overall 79% of farmers individually source farm inputs.

Financial access: 42% of farmers have accessed finance mainly in Busia county at 60%. Working directly with a processor, contributed to Busia farmers accessing credit for procurement of farm inputs.

Extension services: on average farmers had 3.68 contacts with extension officers per annum.

Effective and efficient post-harvest management

- Identify & support drying technologies in while developing markets for the products (demand is readily available)
- Trainings of exporters on GHP, FSSC22000, ISO 14001; ISO 45001:2018, traceability, packaging & labelling
- Percentage reduction in post-harvest losses.

Support formation & strengthening of farmer organizations to facilitate farmers access to essential services

- Encourage farmers to form groups for easier access to services and inputs capitalizing on their economies of scale.
 - Promote blended extension services e.g. Spray service providers (SSPs) providing market information. This could be through trainings by the competent authorities such as HCD.
 - Financial literacy & linkages (tripartite agreements e.g. among banks, farmers and exporters) and tailor made financial products (e.g. cold storage facilities asset financing)
 - Promote smart services e.g. digital financial services for example Digi Farm & Agri Wallet.
- Number of farmers consistently/easily accessing essential support services.

3.0 HERBS VALUE CHAIN

3.1 Macro environment

3.1.1 Value chain description

Herb also known as herbaceous plant, is considered as one of the high value horticultural crops worldwide. The commonly grown herbs across the world include Chives, Rosemary, Dill, Marjoram, Basil, Mint, Parsley, Coriander, Curry leaves and Celery.

The growing interest of consumers for natural, healthy products as well as gastronomic experiences has enabled fresh herbs to gain popularity. The preferences and consumption of herbs vary across Europe but the overall trade value is increasing with a stable import from non-European suppliers.



Figure 5: Basil

3.1.2 Value chain actors and their role

The key actors along Herbs value chain in Kenya includes producers (mainly medium and large scale farmers), processors (who also act as exporters), importing agents, wholesale and retailing (Supermarkets, wholesale stores and digital platforms), consumers, influencers and supporting institutions/facilitators.

Table 7: Herbs value chain actors and their role

	Value chain node	Actors	Role
Direct actors	Consumer	Consumers	<ul style="list-style-type: none"> Buy from producers, local markets & supermarkets for consumption
	Wholesale & retailing	Traders, supermarkets, wholesale & retail stores, digital platforms	<ul style="list-style-type: none"> Share planting programs Buy from producers & exporters and sell to consumers
	Import	Importing agents (for the international markets)	<ul style="list-style-type: none"> Imports from diverse regions and distributes to wholesalers and retailers
	Export	Freight agents & airlines	<ul style="list-style-type: none"> Exports logistics
	Processing	Exporters	<ul style="list-style-type: none"> Source raw materials, process at either company owned or leased facilities and markets in the local, regional and international markets
	Aggregation & transportation	Aggregators/traders & producer organizations	<ul style="list-style-type: none"> Aggregates produce from producers, stores at collection centres and transports or distributes to exporters, wholesalers and retailers.
	Producers	Small, medium and large scale growers	<ul style="list-style-type: none"> Production

	Value chain node	Actors	Role
	Input supply	Manufactures/importers, distributors, agro dealers/stockists	<ul style="list-style-type: none"> Sell inputs to producers and where possible provide advisory services.
Support system	Facilitators	National and county governments ministries and departments; competent authorities (A.F.A., KEPHIS, KEBS); Business associations (such as FPEAK, FPC, KAM); Financial institutions (Banks, SACCOs); Packaging materials suppliers; utility providers; research and learning institutions (Universities, ATVETs); private service providers (e.g. SOCCA); development organizations; certification bodies (GLOBAL GAP)	<ul style="list-style-type: none"> Regulation and policy making Support services to actors along the chain (such as extension services, financial access)

Source: Survey findings

The planting programs guide production where in a case of contractual agreement between an exporter and farmers (the common practice in the subsector is sourcing from medium scale growers), the market requirements flows as below:

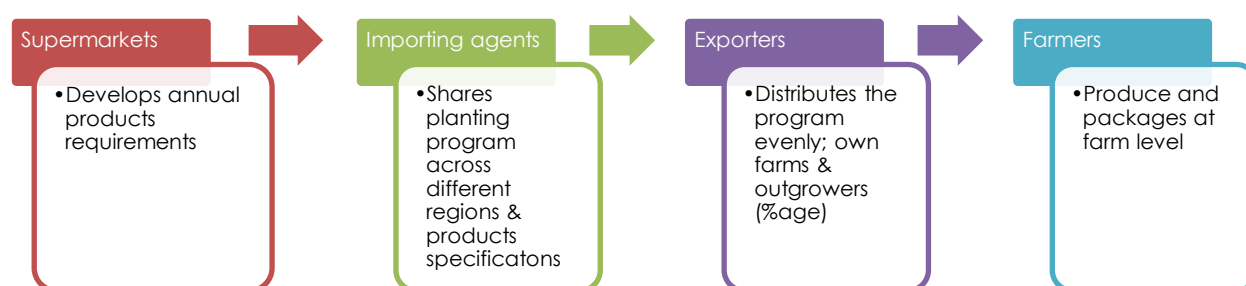


Figure 6: Planting programs guide for herbs

Source: Survey findings

3.2 Demand analysis

3.2.1 Competitiveness of the value chain

In 2019, Kenya exported approximately 17,054 tons of herbs valued at 50,728 thousand Euros. The UK, Netherlands, France, UAE and Somalia are key importers of Kenya's herbs. Kenya's share of world market for herbs is negligible as it only commanded 2% market share in 2019.

United Kingdom is the key market for Kenya herbs (Figure 7). Netherlands and UAE are major re-export and distribution centres.

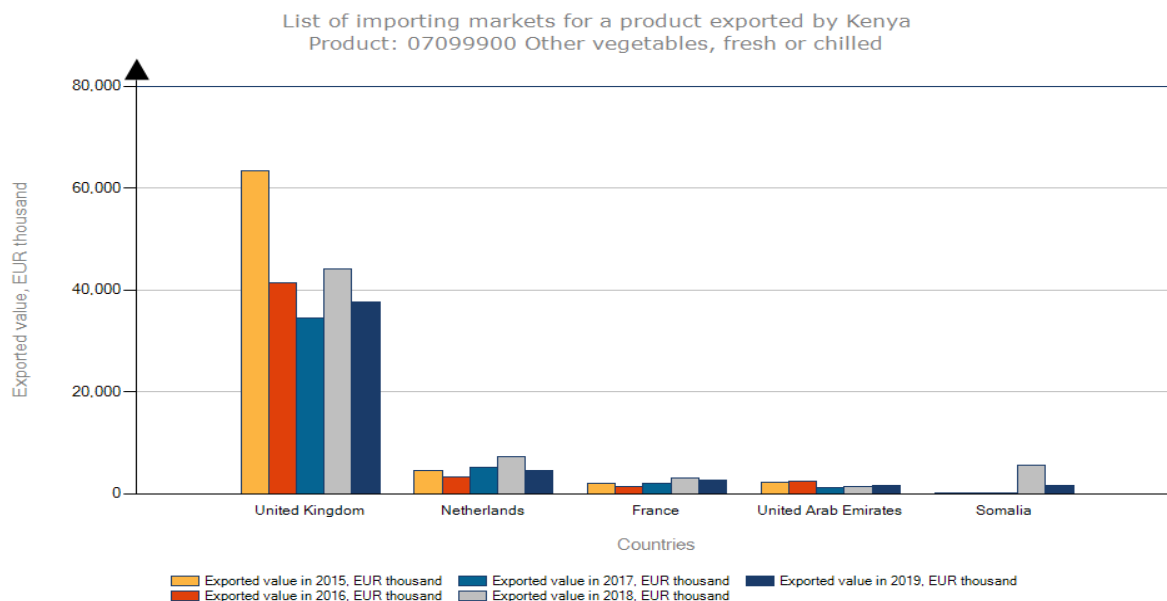


Figure 7: List of importing markets for Kenyan herbs

Source: ITC

Consumption patterns

According to the study findings, in the Kenya the export oriented herbs are grown for income purposes. Herbs are consumed as a food spice both in its raw unripe and cooked state and as a medicine (herbal medicine).

3.2.2 Market requirements and operating environment

The study sought to understand compliance to market requirements specifically GLOBAL GAP certification. It was realized that only 29% of the farmers were GLOBAL GAP certified limiting full exploitation of the export potential.

3.2.3 Competition

Kenya's global market share for herbs was approximately 2% in 2019. Italy had the largest global export market share for herbs (15%), followed by the Netherlands (14.2%), China (13.4%), Mexico (7.4%) and USA (6.1%).

3.2.4 Marketing and trade

Export oriented herbs are sold directly to the exporters mainly under contractual agreements between exporters and growers.

Prices varied across different types of herbs but the reported average price for assorted herbs was KES 300 which was uniform across the counties. Farmers reported different average income for different types of herbs. The most earning herb was chives with KES 400 followed by Basil at KES 300. Farmers who planted Mint and Rosemary reported an income of KES 250 per Kg. The overall average income per acre per month was KES 195,525. Nakuru farmers reported an average of KES 180,000 per acre of herbs which less compared to KES 210,000 reported by Kajiado farmers.

3.2.4 Key market growth potential; unmet market demand

According to the ITC export potential data, Somalia, United Kingdom and United Arab Emirates have the greatest potential for Kenya's exports of herbs. Somalia is the market with the highest demand potential (Figure 8).

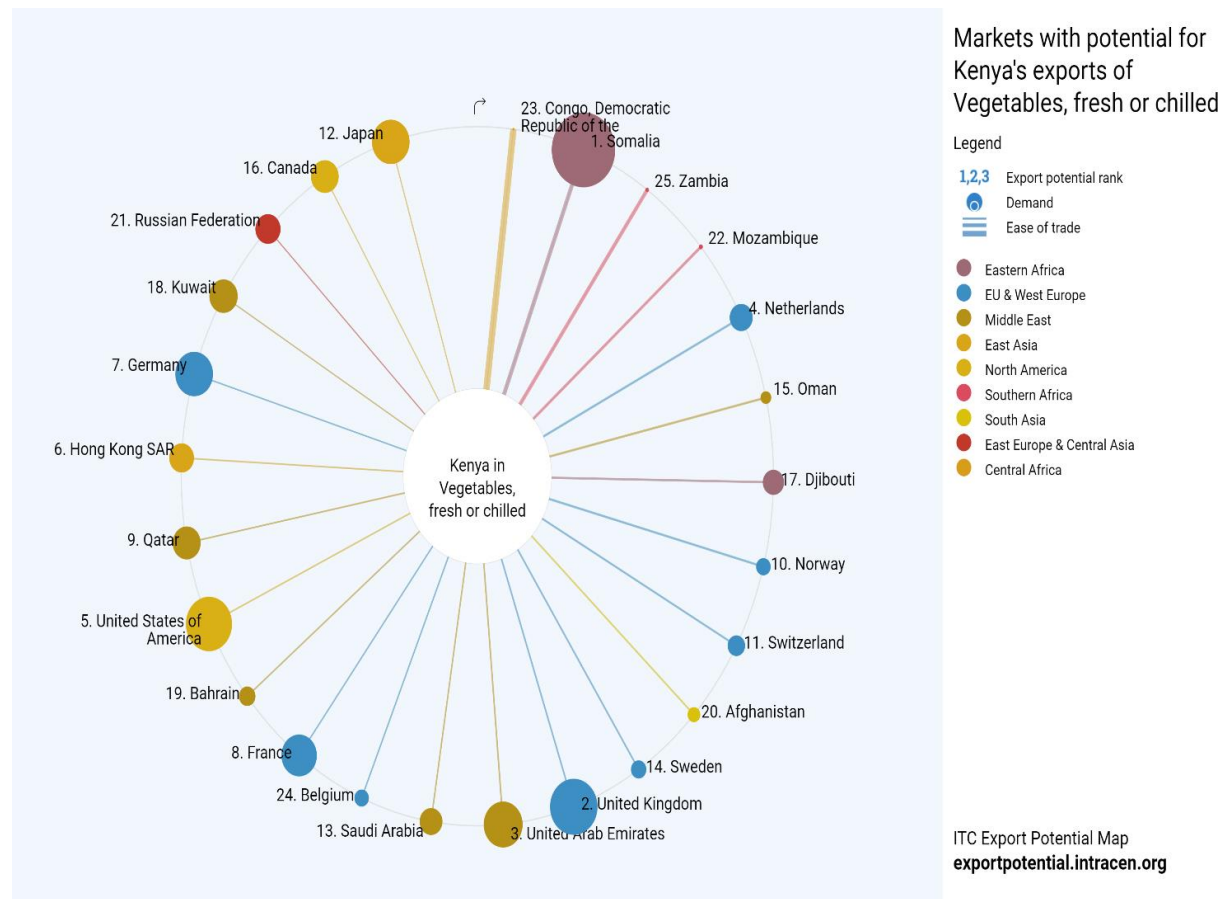


Figure 8: Markets with potential for Kenya's Export for Herbs

Source: ITC

3.3 Supply chain analysis

3.3.1 Demographic characteristic

The overall average age of the household decision makers producing herbs was 51 years. The household sizes in both counties had an average of 6 members. Out of the six members, at least 3 members were earning income. The study further divided the household members into two major categories, that is, those members under 18 years and those above 18 years. It was revealed that on average, at least 3 members of the household are less than 18 years of age.

3.3.2 Production

The sampled respondents under herbs production were from Kajiado (4) and Nakuru (3) Counties. Farmers reported to grow herbs only on own land. The total land size operated by the herbs farmers was approximately 4.75 acres in overall with 1.5 acres covered by herbs representing about 5.68% of the total operated land. This shows that there is still potential for expansion of herbs production.

Access of agricultural Inputs

Farmers interviewed operates individually hence sources for inputs individually. However, it was noted that since the herbs are largely grown under contract, the exporters and or consultants guide the farmers on procurement and effective use and application of inputs.

Use of farming technology

The high value herbs such as chives and basil are grown under greenhouse while products such as mint and rosemary are grown in the open field. Farmers reported ability to grow throughout the year based on the market requirements.

The herbs farmers have adopted use of certified seeds to optimize production.

Access to labour

Like in other vegetables, herbs too are labour intensive enterprise. This is due to the periodic harvesting (usually after two to three weeks) once they have hit the maturity. Both hired and family labour were used in herbs production.

Current yield per Acre

Interviewed farmers reported an average of 650 Kg per acre of assorted herbs (basil, mint and rosemary) per month. This is against the optimal productivity which should be 1500 Kg per acre. Kajiado farmers registered the highest (700Kg) per acre compared to Nakuru (600 Kg).

3.3.3 Post harvest and logistics to pack house

Farmers reported exceptionally high levels of post-harvest losses due to novel COVID-19 as the put restrictions curtailed the international flights for exportation purposes. However, normally the average post-harvest losses were 45%; mainly grade outs.

Like other crops, herbs should be cooled down after they are harvested and packed. While species vary in their requirements for storage temperatures, most importantly basil should not be stored below 50° F to avoid chilling injury; most other herbs can be stored at cooler temperatures (32 to 35° F) to maintain quality. It was noted that farmers have cold storage facilities in their farms to minimize post-harvest losses.

3.3.4 Processing

Exporters interviewed and farmers alike indicated they pack at the farms to improve on product quality. Hence there is packaging at both Nakuru and Kajiado counties where packed products are directly delivered to the airport.

3.3.5 Exports operations

Exporters indicated they heavily rely on JKIA to export their consignments. However, they sell their products on FOB terms hence the importers cater for the freight charges.

3.4 Value chain upgrading strategy recommendations.

The table below summarizes key value chain opportunities and constraints with respective recommendations (inclusive of specific activities) and key performance indicators.

Table 8: Key herbs value chain opportunities and constraints

Opportunities and constraints	Recommendations and activities	Key performance indicators (KPIs)	County specific priority areas
<p>1. Marketing</p> <p>Untapped markets: the growing interest of consumers for natural, healthy products as well as gastronomic experiences has enabled fresh herbs to gain popularity and Kenya has untapped market potential.</p> <p>Somalia, United Kingdom and United Arab Emirates have the greatest potential for Kenya's exports of herbs</p> <p>Compliance to market requirements (standards): 29% of the interviewed farmers were GLOBAL GAP certified limiting access to international markets.</p> <p>Marketing channels and income: Farmers are directly contracted by exporters where the former do not only produce but also packages at source.</p>	<p>Certification and market linkages to increase quality and quantity.</p> <ul style="list-style-type: none"> Support exporters to review and optimize new markets opportunities including but not limited to processed herbs to mitigate against shocks like huge products losses as a result of COVID 19 restricting international freights. Support exporters to enhance compliance and optimize production and processing capacity to competitively exploit the fresh herbs markets like in the UK. 	<ul style="list-style-type: none"> Increase of regional, international trade volume for herbs of targeted farmers and enterprises. 	
	<ul style="list-style-type: none"> Farmer trainings on GAP (GLOBAL GAP); Integrated Pest Management, Biological Control of Pests. Promote certification Link farmers to certifying agencies. Traceability: strengthen/upgrade the traceability system to reflect market needs. 	<ul style="list-style-type: none"> Percentage increase in number of GLOBAL GAP certified herbs farmers participating in the international markets 	
	<ul style="list-style-type: none"> Upscale herbs growers and exporters contractual arrangements 	<ul style="list-style-type: none"> Percentage increase of farmers having signed supply agreements directly with exporters and complying to market standards 	

The overall average income per acre per month was KES 195,525.

- Percentage increase in income per acre

2. Production

The overall yield is 650 Kgs per acre per month against a potential of 1,500 Kgs. Average area under herbs per farmer is 1.5 acres out of 4.75 acres operated by the households. Some of the key constraints leading to low yield and quality includes:

- Limited access to markets
- High capital investments on technologies such as greenhouses limiting production.
- Medium uptake of good agricultural practices due to farms technical teams' capacity.

Productivity, quality and food safety; target to increase productivity (yield per acre) and food safety through:

- Accelerate uptake of good agricultural practices and improved access to, demand & effective use of certified inputs and smart farming technologies (through training of the herbs farmers' technical teams)
- Promote innovative technologies to reduce capital expenditure and growing costs
- Markets development as highlighted in 1 above

- Percentage increase in production of safe, quality herbs (yield) per acre

- Kajia do (Yield and quantities)
- Naku ru (yield & quantities)

3. Harvesting, post-harvest management and processing

On average 45% of herb are graded out at the farms. The percentage could be higher where there are not effective and efficient cold storage facilities.

Effective and efficient post-harvest management

- Identify & support innovative storage and packing facilities at the farms that would lead to extended shelf life of fresh herbs
- Trainings of exporters on GHP, FSSC22000, ISO 14001; ISO 45001:2018, traceability, packaging & labelling

- Percentage reduction in post-harvest losses.

4. Institutional arrangement & access to support services

Technical teams capacity development

The farmers operate individually and majority have contracted agronomists to manage the farms.

- Build capacity of the agronomists contracted by farmers.
- Through upscaling contractual arrangements between exporters and farmers, the latter will be able to use the contracts to secure credit from financial institutions.

Number of farmers consistently/easily accessing essential support services.

Source: Survey findings

ANNEX
Data set