

Kenya MARKUP - Market Access Upgrade Programme

Nuts (Macadamia and groundnuts) sub sector AS IS value chain analysis





ABOUT THIS REPORT

UNIDO commissioned groundnuts and macadamia value chain analysis in Kenya under the Market Access Upgrade Programme. The study focused on nuts in 5 Kenyan counties: Busia, Siaya and Homabay for groundnuts and Embu and Bungoma for Macadamia.

This report presents findings of the study on groundnuts and macadamia 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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ACRONYMS AND ABBREVIATIONS

AFA	Agriculture and Food Authority
ASEAN	Association of Southeast Asian Nations
ATVET	Agriculture Technical Vocational Education and Training
BRC	British Retail Consortium
EAC	East African Community
EU	European Union
FPC	Fresh Produce Consortium
FPEAK	Fresh Produce Exporters Association of Kenya
FSSC	Food Safety System Certification
GAP	Good Agricultural Practice
GHP	Good Hygiene Practices
HCD	Horticultural Crops Directorate
IFS	Food Standard
IMF	International Monetary Fund
IPM	Integrated pest management
ISO	International Organization for Standardization
ITC	International Trade Centre
JKIA	Jomo Kenyatta International Airport
KAM	Kenya Association of Manufacturers
KEBS	Kenya Bureau of Standards
KEPHIS	Kenya Plant Health Inspectorate Service
KES	Kenya Shilling
Kg	Kilogram
KPI	Key Performance Indicator
MARKUP	Market Access Upgrade Programme
MFAK	Macadamia Farmers Association of Kenya
MT	Metric Tonne
NOCD	Nuts and Oil Crops Directorate
NUTAK	Nut Traders Association of Kenya
ODK	Open Data Kit
SACCOs	Savings and Credit Co-Operative Society
Socaa	Society of Crop Agribusiness Advisors of Kenya
SSPs	Spray service providers
UAE	United Kingdom and United Arab Emirates
UK	United Kingdom
UNECE	United Nations Economic Commission for Europe
UNIDO	United Nations Industrial Development Organization
USA	United States of America
USD	United State Dollar
VC	Value Chain
WRMA	Water Resources Management Authority

EXECUTIVE SUMMARY

Macadamia Value chain

Demand

At 11% of the global market share, Kenya was the third largest exporter of shelled macadamia nuts behind South Africa (33.8%) and Australia (25.6%) in 2019. Kenya exported 5,310 MT of shelled macadamia nuts valued at 64,482 thousand Euros. United states of America was the largest importer at 3,398 MT, followed by Germany and Netherlands at 673 and 489 MT respectively.

Despite a negative 17% growth in export volumes between the years 2018-19, Kenya experienced strong growth from 2015 through 2018 of 31%, 13% and 5% respectively. The drop in volumes in 2018-19 is attributed to limited supply of macadamia from farmers as demand continue to outstrip supply. Kenya has untapped market potential where according to ITC export potential data, key un exploited markets include the United States of America, Netherlands, China, Hong Kong, Pakistan, United Kingdom, Germany among others.

While improvement of production quantities is critical to meet the demand, commensurate to that should be supporting farmers meet market requirements such as GLOBAL GAP certification where none of the interviewed farmers was certified. The study established that most producers sold their macadamia nuts through brokers/middlemen who take about 70% of the product while the farmer groups and exporters purchase the remaining 30%. The average farm gate price per Kg was KES. 90 and an average annual income per farmer being KES 60,649.

Supply

The analysis covered two counties namely Embu and Bungoma with a sample size of 53 and 23 respectively totalling to 76 farmers. Average area under macadamia per farmer is 1.9 acres. On average, a farmer produced 16 Kgs per tree per year against a potential of over 50 Kgs. This translated to an average of 699 Kgs per farmer per year. Some of the key constraints leading to low yield and quality includes:

- Limited access to quality seedlings
- Low uptake of good agricultural practices negatively affecting productivity and food safety
- Limited land under crop

Farmers reported low post harvest losses at farm level of 4%. While this is commendable, the exporters reported achieving a processing yield of 14% (nuts from out-growers) compared to 24% from their orchards. The major reason is farmers deliver most of the produce to the processors due to high demand. Low processing yield explains the big disparity between the average farm gate price of KES 90 per Kg compared to the average selling price of 13 Euros (KES 1,477) per Kg at the international market.

Institutional arrangement & access to support services

Only 11% of farmers are members of farmer organizations. Hence farmers operate individually on both marketing and production (89% of farmers individually source farm inputs). 21% of farmers had accessed finance mainly for inputs and had an average of 3 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.		
 Support exporters to review and optimize new markets opportunities. Support exporters to enhance compliance and optimize production and processing capacity to meet the rising demand. 	 Increase of international trade volume for macadamia of targeted farmers and enterprises. 	
 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. 	Percentage increase in number of GLOBAL GAP certified macadamia farmers participating in the international markets	
 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 	 Percentage increase of farmers having signed supply agreements directly with exporters and complying to market standards Percentage increase in income 	• Embu (Price)
Productivity, quality and food safety; target to increase productivity (yield per acre) and food safety through:		
 Strengthen Agri-Research Institutions to promote production of clean planting materials and selection of marketable varieties suitable for each county. Establishment & registration of economically viable (business entities) fruit nurseries that will provide high quality seedlings to farmers consistently at county level. 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). 	 Percentage increase in production of safe, quality macadamia (yield) per tree per year 	 Embu (Yield and quantities) Bungoma (yield & quantities)

Effe	ective and efficient post-harvest anagement		
• •	Work on improving production yield per tree as per 2 above. Trainings of exporters on GHP, FSSC22000, ISO 14001; ISO 45001:2018, traceability, packaging & labelling	 Percentage increase of processing yield from out- growers' macadamia 	
Su org es:	oport formation & strengthening of farmer ganizations to facilitate farmers access to sential services		
• •	Encourage farmers to form groups for easier access to services and inputs capitalizing on their economies of scale. Promote blended extension services	Number of farmers consistently/easily accessing essential support 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, tarmers and exporters) and tailor made financial products Promote smart services e.g. digital financial services for example Digi Farm & Agri Wallet.		

Groundnut Value chain

Demand

Kenya is a net importer of groundnuts. In 2019, groundnuts (16,793 MT) worth 704 thousand Euros were imported from among others Malawi, Tanzania and Uganda. It is against this backdrop that the country has had to first (exported only 118MT) satisfy local demand before exporting to countries such as North America, East Asia, Middle East, Eastern Africa, Central Africa, Pacific south Asia, ASEAN, East Europe, Central Asia and southern Africa which according to ITC, have unmet export potential.

Producers interviewed sold their produce individually with few logistics of ferrying the produce to the market. Brokers formed the largest buyers of groundnuts (86%) while the rest were sold through farmer cooperative/producer group (14%). The average price of groundnuts at farm level averaged KES 109 per Kg leading to an average farmer's income per acre of KES. 50,680.

Supply

The analysis covered three counties namely Busia, Siaya and Homa Bay with a sample size of 29, 39 and 19 respectively totalling to 87 farmers. Average land under groundnuts was 0.83 acres out of an average of 2.83 acres operated by the household. The farmers reported average yield of 466 Kgs per acre against a potential of 600 -1,088 Kgs per acre (depending on the variety). Some of the key constraints leading to low yield and quality includes:

- Use of recycled seeds (78%)
- Low uptake of good agricultural practices negatively affecting productivity and food safety (e.g. soil testing at 21.8%)
- Limited land under crop

Out of total production, 6% of produce was spoilt and lost at farm level mainly due to poor storage facilities.

Institutional arrangement & access to support services

According to the study findings, only 20% of the farmers reported belonging to a producer group. The majority also preferred to transact individually (90%) as opposed to collectively (10%).

Farmers have access to a number of services that assist them in crop production and marketing. Among these services are extension services where on average farmers had 2.26 contacts with extension officers and access to finance at 24%.

Recommendations and activities	Key performance indicators (KPIs)	County specific priority areas
Certification and market linkages to increase quality and quantity.		
 Support farmers build production volumes and quality as in 2 below to exploit the domestic, regional and international market. Support exporters to enhance compliance and optimize production and processing capacity to meet the rising demand 	 Increase of domestic, regional and international trade volume for groundnuts of targeted farmers and enterprises. 	
 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. 	 Percentage increase in number of GLOBAL GAP certified groundnut farmers participating in formal markets 	
 Strengthen direct linkages between farmers and processors Support formation and or strengthening of producer groups for produce aggregation and collective marketing to improve farmer bargaining power and compliance to market standards 	 Percentage increase of farmers having signed supply agreements directly with processors and complying to market standards Percentage increase in income 	 Busia (Price) Homa Bay(Price) Siaya (Price)
Productivity, quality and food safety; target to increase productivity (yield per acre) and food safety through:		

Value chain upgrading strategy recommendations

 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 groundnut production as a business adopting market driven production. Work with competent authorities and county governments for policy/regulation formation and enforcement such food safety policy 	Percentage increase in production of safe, quality groundnut (yield) per acre	 Siaya (Yield and quantities) Homa Bay (yield & quantities) Busia (yield & quantities)
Effective and efficient post-harvest management		
 Identify & support investment opportunities to address postharvest spoilage such as recommended storage facilities Efficient and effective aflatoxin management and control management 	 Percentage reduction in post- harvest losses 	
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 Promote smart services e.g. digital financial services for example Digi Farm & Agri Wallet. 	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 macadamia and groundnuts in 5 counties in Kenya. These are Embu and Bungoma for macadamia and; Busia, Siaya and Homabay for the groundnuts. 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, chilies, 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	Macadamia	Embu and Bungoma	Target counties and Nairobi
2	Groundnuts	Busia, Siaya and Homabay	Target counties and Nairobi

2.0 MACADAMIA VALUE CHAIN

2.1 Macro environment

2.1.1 Value chain description



Figure 1: Macadamia nuts

2.1.2 Value chain actors and role

Macadamia is considered the world's finest dessert nut because of its delicate taste and health benefits such as antioxidant properties. The three species with commercial importance are Macadamia integrifolia, M. ternifolia and M. tetraphylla.

While native to Australia, the nuts are now grown in many countries, including South Africa, Kenya, the U.S.(Hawaii), China, Guatemala, Malawi, Zimbabwe and Brazil.

This report focuses on Embu and Bungoma Counties in Kenya.

The Kenyan macadamia value chain comprises of producers (smallholders, medium scale and large scale farmers/ plantations), aggregators (traders and associations), processors (who also export), influencers, and supporting organizations (Table 2). The key influencers are the county governments, A.F.A., the Nuts and Oil Crops Directorate (NOCD), 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. The Macadamia sector is regulated by the Crops Act 2013 and the Kenya Agriculture and Livestock Research Act.

	Value chain node	Actors	Role
	Consumer	Consumers	Buy from producers, local markets & supermarkets for consumption
	Wholesale & retailing	Traders, supermarkets, wholesale & retail stores, digital platforms	Buy from producers, aggregators, processors and sell to consumers
tions	Import	Importing agents (for the international markets)	 Imports from diverse regions and distributes to wholesalers and retailers
ct ac	Export	Freight agents & airlines	Exports logistics
Dire	Processing	Exporters and processors	• 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	Aggregates produce from producers, stores at collection centres and transports or distributes to exporters, wholesalers and retailers.

Table 2: Macadamia value chain actors and their role

	Value chain node	Actors	Role
			 Small collecting agents (around 3,000 of them) Farmer producer groups, e.g., Macadamia Farmers Association of Kenya (MFAK) with more than 10,000 farmers and The Nut Traders Association of Kenya (NUTAK) with over 250,000 farmers,
	Producers	Smallholder farmers, medium and large scale plantations	 Production Around 200,000 farmers and largescale producers/plantations (Kenya Nut Company, Equatorial Nuts, Wonder Nut International, and Kakuzi).
	Input supply	Manufactures/importers, distributors, agro dealers/stockists	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. SoCAA); development organizations; certification bodies (GLOBAL GAP)	 Regulation and policy making Support services to actors along the chain (such as extension services, financial access)

Source; Study findings

2.2 Demand analysis

2.2.1 Competitiveness of the value chain

In 2019, at 11% of the global market share, Kenya was the third largest exporter of shelled macadamia nuts behind South Africa (33.8%) and Australia (25.6%). Kenya exported 5,310 MT of shelled macadamia valued at 64,482 thousand Euros. United States of America was the largest importer at 3,398 MT, followed by Germany and Netherlands at 673 and 489 MT respectively.

Despite a negative 17% growth in export volumes between the years 2018-19, Kenya experienced strong growth from 2015 through 2018 of 31%, 13% and 5% respectively (Table 3). The drop in volumes in 2018-19 is attributed to limited supply of macadamia from farmers as demand continue to outstrip supply.

Importers	2015	2016	2017	2018	2019
	Exported quantity, Tons	Exported quantity, Tons	Exported quantity, Tons	Exported quantity, Tons	Exported quantity, Tons
World	4,153	5,424	6,125	6,408	5,310
United States of America	2,561	3,006	3,904	3,755	3,398
Germany	381	427	572	983	673
Netherlands	648	990	603	660	489
Japan	127	240	237	173	285
Viet Nam		27	154	188	92
United Kingdom		26	48	15	67
Canada	141	16	6	100	51
Hong Kong, China	28	345	256	107	49
Israel	64	74	42	81	48
Australia	14	76		16	33

Table 3: Macadamia export quantities from Kenya in the last five years

Source: ITC

According to this study, only 4 percent of the produced macadamia in Embu and Bungoma Counties were consumed at home or given out. Approximately 91% were sold, while 4% got spoiled. The high percentage of sales by farmers indicates their commercial orientation as a result of high global demand.

2.2.2 Market requirements and operating environment

Importing countries require producers to comply with multiple production, social and environmental standards, deliver high-quality, traceable macadamia products packaged and labelled clearly) and meet legal requirements. Specific requirements are provided in regulations and standards such as Food Standard (I.F.S.), Food Safety System Certification (FSSC22000), United Nations Economic Commission for Europe (UNECE), British Retail Consortium (B.R.C.) and local quality standards from government regulatory authorities

Out of the farmers interviewed none was GLOBAL GAP certified. Therefore, there is need to support farmers comply to market requirements.

2.2.3 Competition

Despite being 3rd largest macadamia exporter in 2019, volumes are comparatively low. South Africa and Australia produce and export the most, with shares of 33.8% and 25.6% respectively, in 2019. The number of macadamia-producing counties has increased in the last 10 years from 16 in 2010 to 22 in 2019 which is a move in the right direction to assist exploit the global demand.

Locally, consumption levels of Macadamia Nuts were low due to various factors, including culture, consumer purchasing powers, and availability.

2.2.4 Marketing and trade

Macadamia nuts marketing in Kenya is highly unstructured, with the majority of farmers selling their products individually.

According to this survey, most producers sold their macadamia nuts to brokers/middlemen who take about 70% of the product while the farmer groups and exporters purchase the remaining 30%. This is attributed to low quantities of produce for most farmers, lack of farmer organization, poor road infrastructure, which increases operational costs among other factors.

There are usually no formal contracts between the farmers and the buyers, with only 26.7% of the farmers reporting to have a signed contract. The majority of the farmers had not signed any contract in the past year. Most farmers (73,3%) that had signed contracts stated that some of their contracts were partially defaulted. The leading causes of the contract's default include weather challenges, better prices, and the buyer's lack of collection. Most contracts were seasonal (76%), while others were annual (24%).

Average price and income

The study established that the average farm gate price per Kg was KES. 90 (KES 77 in Embu and KES 120 in Bungoma). The average income per farmer per year was KES 60,649.

2.2.5 Key market growth potential; unmet market demand

Kenya has untapped market potential where according to ITC export potential data, key un exploited markets include the United States of America, Netherlands, China, Hong Kong, Pakistan, United Kingdom, Germany among others (Figure 2). The local demands for the product is also rising as more Kenyans understand the health benefits of macadamia.



Figure 2: Kenyan nuts export potential Source: ITC

2.3 Supply chain analysis

2.3.1 Production

The majority of the farmers in Embu and Bungoma Counties had been producing macadamia for over 11 years at the time of this survey. The average land operated by the household was slightly higher in Bungoma County (2.91 acres) compared to Embu County (2.19 acres).

However, when it came to land under agriculture, Embu county had an average of 2.12 acres, which was higher than Bungoma county's 1.63 acres. Most of the farmers in Bungoma County (86.96%) and Embu county (96.23%) counties had title deeds. 100% of farmers in Embu county owned their land. Farmers had planted three varieties of Macadamia; Integrifolia, Ternifolia, and Tetraphylla. The Integrifolia macadamia variety was more popular Figure 3: Variety of Macadamia Planted amongst the producers (55.60%) as compared to the



Ternifolia and Tetraphylla (Figure 3). For planting, 69,7% of farmers sourced seedlings from community nurseries or propagated their own, most of which were not certified and of unknown quality.

Crop nutrition and protection

Most farmers used compost manure for their cropland Embu (81.13%) and Bungoma (73.91%) to improve soil structure and nutrition. On crop protection, the decision to apply agrochemicals in the farms was informed by scouting (72%), follow the chart (26.67%), or after time period (1.33%) and most farmers (89.33%) bought chemicals in sealed containers. While applying, the farmers mix different chemicals in one tank (Bungoma County at 68.18% and Embu County at 77.36%). The percentage of farmers who used a incomplete set of equipment ranged from 23.08% in Embu County to 62.50% in Bungoma County. A low proportion of farmers in Embu County (7.55%) and Bungoma County (36.36%) had dedicated knapsack that is separate for crops and livestock.

Access to labour and Inputs

Most farmers (40.91%) in Bungoma County had labor challenges compared to 9.43% in Embu County. Producers relied more on family labor in all production processes, except for planting, where hired labor exceeded family labor (Figure 4). This was attributed to farmers' limited knowledge on the selection and propagation of quality seedlings, hence hired professionals to assist.



The highest labor costs were incurred during harvesting, planting, agro-inputs application. Men were mostly involved in seedlings, sourcing pruning, harvesting and marketing; with females playing the role of labor provision in planting, inputs application and post-harvest processing. The majority of farmers weeded twice for the period

before harvesting using either family members or hired labor.

Use of farming technology

There was generally low application of technology in macadamia nuts production. 82.9% of farmers reported that they prepared their land manually. A few farmers used tractor-draw (10,5%), animal-drawn (5.26%), and chemical (1.3%) approaches. The majority of farmers used manual

spraying approaches (97.34%) instead of motorized spraying, thus increasing labor costs and reducing efficiency (Figure 5). Bungoma County (4.55%) compared to Embu County (1.89%). Most farmers in Embu County (92.45%) cleaned the spraying pumps after every Job, contributing to the efficiency and longevity of the sprayers.



Figure 5: Approach of Spraying

The farmers reported they manually harvest the nuts.

Water management

Availability of clean and safe water was one of the critical challenges for farmers, with the primary sources of water for crop farming being rainfall (53.33%) followed by stream water (16.00% and rooftop harvested rainwater (13.33%). Other water sources included rivers, wells, and surface runoff. While the majority of Bungoma county farmers relied on surface runoff rainwater (40.91%), most farmers in Embu county relied on rain-fed agriculture (73.58%).

Less than 5% of farmers had WRMA license for irrigation in their farms. This could be because most of them lack WRMA licenses for water abstraction and did not have a water management plan and records for crop irrigation.

2.3.2 Harvest, yield and Post-harvest management

Due to inadequate resources and knowledge, only 20% of farmers in Embu county and 63.64% of farmers in Bungoma county used exclusive harvest containers.

Current yield per tree

The survey established that most farmers had existing trees for more than five years old and already in production. On average, a farmer produced 16 Kgs per tree per year against a potential of over 50 Kgs. This translated to an average of 699 Kgs per farmer per year.

Post-harvest losses

This study established post-harvest loss of 4%. This mainly occurred during threshing/removal of the husk, especially for most smallholders who manually carry out the activity by crushing with stones or pieces of wood. 52% of farmers experienced losses during grading as some of their products were categorized as unfit for the Market.

There was inadequate record-keeping by farmers.

The macadamia nuts were stored in open stores (56.2%), closed store (17.9%) and in the field (24.1%) which may not have appropriate temperature conditions and had the possibility of contamination. A relatively small percentage of farmers (12%) sold their produce through producer groups; some charged a fee. However, nearly half of the producer groups did not have access to a collection/storage facility. For those who had the storage facilities, the farmers used them on a seasonal basis. Only 25.3% of the farmers used collection centers, most of which were owned by farmer groups.

The majority of farmers used buyer's transportation from farm to market. Other modes of transport included motorcycles, pick-ups, vans, and private cars.

2.3.3 Processing

Kenya exports shelled macadamia which are processed and packaged mainly near the key growing regions on Embu and Muranga. The exporters reported achieving a processing yield of 14% (nuts from out-growers) compared to 24% from their orchards. Seven kilograms of raw nuts from out-growers produce 1 Kg for export compared to 5 Kg from commercial orchards. This could explain the low post harvest losses at farm level (4%) where farmers deliver most of the produce to the processors due to high demand.

2.3.4 Exports operations

Exporters indicated they mainly export their consigments through sea via the Mombasa sea port. Despite this, there are instances where their airlift cargo based on the customers' demand.

2.3.5 Institutional arrangement and access to support services

Group Membership

The proportion of respondents from Embu and Bungoma Counties that were members of crop cooperative/farmer organizations was 0.00% and 36.36%, respectively. It was evident that 100% of respondents from Embu County accessed their farm inputs individually compared to 63% from Bungoma County. Low numbers of farmers in such groups might reduce their bargaining power and ability to work together to improve access to farm inputs and markets.

Credit Access

The mean distance to the bank was 11 kilometers. All the banks had mobile and internet banking services. However, only 38% of farmers had access to digital financial services that they accessed, such as Mshwari and Timiza. The main challenge of accessing digital financial services was lack of interest, lack of knowledge, funds, and security issues. Over 90% of the farmers had access to the M-Pesa system, and 21% had accessed credit facility/loan between 2015 and 2020. The minimum and maximum loans are taken over the last 12 months were KES 8,000 and sh 450,000, respectively, while the average loan was sh 68,000. Most of the loans (81.1%) were replayed in an average time of two years. Sixty-six percent (60%) of farmers were aware of the existence of funding opportunities.

Training and extension

The average number of times the farmers were in contact with extension officers in the last 12 months before this study were 3 times. Only 47.17% of farmers in Embu County and 31.82% of farmers in Bungoma county had access to an average of 2 training services and three extension services per year. Some of the training received included farm management, harvest, post-harvest management, chemical use, agribusiness, and safe use of chemicals. The critical area of support that the farmers needed to be included in the training sessions were; farm inputs, training, financial aid, marketing and irrigation systems. All respondents requested more advice on nut production, weather forecast, and how to access finance.

2.3.6 Environmental analysis

The majority of farmers agreed that enhancing the environment improves climatic conditions that lead to food availability, rainfall, and safe and healthy lives and livelihoods. Macadamia trees have been shown to capture carbon from the environment because of their full foliage, reducing pollution and the greenhouse effect. The plant can optimize water used and help reduce soil erosion (Barrueto et al., 2018). To improve energy efficiency, some farmers use improved jikos and low energy-consuming equipment. While most of them do not have any measure in place for environmental sustainability, most of them, 43.2%, are aware that if they do not make changes to the farm, the production will decrease over the next 20 years.

2.3.7 Gender analysis

The male dominates both on marketing and production of the macadamia across Kenya specifically. This calls for the need for women and youth empowerment. The men predominate the value chain because they had access to resources since most of them provide capital and control resources and revenues. The key areas that women can work on include management, value addition, marketing among others. Youth can participate in the digital agriculture space, provide labor, marketing and research. To enhance youth and women's participation in the V.C., funding, training, mentorship and sensitization were identified as the fundamental strategies.

2.4 Value chain upgrading strategy recommendations.

Table 4 summarizes key value chain opportunities and constraints with respective recommendations (inclusive of specific activities) and key performance indicators

Table 4: Key Macadamia value chain opportunities and constraints

Opportunities and constraints	Recommendations and activities	Key performance indicators (KPIs)	County specific priority areas
1. Marketing	Certification and market linkages to increase quality and quantity.		
Untapped markets; Despite being 3 rd largest macadamia exporter in 2019, volumes are comparatively low and there is untapped market potential. Key un exploited markets include the United States of America, Netherlands, China, Hong Kong, Pakistan, United Kingdom, and Germany among others.	 Support exporters to review and optimize new markets opportunities. Support exporters to enhance compliance and optimize production and processing capacity to meet the rising demand. 	 Increase of international trade volume for macadamia of targeted farmers and enterprises. 	
Compliance to market requirements (standards): none of the interviewed farmers were GLOBAL GAP certified limiting access to international markets.	 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. 	• Percentage increase in number of GLOBAL GAP certified macadamia farmers participating in the international markets	
Marketing channels and income; According to this survey, most producers sold their macadamia nuts to	 Strengthen direct linkages between farmers and exporters. 	 Percentage increase of farmers having signed supply 	• Embu (Price)

brokers/middlemen who take about 70% of the product while the farmer groups and exporters purchase the remaining 30%.

The study established that the average farm gate price per Kg was KES. 90 (KES 77 in Embu and KES 120 in Bungoma). The average income per farmer per year was KES 60,649.

2. Production

The survey established that most farmers had existing trees for more than five years old and already in production. On average, a farmer produced 16 Kgs per tree per year against a potential of over 50 Kgs. This translated to an average of 699 Kgs per farmer per year.

Some of the key constraints leading to low yield and quality includes:

- Limited access to quality seedlings
- Low uptake of good agricultural practices negatively affecting productivity and food safety
- Limited land under crop

3. Harvesting, post-harvest management and processing

Farmers reported low post harvest losses at farm level of 4%. While this is commendable, the exporters reported achieving a processing yield of 14% (nuts

• Support formation and or strengthening of producer groups for produce 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 •

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• Percentage increase in income

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

- Strengthen Agri-Research Institutions to
 promote production of clean planting materials and selection of marketable varieties suitable for each county.
- Establishment & registration of economically viable (business entities) fruit nurseries that will provide high quality seedlings to farmers consistently at county level.
- 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).

Effective and efficient post-harvest management

- Work on improving production yield per tree as per 2 above.
- Percentage increase of processing yield from out-growers' macadamia

from out-growers) compared to 24% from their orchards. The major reason is farmers deliver most of the produce to the processors due to high demand.	 Trainings of exporters on GHP, FSSC22000, ISO 14001; ISO 45001:2018, traceability, packaging & labelling 	
4. Institutional arrangement & access to support services	Support formation & strengthening of farmer organizations to facilitate farmers access to essential services	
Only 11% of farmers are members of farmer organizations. Hence farmers operate individually on both marketing and production (89% of farmers individually source farm inputs)	 Encourage farmers to form groups for easier access to services and inputs capitalizing on their economies of scale. Promote blended extension services 	Number of farmers consistently/easily accessing essential support services.
Financial access; 21% of farmers have accessed finance mainly for inputs.	e.g. Spray service providers (SSPs) providing market information. This could be through trainings by the competent	
Extension services: on average farmers had 3 contacts with extension officers per annum.	 authorities such as HCD. Financial literacy & linkages (tripartite agreements e.g. among banks, farmers and exporters) and tailor made financial products Promote smart services e.g. digital financial services for example Digi Farm & Agri Wallet. 	
Source: Survey findings		

3.0 GROUNDNUT VALUE CHAIN

3.1 Macro environment

3.1.1 Value chain description

Groundnut, also known as peanut, is a species in the legume family (Fabaceae) and among fifteen leading cultivated food crops in the world. It is a high-value crop nutritionally and economically and is the sixth most important oilseed crop in the world. It contains up to 50% oil, 28% protein and is a rich source of dietary fibre, minerals and vitamins.

Groundnut is grown on about 23.95 million Ha worldwide with the total production of 36.45 million tons, and an average yield of 1520 Kg/ha in 2009. Developing countries in Asia, Africa and South America account for about 97% of world groundnut area and 95% of total production. Worldwide,



around 23.79 million hectares are planted to groundnuts, spread as follow: 49.9% in Asia, 44.54% in sub-Saharan Africa, 4.88% in America. The major producers include Nigeria, Senegal, Sudan and Ghana, with Kenya producing lower volumes compared to these countries. In Kenya, groundnut growing areas include Nyanza, Western and Coastal regions. The main varieties are Nyanza Local (Njugu Machon), Red Valencia (Nyahela), Minipintar, Asiriye Mwitunde, Serere and Makulu Red1

Figure 6: Groundnuts

3.1.2 Value chain actors and their role

The key actors along groundnut value chain in Kenya includes producers, processors (mainly cottage industry), wholesale and retailing (Supermarkets, wholesale stores), consumers, influencers and supporting institutions/facilitators (Table 5).

	Value chain node	Actors	Role
	Consumer	Consumers	Buy from producers, local markets & supermarkets for consumption
ct actors	Wholesale & retailing	Traders, supermarkets, wholesale & retail stores, digital platforms	Buy from producers & exporters and sell to consumers
Dire	Processing	Processors (mainly cottage industry)	• Source raw materials, process at either company owned or leased facilities and markets in the local, regional and international markets

Table 5: Groundnut value chain actors and their role

¹ Cilliers, A. (n.d). Groundnut production. Retrieved from https://www.arc.agric.za/arc-gci/Fact%20Sheets%20Library/Groundnut%20Production.pdf

	Value chain node	Actors	Role
	Aggregation & transportation	Aggregators/traders & producer organizations	Aggregates produce from producers, stores at collection centres and transports or distributes to processors, wholesalers and retailers.
	Producers	Small holder farmers	Production
	Input supply	Manufactures/importers, distributors, agro dealers/stockists	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)	 Regulation and policy making Support services to actors along the chain (such as extension services, financial access)

Source: Study findings

3.2 Demand analysis

3.2.1 Competitiveness of the value chain

The largest producers of groundnuts are China and India with a proportion of 41.5% and 18.2% of overall world production respectively, followed by Sub-Saharan African countries and United States of America (6.8%). Even though China and India produce the highest amount of groundnuts, only 4% reaches the international market due to their high domestic demand.

Kenya is a net importer of groundnuts despite being a producer due to higher demand as compared to supply. Major exporters to Kenya include Malawi, Tanzania and Uganda.

Consumption patterns

Groundnut is used for human consumption in the raw, boiled or roasted forms. As edible oil and protein, the nuts are pounded and used as vegetable oil for cooking, or made into a paste and consumed with traditional foods like sweet potatoes, cassava and bananas among others. With the increasing cost of animal protein, groundnuts have become an essential source of protein in Africa, accounting for 38.6 % protein content as well as 47% oil content (Wanyama et al., 2013).

3.2.2 Market requirements and operating environment

Across all consumer markets in Europe, Asia, Middle East and Africa, the main guiding factor for regulation is safety and economics. Regulatory requirements include BRC and FSSC22000 in Europe and the East African Standard 2000 (EAC, 2000). Most regions require buyers to comply with social and environmental responsibility policy and deliver high-quality groundnuts nuts absent of insects, mould, rancidity or damage, characteristic and moisture content not more than 2%. Europe established Non-product-specific EU legislation that relates to packaging and labelling of

food under Regulation 1169/2011 and declaration of allergens. Quality is critical aspect given the globalization and export trends.

However, ensuring quality remains a challenge among chain actors in Kenya. Limited export of groundnuts could have led to none of the interviewed farmers being GLOBALGAP certified.

3.2.3 Competition

Kenya's global market share for groundnuts (shelled, not roasted or cooked) is approximately 0.1% (ranked 47th). India (19.2%) has the largest global export market share, followed by United States (14.6%), Argentina (13.7%), China (11.1%) and Brazil (7.1%). Senegal, Sudan and Egypt have a global export share of 5.8%, 2.9% and 2.9% respectively.

The critical competitors to Kenya have not only price advantage and access to large markets but also product differentiations and adequate resources to empower all actors in the groundnut value chain (Ojiewo, 2020).

The prices vary within and between seasons and by variety across the world. The lowest selling prices are for unshelled products. The global wholesale prices per Kg of groundnuts is around 2.21 USD. The prices increased up until 2018 and then declined in 2019 (IMF, 2019). In Kenya, the estimate wholesale price is USD 1.67 per Kg. At the same time, South Africa prices ranged between 1.31USD and 0.99 USD per Kg (Tridge.com, 2020). In the formal sector, supermarkets or mini-marts are mainly frequented by middle-class consumers with higher prices compared to informal markets.

3.2.4 Marketing and trade

Marketing channels

Studies indicate that marketing of groundnuts in Kenya is done through different channels but without an organized marketing structure. Farmers produce groundnuts, and after harvesting, they dry the peanut pods up to 8 -10 % moisture content level or until the kernels brattle in the pods. The pods are packed in gunny bags weighing approximately 45 -50 Kg dry weight. The packed groundnuts are then sold either to the local market (for seed) or stored for on-farm processing and future sales. They are mainly marketed through farmer to farmer contacts, or through middlemen (Wanyama et al., 2013). Peanut farmer groups and farmer cooperatives also carry out marketing for their members. In the market, groundnuts are sold as boiled, unshelled and shelled roasted nuts while some are sold in the confectionery trade. Value addition technologies are not fully exploited, and most of the groundnuts were sold as whole kernels.

Producers interviewed sold their produce individually with few logistics of ferrying the produce to the market. Brokers formed the largest buyers of groundnuts (86%) while the rest were sold through farmer cooperative/producer group (14%). This study found out that the terms of trade varied from farmer to farmer with the majority of them operating with oral contracts with brokers. More than 48% per cent of the contracts partially defaulted. Of the signed contracts, 51% totally defaulted. The leading causes of default included; buyer did not collect (33.3%), weather challenges (50%) better prices (16.7%). The contract terms were either seasonal (79.3%) or annual (20.7%).

Average price and income

The price of groundnuts at farm level averaged KES 109 per Kg. On average, farmer's income per acre was KES. 50,680. The payment was either through cash (66.7%) or entirely on credit (33.3%).

3.2.4 Key market growth potential; unmet market demand

The markets with potential for Kenya export of groundnut include North America, East Asia, Middle East, Eastern Africa, Central Africa, Pacific south Asia, ASEAN, East Europe, Central Asia and southern Africa.

The production of groundnuts in Kenya does not meet the demand, and the country had to import raw ground-nuts worth 6,704 thousand Euros in 2019. This indicates the strong demand locally that Kenyan producers should exploit.

3.3 Supply chain analysis

3.3.1 Production

The groundnut plant can survive in areas of low rainfall (arid and semi-arid regions) and because it is a legume, it increases soil fertility by fixing nitrogen in the soil. It requires fewer inputs than many other crops, giving a high return per unit of land, and hence is appropriate for small-scale farmers, including women, (Okello, 2010; Mutegi, 2010). Groundnuts in Kenya are mainly grown in western and Nyanza regions. The best planting seasons are February to March and August to September.

Farmers reported to grow groundnuts in both owned and rented in land, with most land under groundnut being owned land (Figure 8). Overall, the average land size under groundnuts production was 0.83 acres. Majority of farmers had title deeds for their parcels of land in the three counties.



Figure 7: Land ownership

There is common use of recycled seeds by groundnut farmers (78%) while others use certified seeds. This is attributed to inadequate access to certified seeds in terms of affordability and availability. Also, groundnuts are open-pollinated and therefore use of recycled seeds is still productive and therefore, most producers go for the farmer saved seeds to lower the cost of production. The germination rate of recycled/second generation seed nevertheless is lower (57%) compared to that of certified seed at 78%. These germination rates were slightly higher in Busia as compared to Siaya and Homabay.

Farmers reported use of manure, fertilizer for both planting and top dressing and pesticides for pest and disease management. Soil testing was highly practiced in Busia county (55.17%) followed by Homabay County (10.53%) and then Siaya County (2.56%))

Most of the producers (over 80%) rely on manual techniques for land preparation, planting, weeding and harvesting. The land was prepared either manually (83.9%), tractor-drawn (13.8%), animal-drawn (1.1%), or through minimum tillage (1,1%). Harvesting was done either manually (97.7%) or using a machine (2.3%). Most farmers (92%) did not use a machine to plant and instead

relied on manual planting method. Manual land preparation was highest in Homabay and Siaya while Busia led in Tractor and animal-drawn power. Among other technologies used are composted manure and soil testing. The most used technology was compost manure (42 per cent) as materials were readily available, affordable and easy to make.

Access to labour

Farmers reported not to have challenges in labour as most of them use mainly family labour and less of hired labour. However, females were used as the primary source of labour on the farm, especially in planting, weeding and harvesting while their male counterparts provided labour on fertilizer and pesticide application. The common methods of weeding groundnuts were hand weeding (95.4%), chemical weeding (2.3%) and animal-drawn weeding (2.3%).

Water management; Groundnuts are mainly grown under rain-fed agriculture with very minimal use of irrigation as reported by 26% of producers.

3.3.2 Harvest, yield and post-harvest management

The farmers manually harvest the groundnuts.

Current yields per acre

The farmers reported average yield of 466 Kgs per acre against a potential of 1.5 tonnes per acre. This is due to low adoption of farm technologies including certified seeds, soil testing and farm machinery. Under optimal conditions, a farmer can harvest up to 1.6 tonnes of groundnuts in an acre piece of land (Ojiewo, 2020).

Out of total production, 6% of produce was spoilt and lost at farm level. Majority of producers lose their produce to lack of storage facility after harvest, transport to the market or as they wait for prices to go up and sell the produce. Among storage facilities used are open and closed stores or left open in the field. Use of open store was the most common (82 per cent) followed by closed stores (16 per cent).

3.3.3 Processing

At processing level, in addition to limited supply of nuts, another key issue raised by processors was control and management of aflatoxin. Aflatoxin is a key challenge that occurs at all levels; in the field, during post-harvest drying, storage and even transportation.

3.3.4 Institutional arrangement and access to support services

Majority of the producers are not organized into farmer groups to help them have easier access to support services. According to the study findings, only 20% of the farmers reported belonging to a producer group. The majority also preferred to transact individually (90%) as opposed to collectively (10%).

Farmers have access to a number of services that assist them in crop production and marketing. Among these services are extension services where on average farmers had 2.26 contacts with extension officers and access to finance at 24%. Extension services are mainly provided by government staff as well as from the private sector players who include agrochemical companies and local agro-dealers who provide agricultural information on the use of inputs. Only 28.7% of the farmers had accessed training services related to agriculture. The farmers had attended training on agribusiness, crop husbandry, farm management, marketing and soil management systems. Access to financial services was majorly through SACCOS, table banking and merry-go-rounds and local microfinance institutions. However, according to the study results, the majority of the producers (68%) did not have an active bank account.

3.3.5 Gender and social analysis

The male dominates both on marketing and production of the groundnuts across Kenya specifically. This calls for the need for women and youth empowerment. The men predominate the value chain because they had access to resources since most of them provide capital and control resources and revenues. The key areas that women can work on include management, value addition, marketing among others. Youth can participate in the digital agriculture space, provide labor, marketing and research. To enhance youth and women's participation in the V.C., funding, training, mentorship and sensitization were identified as the fundamental strategies.

3.3.6 Environmental analysis

The environmental index and resource depletion index for one-ton production of peanut were 0.62 and 4.30, respectively (Nikkah, 2015). According to Nikka et al., the impact of peanut production can be classified into global warming, acidification depletion of fossil resources, phosphates and potash and terrestrial eutrophication. Studies show that farms between 0.1-0.5 Ha have the highest amount of global warming potential as well as depletion of fossil resource. During farming of the groundnut, most farmers in Kenya identified impacts such as air pollution, creation of microorganism and soil erosion. Nonetheless, the majority of farmers (48.3%) were aware that if they do not make changes to the way they farm over the next 20 years, their production would highly decrease. The work environment in groundnut farming also presented a risk to the workers. Most farmers did not have environmentally safe holding areas for fuel wastes. Only 23% had a waste management plan, and 31% had clean food storage areas and handwashing facilities.

3.4 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 groundnut value chain opportunities and constraints

Opportunities and constraints	Recommendations and activities	Key performance indicators (KPIs)	County specific priority areas
1. Marketing	Certification and market linkages to increase quality and quantity.		
Untapped markets; The production of groundnuts in Kenya does not meet the demand, and the country had to import raw ground-nuts worth 6,704 thousand Euros in 2019. This indicates the strong demand locally that Kenyan producers should exploit. There is also regional and international demand from countries such as North America, East Asia, Middle East, Eastern Africa, Central Africa, Pacific south Asia, ASEAN, East Europe, Central Asia and southern Africa.	 Support farmers build production volumes and quality as in 2 below to exploit the domestic, regional and international market. Support exporters to enhance compliance and optimize production and processing capacity to meet the rising demand 	 Increase of domestic, regional and international trade volume for groundnuts of targeted farmers and enterprises. 	
Compliance to market requirements (standards): none of the interviewed farmers were GLOBAL GAP certified.	 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. 	• Percentage increase in number of GLOBAL GAP certified groundnut farmers participating in formal markets	

Marketing channels and income; Brokers formed the largest buyers of groundnuts (86%) while the rest were sold through farmer cooperative/producer group (14%). The average price of groundnuts at farm level averaged KES 109 per Kg. On average, farmer's income per acre was KES. 50,680.	 Strengthen direct linkages between farmers and processors Support formation and or strengthening of producer groups for produce aggregation and collective marketing to improve farmer bargaining power and compliance to market standards 	 Percentage increase of farmers having signed supply signed supply agreements directly with processors and complying to market standards Percentage increase in increase in increase in increase in increase in increase in increase i
2. Production	Productivity, quality and food safety; target to increase productivity (yield per acre) and food safety through:	
 Average land under groundnuts was 0.83 acres out of an average of 2.83 acres operated by the household. The farmers reported average yield of 466 Kgs per acre against a potential of 600 - 1,088 Kgs per acre. Some of the key constraints leading to low yield and quality includes: Use of recycled seeds (78%) Low uptake of good agricultural practices negatively affecting productivity and food safety (e.g. soil testing at 21.8%) Limited land under crop 	 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 groundnut production as a business adopting market driven production. Work with competent authorities and county governments for policy/regulation formation and enforcement such food safety policy 	 Percentage increase production of safe, quality groundnut (yield) per acre Siaya (Yield and quantities) Homa Bay (yield & quantities) Busia (yield & quantities)
3. Harvesting, post-harvest management and processing	Effective and efficient post-harvest management	

Out of total production, 6% of produce was spoilt and lost at farm level 4. Institutional arrangement & access to support services	 Identify & support investment opportunities to address postharvest spoilage such as recommended storage facilities Efficient and effective aflatoxin management and control management Support formation & strengthening of farmer organizations to facilitate farmers access to essential services 	 Percentage reduction in post-harvest losses
According to the study findings, only 20% of the farmers reported belonging to a producer group. The majority also preferred to transact individually (90%) as opposed to collectively (10%). Farmers have access to a number of services that assist them in crop production and marketing. Among these services are extension services where on average farmers had 2.26 contacts with extension officers and access to finance at 24%.	 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 Promote smart services e.g. digital financial services for example Digi Farm & Agri Wallet. 	Number of farmers consistently/easily accessing essential support services.

ANNEX Data set