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Value Chain Analysis of Macadamia Nuts in Kenya

Commissioned by The Centre for the Promotion of Imports from developing countries (CBI)

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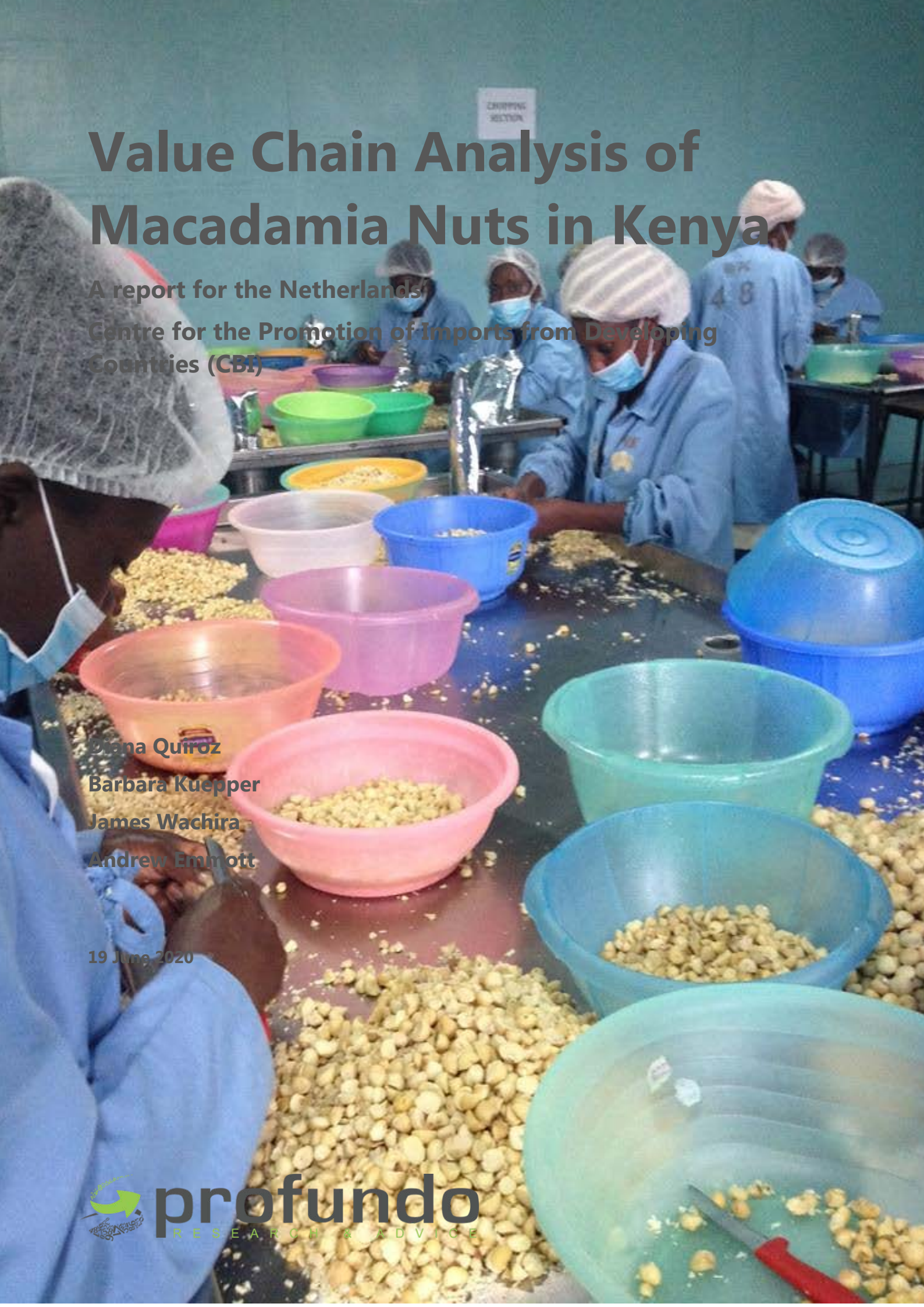

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RESEARCH & ADVICE

About this report

This value chain analysis report was commissioned by the Netherlands' Centre for the Promotion of Imports from developing countries (CBI). It presents the study findings on Kenya's macadamia value chain stakeholders, obstacles, opportunities and potential intervention areas. It is intended as input for a possible project to enhance the production and export of macadamia from Kenya to Europe.

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Authorship

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Front page cover photograph of macadamia processors at Wish Kenya Limited by Diana Quiroz.

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Disclaimer

Executive summary

Macadamia farming offers an important source of income for producers worldwide and especially for smallholder farmers in Kenya. Kenya is currently the third top macadamia producer, with a global market share of 13 percent (7,750 tonnes on kernel basis). The role of macadamia as a cash crop for foreign exchange earnings has steadily increased in recent years. In 2018, exports of macadamia kernel had a value of KES 1,380 per kilo, making it 1 of the most lucrative cash crops in Kenya after tea. The bulk of Kenyan macadamia is produced by about 200,000 smallholder farmers. Kenya's macadamia production increased rapidly during the last decade, from around 11,000 tonnes nut-in-shell (NIS) production in 2009 to 42,500 tonnes in 2018. Kenya's Agriculture and Food Authority (AFA) estimates that, with increased acreage under the crop, production will reach 60,000 tonnes NIS by 2022. That would constitute an increase by around 40 percent from the production achieved in 2018.

Moreover, only a few processors export cashew nuts in addition to macadamia. According to processors interviewed for this study, the reason for this is that cashew trees are very old in Kenya and have not been replaced. Kenya currently produces less than 45,000 tonnes of cashew.

The findings of this VCA can be summarised under the following 4 broad headings:

Export market and VC competitiveness

Between 90 and 95 percent of Kenya's macadamia is produced for export. Key export destinations for Kenyan macadamia are the U.S., the EU, Japan, China, Hong Kong and Canada. Direct imports of Kenyan macadamia enter the EU mainly through the Netherlands and Germany, accounting for a combined share of around 98 percent of the imports in 2018; small volumes also go to Spain, the UK and Italy. Europe's importance as an export market for Kenyan macadamia shows an increasing trend, with imports growing from 1,268 tonnes in 2014 to 1,654 in 2018. The growing EU demand for macadamia, and especially organic macadamia, is rooted in a greater interest among EU consumers in food products with superior health benefits as well as natural cosmetics. An estimated 80 percent of macadamia nuts are consumed as snacks on the EU market; the remaining 20 percent are used as ingredients, for example in cookies or ice cream. Looking at average prices for macadamia kernel imports to Europe, Kenyan nuts used to achieve lower prices than imports from top producers Australia and South Africa. However, average prices almost caught up with other key origins in 2018, although quality issues at origin prevail.

Despite the increasing trends, both globally and in Europe, it is generally not expected that the demand for macadamia will compete with the more dominant nut varieties like walnuts or peanuts anytime soon. This is partially because consumers are not familiar with the product, but notably also because of its comparatively high price. Macadamia is expected to remain a niche product in the nut sector, albeit with a growing market base.

Structure, governance and sustainability of the VC

The Kenyan macadamia value chain (VC) comprises producers (smallholders and macadamia processors' plantations), aggregators (traders and associations), processors (who also export), influencers and supporting organisations. Main influencers in Kenya's macadamia value chain are AFA, the Nuts and Oil Crops Directorate (NOCD), the Kenya Bureau of Standards and county governments. Other stakeholders influence the macadamia value chain one way or another, including the Kenya Plant Health Inspectorate Service and the Ministry of Industry, Trade and Cooperatives.

The Kenyan government, through AFA and the NOCD, is at the centre of governance of the macadamia sector in the country. The sector is regulated through 2 main instruments – the Kenyan Crops Act 2013 and the Kenya Agriculture and Livestock Research Act (particularly Section 43, which prohibits NIS exports). AFA and the NOCD are the primary institutions responsible for leading the sector and implementing the development strategy and directive.

Despite the existence of a dedicated governmental body for nuts (the NOCD), the consensus among Kenyan macadamia stakeholders is that these 2 main regulatory instruments have so far insufficiently championed progress for the sector. This is in part due to obstacles in the value chain.

Obstacles and opportunities in the VC

Some of the main obstacles and areas of opportunities in the VC include:

- **Low productivity**: factors affecting low productivity in Kenya's macadamia sector include the effects of climate change, the impact of pests and diseases, poor Good Agricultural Practices (GAP), lack of access to inputs, use of unsuitable or old macadamia varieties and immature harvesting. The main opportunity for yield improvement lies with supporting extension service providers (such as KALRO and AFA) to increase their capacities and to multiply and disseminate high-yielding macadamia seedlings that are suited to the different macadamia growing regions of Kenya;
- **Low-quality nuts**: immature harvesting is the main driver of low-quality nuts. Also, an uneven supply of hard and soft-shell macadamia nuts together with inadequate processing machinery reduces the capability of the sector to supply the international market with A-grade nuts. There are 2 main areas of intervention for quality improvement. The first involves supporting processors who wish to obtain loans to buy crops in advance, thereby addressing farmer' need for quick cash. The second is the implementation of region-relevant harvesting moratoria.
- **Traceability:** upstream traceability of Kenyan macadamia is severely challenged by the large number of smallholder farmers and independent buying agents. Adopting traceability systems (some of which are part of mobile cash applications) could help in addressing this problem. Moreover, support should go the creation of a registry of farmers (including data such as landholding size and age, number of macadamia trees and macadamia varieties) and traders. This registry should be governed and accessed by members of sectors associations and AFA;
- **Insufficient stakeholder collaboration**: communication and dialogue among macadamia stakeholders is lacking. Often, conflicting interests among actors lead to attitudes of rivalry. To address this, sector associations should establish, adopt and enforce codes of conduct to regulate the practices of sector players. Dialogue and transparency should be the ruling principles of this code of conduct. Moreover, all actors should discuss a multi-stakeholder strategy to address the challenges facing the macadamia sector;
- **Poor EU market access**: although some processors have links to European markets, the notion prevails among EU buyers that Kenyan macadamia is of inferior quality. Moreover, processors regard the EU market regulations as more stringent than those of the U.S. To address poor EU market access, the creation and marketing of a Kenyan macadamia brand should be explored. This brand, together with a revamped image of Kenya as a macadamia producer, could be launched during the 9th International Macadamia Symposium to be held in Nairobi in 2021.

Possible interventions in the VC

This VCA discusses several areas of intervention, covering quality improvement, improved extension services, market readiness, improved stakeholder collaboration and governance, and an enabling environment.

Table of contents

List of figures

List of tables

Abbreviations

AFA	Agriculture and Food Authority
AFA-NOCD	Nuts and Oil Crops Directorate of the AFA (AFA-NOCD)
CEDAW	UN Committee on the Elimination of Discrimination against Women
COMESA	Common Market for Eastern and Southern Africa
DANIDA	Danish International Development Agency
DFID	Department of International Development (UK)
EAC	East African Community
EPOPA	Export Promotion of Organic Products in Africa
EPZ	Export Processing Zone
EU	European Union
FOB	Free On Board
GAP	Good Agricultural Practices
GoK	Government of Kenya
HCD	Horticultural Crops Directorate
KALRO	Kenyan Agricultural and Livestock Research Organization
KEBS	Kenya Bureau of Standards
KEMDP	Kenya Export Market Development Programme
KEPROBA	Kenya Export Promotion and Branding Agency
KEPHIS	Kenya Plant Health Inspectorate Service
KOAN	Kenya Organic Agriculture Network
IDH	Sustainable Trade Initiative
ILO	International Labour Organization
INC	International Nut and Dried Fruit Foundation
M&E	Monitoring and Evaluation
NIS	Nuts in Shell
Nutak	Nuts Traders Association of Kenya
NutPak	Nut Processors Association of Kenya
R&D	Research and Development
SNI	Sustainable Nut Initiative
SNV	Netherlands Development Organisation
UNIDO	United Nations Industrial Development Organization
USAID	U.S. Agency for International Development
VCA	Value Chain Analysis
WBG	World Bank Group

Introduction

The Centre for the Promotion of Imports from developing countries (CBI) develops and implements projects using several consecutive phases, moving from an initial Value Chain Selection (VCS) phase, via a Business Case Idea (BCI) phase to formulate an initial idea for a project, to the in-depth Value Chain Analysis (VCA) phase. Depending on the outcome of the VCA, it may be followed by a Business Case (BC) phase to formulate a detailed case for a project. For Kenya, the macadamia nut VC has been selected to enter the VCA phase. This is based on the following assumptions:

- There is high export potential and demand for macadamia nuts in Europe, coupled with possibilities to cooperate with local organisations, interest from the Dutch embassy in a future CBI project and possibilities to collaborate with running donor projects.
- CBI desires to build up more experience in the edible nuts sector and to help African nut producers become more competitive and successfully develop towards value addition.
- CBI's strengths in business export coaching (BEC), institutional support and helping companies implement sustainability measures will add enough value to the sector in its current state as it is perceived in the VCS and BCI phases.

The VCA consists of desk and field research components. This combination should answer a range of questions around the obstacles and opportunities related to the export of Kenyan macadamia and macadamia products. These issues include the competitive situation of the Kenyan nuts sector, potential for value addition, as well as structural, governance and sustainability conditions. Based on these findings, the VCA will develop suggestions for concrete interventions and support activities.

The purpose of a potential future project is to support 10 to 15 Kenyan processors as well as actors in the supporting institutional environment (public and/or private organisations), expanding exports of macadamia in an inclusive, responsible way that matches European market demands.

The core questions that this VCA answers are as follows:

1. What are the challenges in the value chain for Macadamia exports from Kenya to Europe and which interventions could help Kenyan stakeholders solve these challenges?
2. Which Macadamia processors are already exporting their product to the world? Are they able to diversify and grow their exports to the European market by themselves? Or would they need the support of international organisations (such as CBI) to do so?
3. Which government agencies, private sector associations, certification bodies and international organisations are likely partners in a possible project focused on expanding macadamia exports to Europe? What interventions have priority?
4. Which quality measures and which CSR measures should macadamia processors focus on? What measures should actors in the supporting institutional environment focus on? This document serves as a project inception report.

This draft report presents the conclusions of the key VCA elements and the possible interventions for a CBI macadamia sector project. The methods used for the collection of data (including the limitations of this study), background data on the macadamia market, detailed lists of interviewed Kenyan stakeholders and international market players, as well as a value chain baseline measurement are provided in the Appendices.

Product description[1]

Macadamia nuts are the fruit of the evergreen macadamia tree. The 3 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. Once planted, the trees need 5 years before bearing fruit and 10 years to reach full maturity. They require warm temperatures and good annual rainfall to yield a good crop. The biggest threats to production are droughts and heavy frost.

The nuts are encased by a hard, woody shell that in turn is protected by a green-brown fibrous husk that splits open as the nut matures (Figure 1). The dried shells are very hard and are typically removed with cracking machines that have steel rollers or rotating knives.

Figure 1 Macadamia nuts in shell and macadamia kernel

Source: Wikimedia Commons and Flickr.

In trade statistics, macadamia nuts are traded under 2 codes: 0802.61 for fresh or dried macadamia nuts, in shell; and 0802.62 for fresh or dried macadamia nuts, shelled.

The basic quality requirements for macadamia nuts are defined by the following criteria:

- Style: whole, mixture of whole and pieces;
- Absence of insects, mould, rancidity or damage;
- Characteristic taste and flavour free from foreign smell or taste;
- Moisture content of kernels not exceeding 2 percent;

Table 11 in Appendix 2 lists the key macadamia nut classifications. Table 1 lists key terms used in describing macadamia nuts. These terms are also used in the rest of this analysis.

Table 1 Key terms in relation to macadamia nuts

Husk	Outer hull of the macadamia nut that covers the shell.
Immature kernel	Misshapen, abnormally small, shrivelled and shrunken kernel.
Kernel recovery	Total weight of all kernels recovered (including both kernels conforming with minimum quality standards and immature or damaged kernels), expressed as a percentage of the dry-in-shell weight from which the kernels were recovered. Kernel recovery ratios can vary between an average of 10 to 15 percent in Kenya on the lower end of the scale and a high-end recovery ratio of 40 percent achieved by some processors in Australia.
Moisture content	Kernel moisture percentage (by mass).
Nut in shell (NIS)	Nut that is still encased by the inedible, woody shell.

The scope of the VCA covers the processing and trade of Kenyan macadamia kernel. Consequently, the analysis of the value chain and its key stakeholders focuses on processors and exporters of macadamia kernel.

Chapter 1 Macadamia export market and value chain competitiveness

The following subsections first provide a brief overview of global tree nut and macadamia production (Section 1.1). The characteristics of Kenya as a producer are described in Section 1.2, followed by an analysis of the country's export capacity (Section 1.3) and the situation in its key markets in Europe (Section 1.4) and in the U.S. and China (Section 1.5).

1.1 Global macadamia production and key players

Macadamia production has continuously increased in recent years. This is expected to continue in the coming years. The global nut-in-shell (NIS) volume is anticipated to reach 232,428 tonnes in 2019, a 4-percent increase from 2018. However, this is 1 percent less than the forecast from earlier this year, putting the market in tight supply and providing minimal inventory leading into 2020. Projections until 2025 anticipate a further significant growth to 700,000 tonnes NIS.

Meanwhile, kernel forecasts are less positive, with an anticipated 60,630 tonnes in 2019, a year-on-year (y-o-y) increase of 2 percent. The lower kernel yield is largely due to unfavourable climatic conditions in Kenya and Malawi.[2] Australian producers suffered from an abnormally long, hot and dry summer, resulting in a smaller nut size. Similarly, China's harvest has been impacted by drought. Meanwhile, the South African crop slightly exceeded expectations.[3]

For reasons of comparison, production statistics for tree nuts are reported on kernel basis. Figure 2 illustrates the development of global tree nut production between 2014/15 and 2018/19.

Figure 2 Global tree nut production on kernel basis (except pistachios), 1,000 tonnes

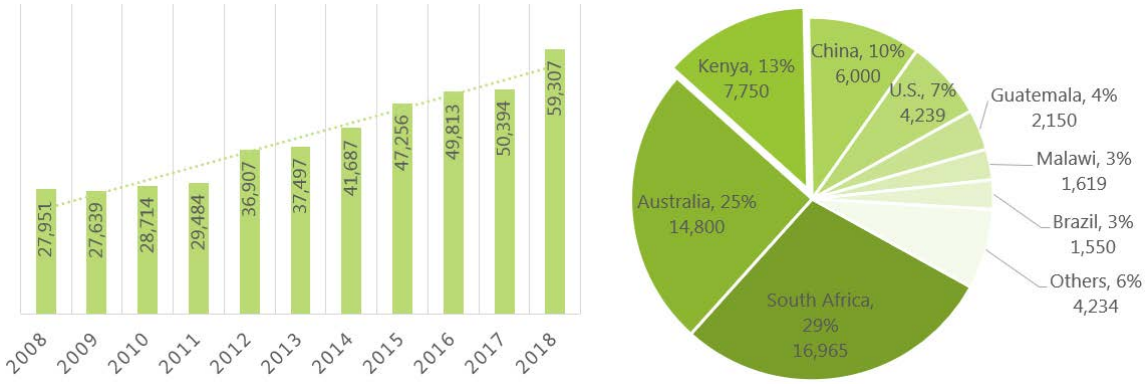
Source: International Nut & Dried Fruit (2010 to 2019), *Nuts & Dried Fruits Statistical Yearbooks 2014/15 to 2018/2019.*

Compared to other tree nuts, like almonds, walnuts, cashews and pistachios, macadamia production and consumption play a much smaller role globally (Figure 2).[4] Due to the globally increasing tree nut production, the share of macadamia remained stable at 1 percent during the past 5 years. Total tree nut production showed a compound annual growth rate (CAGR) of 6 percent between 2014/15 and 2018/19. While pine nuts and brazil nuts experienced a negative CAGR, macadamia exhibited an above-average CAGR of 8 percent during this 5-year period.

Global macadamia production more than doubled over the last decade, increasing from almost 28,000 tonnes (kernel basis) in 2007 to 59,300 tonnes in 2018.[5] Today's global top producers are South Africa and Australia, accounting for over half of the world's macadamia production in 2018 with shares of 29 percent and 25 percent, respectively (Figure 3). Kenya is the third producer with a share of 13 percent (7,750 tonnes on kernel basis), followed by the U.S. (9 percent) and China (8

percent).[6] For China, the leading nut-in-shell (NIS) importer globally, the share of NIS imports processed in the country that may be counted as domestic kernel production is uncertain.

Figure 3 World macadamia production, 2008 to 2018 and 2018 breakdown (tonnes, kernel basis)



Source: International Nut & Dried Fruit (2019), *Nuts & Dried Fruits Statistical Yearbook 2018/2019*, p. 30.

Demand for macadamia kernel from key markets has continued to rise in recent years. With European, U.S. and Japanese imports as well as Australian domestic sales peaking, 2018/19 has been a year of records. These countries plus China are the biggest consuming markets, collectively accounting for around 70 percent of global kernel production. Their imports increased by 27 percent in the 12 months leading up to April 2019. Meanwhile, value rose by 40 percent to US$519 million (€465 million).[7]

1.2 Macadamia production in Kenya

1.2.1 Developments in macadamia production and influencing factors

The highland regions around Mount Kenya with their volcanic soil, known for the country's high-quality coffee production, are now the biggest producers of macadamia (see Figure 14, Appendix 2 for a map).[8] Kenya's macadamia production increased rapidly during the last decade, from around 11,000 tonnes NIS production in 2009 to 42,500 tonnes in 2018.[9] According to INC estimates, kernel production in 2009 was around 2,000 tonnes, while it reached 7,750 tonnes in 2018 (Figure 4). Production follows a growing trend, but is highly volatile with considerable y-o-y fluctuations in yield.[a] Officially reported production figures may be lower than actual production, due to smuggling of unshelled macadamia through neighbouring countries for export to China (see Section 1.2.4).

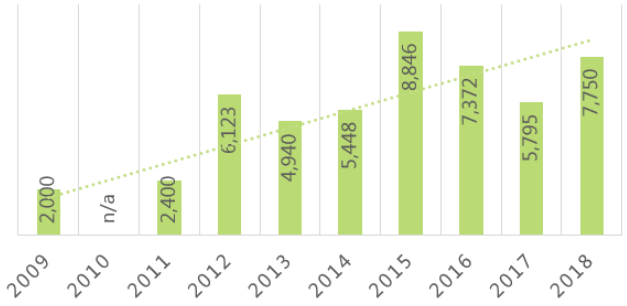
For 2019, a y-o-y decrease by an estimated 20 percent based on NIS volume is expected due to an ongoing drought in East Africa, which is having an impact on agricultural production.[10] Erratic weather driven by the changing climate can be seen as one of the underlying challenges to stable

[a] For example, Kakuzi reports macadamia orchards at a constant surface area of 510 hectares in 2017 and 2018. However, the harvest reached 830 tonnes in 2018, almost 50 percent more than the 568 tonnes harvested in 2017.

macadamia production. Moreover, low-quality seedlings, immature harvesting and poor tree pruning influence the yields as well (see Section 1.9.2).

According to Kenya's Agriculture and Food Authority (AFA), an expanded cultivation area and higher productivity will contribute to future production.[11] Farmers are increasingly aware of the earning opportunities of macadamia. As macadamia trees can grow where coffee is grown, farmers have been switching crops. While coffee production dwindles, the volume and value of macadamia production are increasing.[12] Farmers' earnings were reportedly positively impacted by quality improvements and a reduction in immature harvesting in recent years.[13]

Figure 4 Macadamia production in Kenya, 2009 to 2018 (tonnes, kernel)



Source: International Nut & Dried Fruit (2010 to 2019), *Nuts & Dried Fruits Statistical Yearbooks 2009 to 2018/2019.*

In parallel with the growing production, processing capacity has expanded from 4 processors in 2009 to at least 30 processors by 2018 (see Appendix 5 for an overview of processors). Anticipating continuously growing production in the next 5 years, processors have upped the installed processing capacity to approximately 90,000 tonnes NIS, leaving 50 percent unused capacity at present, so there is still ample room for processing expansion.[14] In the longer term, Kenya's production is expected to further increase until 2022, when saplings with better yields will mature (see Section 1.2.5) and most processors will achieve their planned increase in capacity.[15]

1.2.2 Economic role of macadamia in Kenya

Tea and coffee are the top export earners of the Kenyan agricultural sector. Macadamia trees used to be grown by farmers to shade their coffee bushes or as windbreakers. However, farmers are increasingly abandoning coffee and turning to the tree nut due to better returns. The role of macadamia as a cash crop for foreign exchange earnings has steadily increased in recent years as global demand outstrips supply.[16] In 2018, exports of around 6,400 tonnes of macadamia kernel had a value of US$87.1 million (€76.1 million or KES 8.8 billion), or around KES 1,380 per kilo.[17]

Farm gate prices started at KES 150 (US$1.48) per kilo at the beginning of the 2018 season and reached KES 200 (US$1.95) by the close of the season in October 2018.[18] In early 2019, macadamia farmers in the Mount Kenya region were selling their produce at an average price of KES 100 (US$1.0) per kilo. By early April, prices increased to up to KES 220 (US$2.16) and were expected to increase further.[19] These prices make it one of the most lucrative cash crops in Kenya after tea. By contrast, many coffee farmers operate at a loss, with coffee beans earning about US$0.55 per kilo. Nonetheless, the earnings of Kenyan farmers are dwarfed by top producers South Africa and Australia, where farm gate prices range between US$3.90 and 5.86 a kilo.[20]

Macadamia production in Kenya is dominated by smallholders. More than 100,000 mostly small-scale farmers are cultivating the trees primarily in mixed cropping with coffee and other products. Larger producers and contract farming arrangements are the exception (see Section 2.1.2 on actors).

1.2.3 Certified production

Though not a quality criterion, certification is often considered as a quality specification by the market. Organic is the most important certification for Kenyan macadamia nuts, driven by increasing global demand and projects supported by foreign investors. Larger companies sourcing and offering organic certified macadamia nuts include Ten Sense Africa (backed by USAID and the Slovak Embassy as well as by Dutch impact investment firm DOB Equity), Limbua and Delphi Organic (a German wholesale trader sourcing from 4,700 farmers cultivating organic macadamia nuts on the slopes of Mount Kenya).[21]

Fair trade certification often comes with organic certification. While Fairtrade International certified macadamia was identified, Jungle Macs and Limbua Group hold Fair for Life certification (Ecocert).[b,22] More companies are expected to obtain certification. There are currently no Rainforest Alliance certified macadamia farms, farm groups or chain-of-custody operations in Kenya.[23]

1.2.4 Regulatory environment

The most important laws and guidelines governing the macadamia sector in Kenya are briefly described in the following sections.

Ban on export of raw macadamia

Exports of macadamia NIS from Kenya without written authorisation from the Cabinet Secretary have been illegal since 2009 under Section 43 of the Kenya Agriculture and Livestock Research Act.[24] The government aims for all macadamia grown in Kenya to be processed locally, arguing that this would empower local processors, advance domestic value addition, secure jobs and increase farmers' income.[25]

In support of this objective, the GoK has promoted the establishment of processing factories and the crack-down on Chinese middlemen that seek to purchase immature NIS and smuggle them out of the country.[26] According to the Trade Ministry, the industry faces a major challenge as "*[t]he rising global competitive demand and prices for macadamia has led Kenyan farmers to harvest their crop prematurely in order to turn a quick profit from Chinese middlemen who offer money in advance to farmers for their crop at below market prices. The majority of these nuts in-shell are then exported illegally through a coordinated syndicate involving foreign firms, local dealers and clearing agents.*"[27] According to NutPak figures from 2018, an estimated 40 percent of the harvest is lost to smugglers who channel the nuts through Tanzania to China. Reportedly, the traders receive a 25 percent rebate from the Chinese government for importing a high-value commodity that is in tight supply.[28] According to AFA, the prevalent harvesting of immature macadamia nuts is encouraged by a rejection rate of up to 10 percent of annual produce by processing factories.[29]

NutPak calls for tighter controls to ensure compliance with the ban.[30] However, farmers complain that the ban has cut links between them and foreign companies and that processors are taking advantage of the ban to lower prices.[31] Also, the Nut Traders Association (Nutak) calls for the ban

[b] In addition, Athi River Oils EPZ and Fairoils EPZ are also Fair for Life certified. These are companies that buy second-grade nuts from other processors and press the oil.

on exporting raw nuts to be lifted in order to increase competition.[32] Meanwhile, it opposes the decision by some key production counties (Murang'a and Kirinyaga) to consolidate farmers into cooperatives ('saccos').[33] Interview partners and other sources noted poor governance of cooperatives in the coffee sector though, leading to low performance in the sector.[34]

Moratorium on premature harvesting

Similarly, players in the macadamia sector are divided over the harvesting ban between 30 November and 15 February that was imposed by AFA in October 2018, which aimed to prevent farmers from picking immature nuts and consequent poor quality of produce, with significant consequences for kernel quality (see Section 3.1.2).[35]

Those opposing the ban state that the exercise will compromise the quality of the commodity meant for export.[36] Reportedly, macadamia farmers from the Mount Kenya region complained in early January that the moratorium on harvesting will subject them to significant losses when their macadamia nuts are ready for harvest, as the nuts mature at different times, depending on climatic conditions. Farmers also criticised the ban for denying them a lucrative ready market of Chinese buyers.[37]

Law to streamline the macadamia sector

The Nuts Processors Association, backed by AFA, drafted a law to streamline the farming, harvesting and marketing of macadamia nuts in Kenya.[38] Public participation was conducted in March 2019 to get the public opinion on the proposed law before sending it to Parliament. According to the processors, macadamia quality has been increasingly compromised unconscionably by brokers and traders.

According to the CEO of NutPak, lack of regulations has driven increased theft of macadamia from farms and harvesting of immature nuts, leading to losses in export markets. Consequently, the processors have lobbied to have all macadamia farmers registered and attached to specific processors. Rebutting the allegations, spokespersons of Nutak criticised the proposed law as an attempt to push independent traders out of the macadamia business.[39] All participants at the public participation meeting agreed, however, that tough measures need to be taken so that only mature nuts reach the market.[40]

Export requirements for nuts

Pursuant to provisions of the Kenyan Crops Act 2013, individuals or businesses who wish to export must obtain a license from the Nuts and Oil Crops Directorate of the AFA (AFA-NOCD) before being allowed to export to any country. AFA-NOCD clears all nuts and oil crops exports through the Kenya Trade Network Agency's Portal (KenTrade). After being licensed, exporters of nuts and oil crops can opt into the Kenya Electronic Single Window System (KESWS). Once they are licensed, exporters can apply for an export permit for consignments. Applications require an invoice, a packing list and a Kenya Revenue Authority (KRA) entry document, as well as export levy payments where applicable. The consignment may be subject to physical verification/inspection by AFA-NOCD inspectors before clearance. Exporters must also be cleared by the KRA, the Kenya Plant Health Inspectorate Service (KEPHIS), the Kenya Bureau of Standards (KEBS) and the Pest Control Products Board (PCPB).[41]

1.2.5 Expected future production developments

In order to obtain a license from AFA, processors are required to have a nursery with seedlings that are distributed to farmers at a subsidised price. AFA estimates that, with increased acreage under the crop production will reach 60,000 tonnes NIS by 2022.[42] That would constitute an increase by

around 40 percent from the 42,500 tonnes NIS achieved in 2018.[43] Macadamia production in Kenya is also expected to increase in the coming years as trees with better yields mature.[44]

Expansion is targeted at non-traditional areas such as the counties of Uasin Gishu, Elgeyo Marakwet and Nandi in the West of the country. The county governments of Meru, Taita Taveta, Nyeri, Kirinyaga, Embu and Tharaka-Nithi have also stepped up efforts to expand production. In Meru, farmers were provided with 200,000 grafted seedlings in 2018, as part of a joint project with the government of Slovakia that aims to double production in the county by 2022 (see Section 2.4.12).[45]

1.3 Macadamia export capacity

The following subsections look at Kenya as a macadamia exporter. First, export patterns from competing markets are briefly discussed (Section 1.3.1). These baseline data provide the starting point for an analysis of recent developments in macadamia exports from Kenya (Section 1.3.2) as well as export gaps for Kenyan macadamia (Sections 1.3.3).

1.3.1 Leading macadamia exporters globally

Table 2 lists 2018 macadamia export destinations of important producing countries. It illustrates the dominance of China, Hong Kong and, to a lesser degree, Vietnam on the market for NIS imports. Hong Kong itself exports most of its imports again, with Vietnam as a key destination. In kernel trade, the U.S. and the EU are the leading importers.

Table 2 Leading macadamia export countries, 2018

Country	Exports (tonnes)		Key destinations	
	NIS	Kernel	NIS	Kernel
Kenya*	538	6,435	China (unofficial), Hong Kong, U.S.	U.S. (60%), EU (27%)
Other producers/processors				
South Africa	24,861	10,231	Hong Kong (55%), Vietnam (23%), China (15%)	U.S. (49%), EU (30%), Vietnam (4%)
Australia	15,689	8,541	China (55%), Vietnam (33%), Hong Kong (10%)	Japan (20%), U.S. (17%), China (16%), Hong Kong (11%)
Zimbabwe	4,878	1	South Africa (58%), Mozambique (34%)	-
Guatemala	3,997	1,209	Hong Kong (57%), Vietnam (31%)	U.S. (64%), EU (19%)
U.S.	3,644	800	China (95%)	Canada (53%), Japan (16%), South Korea (15%)

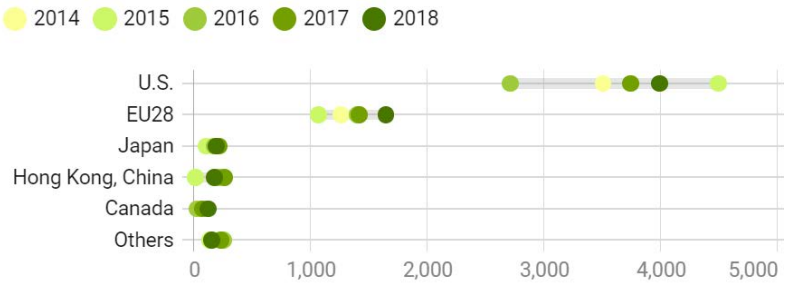
Note: *Statistics for NIS exports from Kenya are unreliable due to the illicit nature of most of the trade. According to statements by local stakeholders, the Kenyan export volume was considerably higher.
Source: *ITC Trademap* (2019), 'List of importing markets for a product exported by Kenya - Product: 080261 Fresh or dried macadamia nuts, in shell and 080262 Fresh or dried macadamia nuts, shelled'.

1.3.2 Export volume, value and key destinations for Kenyan macadamia

Around 90 percent of Kenya's production goes into export, with a small, yet growing volume recorded as domestic consumption.[46] This includes, for example, snacks packaged for long-haul flights. According to various sources, macadamia oil production is mainly based on low-quality nuts that could otherwise not be sold. Consequently, exports are small and not separately reported in statistics. The largely illegal character of the NIS exports means that statistics may provide an incomplete picture.

Total exports of shelled macadamia reached 6,400 tonnes at a value of US$87.2 million in 2018, up from around 4,900 tonnes in 2014.[47] The U.S. and the EU-28 as the top 2 importers of macadamia kernel from Kenya accounted on average for 89 percent of the country's total macadamia kernel export volume in the 5-year period from 2014 to 2018. These destinations also showed the strongest growth over this period. The U.S. imported the largest volume with around 3,800 tonnes, or 59 percent of total exports. The EU is the second importer with 27 percent. Within the EU, the Netherlands and Germany are the 2 key importers, accounting for 58 percent and 37 percent, respectively. Other EU destinations only received a combined share of 4 percent.[48] Importantly, both the Netherlands and Germany are transhipment countries, especially for other EU destinations (Section 1.4.1). No other destination accounted for more than 5 percent in any of the years (Figure 5, data in Table 10, Appendix 2).

Figure 5 Key destinations of Kenyan macadamia kernel exports, 2014 to 2018 (tonnes)



Source: *ITC Trademap* (2019), 'List of importing markets for a product exported by Kenya - Product: 080262 Fresh or dried macadamia nuts, shelled'; *U.S. Census Bureau* (2019), 'Port-level imports: 080262 Macadamia Nuts, Shelled, Fresh Or Dried'; *Eurostat* (2019), 'EU trade since 1988 by HS6: 080262 - Fresh or dried macadamia nuts, shelled'.

For NIS, the insecurity in estimating export volumes is considerable, but these volumes may be substantial (see Section 1.2.4). Trade statistics for the last 5 years only report NIS exports ranging between 10 tonnes in 2014 and 538 tonnes in 2018. These may be officially approved exports.

Table 3 Exports of NIS from Kenya, 2014 to 2018 (tonnes)

	2014	2015	2016	2017	2018
U.S.	-	166	-	-	380
China	-	-	-	62	122
Hong Kong	-	-	-	7	25
EU-28	1	69	19	46	11
Other	9	6	11	4	-
Total	**10**	**241**	**30**	**119**	**538**

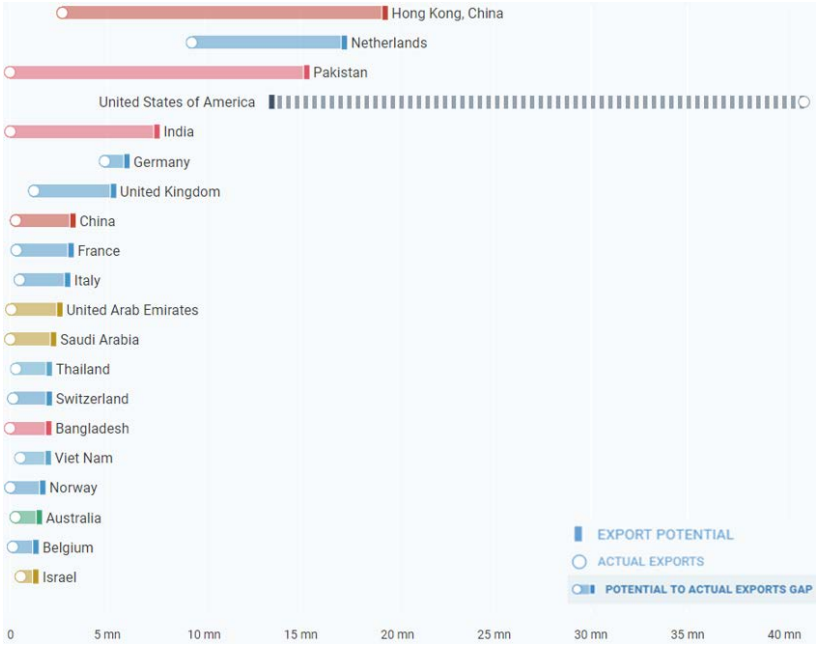
Source: *ITC Trademap* (2019), 'List of importing markets for a product exported by Kenya - Product: 080262 Fresh or dried macadamia nuts, in shell'; *U.S. Census Bureau* (2019), 'Port-level imports: 080261 Macadamia Nuts, In Shell, Fresh Or Dried'; Source: *Eurostat* (2019), 'EU trade since 1988 by HS6: 080261 - Fresh or dried macadamia nuts, in shell'.

1.3.3 Export gap for macadamia from Kenya

An analysis of the gap between potential and actual exports of macadamia nuts from Kenya is shown in Figure 6 based on ITC's Export Potential Map. The potential export value for macadamia supplied by Kenya to a specific market is calculated as supply × demand × bilateral ease of trade.[c,49]

Export potential gaps are identified for 19 Asian, European and Middle Eastern markets, with Hong Kong, Pakistan and India showing the greatest potential for exports of Kenyan macadamia. In Europe, the Netherlands, Germany and the UK are exhibiting the largest export potential gap for Kenyan exports of macadamia. Meanwhile, the U.S. as the largest exporter is the only country where actual exports by far exceed the estimated potential.

Figure 6 Gap between potential and actual exports of Kenyan nuts (US$ million)



Note: the analysis is based on HS code 0802Xc for 'nuts not elsewhere specified'. Since Kenya is not exporting other types of nuts falling into this category, this code seems a good proxy for macadamia trade.
Source: *ITC Export Potential Map* (2019) 'Export potential 0802Xc Nuts nes'.

However, these projections do not include important external influences that could have a considerable impact on a trade relationship, such as the USAID support programme for exports to the U.S. (see Section 1.5.1). Additionally, nut quality and consistency, and changes in the regulatory environment influence the ability to successfully tap into potential export market opportunities.

[c] The export potential value is projected by an economic model based on the characteristics of the exporter, the target market and the strength of the relationship between them. The estimated dollar value serves as a benchmark for comparison with actual export performance and should not be interpreted as a ceiling value.

1.4 European market situation

The following subsections analyse the demand for macadamia in Europe (Section 1.4.1) and for certified produce specifically (Section 1.4.2). Questions around potentially unmet demand for macadamia in the EU, the potential for market expansion for macadamia nuts and macadamia nut products as well as risks for market decline are discussed in Section 1.4.3. Also, main European buyers of macadamia are briefly profiled in Section 1.4.4.

1.4.1 European market for macadamia

Macadamia imports to Europe increased in recent years (Figure 7). They are mostly consumed as roasted and salted snacks and in snack mixes. Key countries of origin are South Africa, accounting for 42 percent of total imports in 2018, followed by Kenya with 24 percent and Australia with 18 percent. Other origins all accounted for less than 10 percent each. Besides Kenya, Malawi has also experienced an ongoing increase in trade with the EU in the last 5 years, albeit at only around one third of Kenya's volume. Year-on-year fluctuations in imports are influenced by the volatility of annual global production rather than changes in market demand.

Despite considerable y-o-y fluctuations, macadamia imports in general have shown an increasing trend in recent years. It is difficult to make concrete statements on the development of macadamia nut consumption in individual countries based on trade statistics, as this would require trade in processed products for which it is difficult to identify the share of macadamia, such as packaged snacks, to be considered as well. Future growth opportunities and obstacles are discussed further in Section 1.4.3.

Figure 7 Imports of macadamia to EU Member States (tonnes, kernel)

	South Africa	Kenya	Australia	Malawi	U.S.	Other	EU28_EXTRA
2014	1,847	1,268	1,104	295	113	482	5,108
2015	2,755	1,078	1,139	314	39	492	5,816
2016	2,452	1,412	1,161	371	37	523	5,955
2017	1,975	1,425	1,073	366	126	301	5,266
2018	2,876	1,654	1,275	520	287	310	6,921

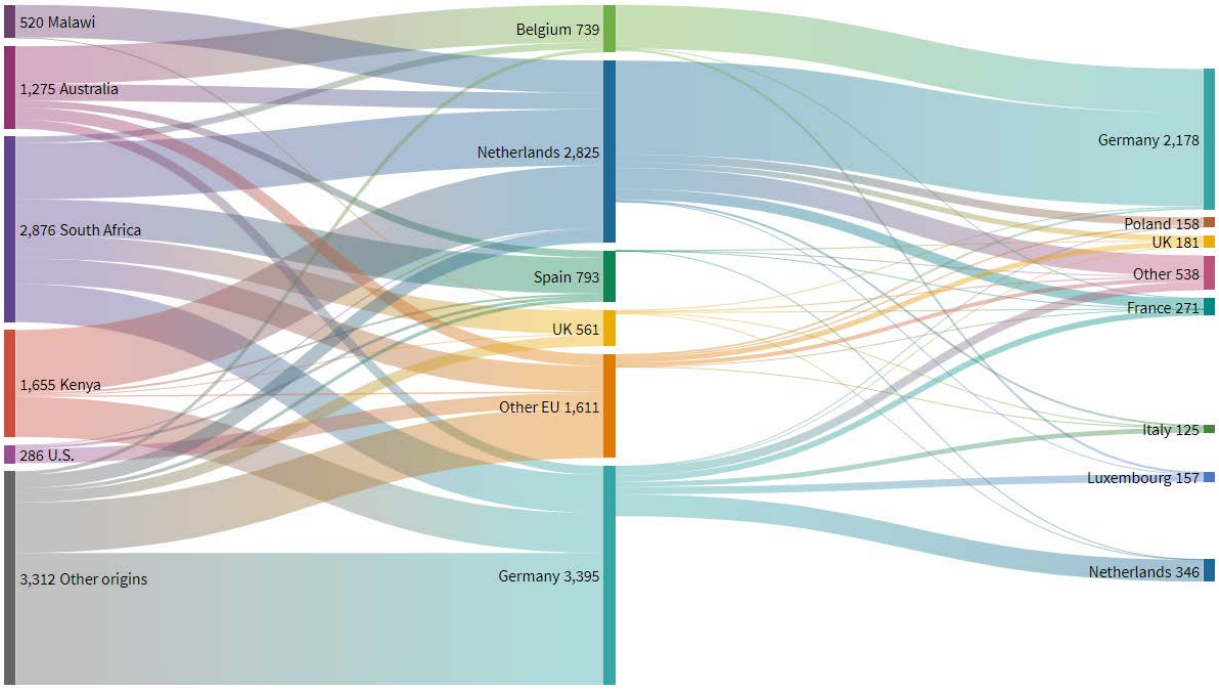
Notes: Imports of shelled macadamia nuts reported under HS code 080262. NIS imports (HS code 080261) have not been considered, as they are negligible in size and show inconsistencies.
Source: *Eurostat* (2019), 'EU trade since 1988 by HS6: 080262 - Fresh or dried macadamia nuts, shelled'.

The European import market for macadamia nuts is highly concentrated, with Germany and the Netherlands accounting for a combined 63 percent of total imports in 2018 (Figure 8).[d] However, both countries are not only consumers of macadamia, but also key transit points for other European destinations. For example, around 78 percent of the volume imported to the Netherlands in 2018 was re-exported.[50] The 2 countries also do business with each other.

[d] These figures only consider trade of shelled macadamia and thus disregard macadamia products such as snack mixes.

Kenyan macadamia imports also enter the EU mainly through the Netherlands and Germany (accounting for a combined share of around 98 percent of the Kenyan imports in 2018; small volumes also go to Spain, the UK and Italy) (Figure 8). Due to re-exports, it is not possible to trace in which countries Kenyan macadamia are eventually consumed. It can be assumed, however, that a general pattern applies, with high-income Western European markets as key markets, namely Germany, France, Italy and the Netherlands, and smaller shares in Scandinavian countries.

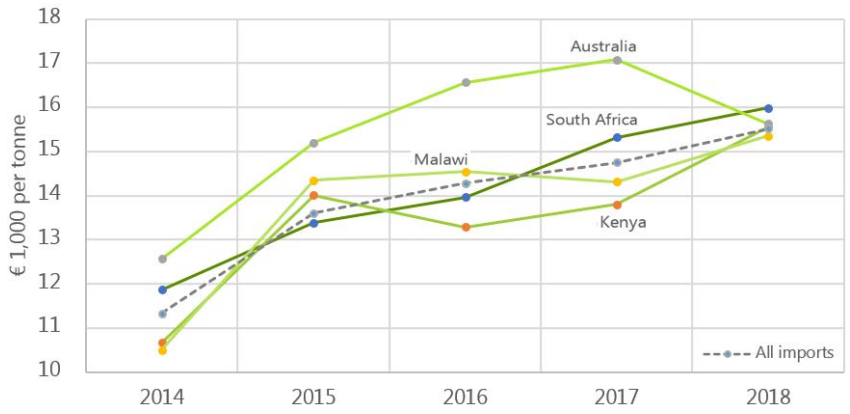
Figure 8 EU imports and exports of macadamia nuts in 2018 (tonnes, kernel)



Source: *Eurostat* (2019), 'EU trade since 1988 by HS6: 080262 - Fresh or dried macadamia nuts, shelled', online: https://ec.europa.eu/eurostat/data/database, viewed in September 2019.

Looking at average prices for macadamia kernel imports to Europe, an upwards trend can be observed in the last 5 years: the average price across all imports increased from €11,336 to €15,522 per tonne (Figure 9). In comparison, average prices per tonne of other tree nuts were around €4,972 for almonds, €6,690 for walnuts and €8,377 for cashews.[51] The highest prices were achieved for Australian imports, a country that is recognised for the high quality of its macadamia produce. South Africa also achieved higher-than-average prices in the last 2 years. Kenyan nuts used to achieve comparatively low prices but showed an increasing trend in the last 2 years, almost catching up with other key origins in 2018. It is likely that the highest-quality nuts are going into export.

Figure 9 Average price of EU macadamia imports, 2014 to 2018 (€1,000 per tonne)



Source: *Eurostat* (2019), 'EU trade since 1988 by HS6: 080262 - Fresh or dried macadamia nuts, shelled', online: https://ec.europa.eu/eurostat/data/database, viewed in September 2019.

Comparing average EU prices for imports of macadamia kernel from Kenya in the years from 2016 to 2018 with prices for US imports, the difference is minimal and may be due to currency exchange fluctuations.[52]

Many macadamia nut importers are also packers and, in addition, conduct trading and wholesale activities. Products are sold through different channels (Figure 15, Appendix 2). An estimated 80 percent of macadamia nuts are consumed as snacks on the EU market; the remaining 20 percent are used as ingredients, for example in cookies or ice cream. This ratio provides opportunities to develop more market segments.

1.4.2 Demand for certified macadamia

Demand for certified macadamia has continuously increased in recent years and is expected to grow even more in the coming years. According to interviews with sector experts, this applies to organic certified nuts in particular. Meanwhile, opinions on the demand for Fairtrade certified nuts are somewhat divided, with some interview partners confirming a growing trend, while others see less potential for the additional premium asked for this certification.

Limbua Group, a producer of organic certified macadamia in Kenya, has seen a rapid increase in demand for its produce in Germany in the last 2 years. This assertion is corroborated by some processors in Kenya. Next to conventional macadamia (mostly roasted and salted), raw organic macadamia nuts are also increasingly found in organic shops as well as conventional supermarkets.[53] Sector experts are also seeing growing demand for organic-certified macadamia nuts in Southern European countries, including Spain, Italy and France.

1.4.3 Growth opportunities and risks for Kenyan macadamia in Europe

The introduction of macadamia into Europe seems to follow a similar pattern to that of cashew nuts, which started in the same Northwest European countries and then gradually spread across Europe.[54] Macadamia nuts currently only account for a small share of the global and European market for tree nuts. It is generally not expected that the demand for macadamia will compete with the more dominant nut varieties like walnuts or peanuts anytime soon. This is partially because consumers are not familiar with the product, but notably also because of its comparatively high price. Macadamia is expected to remain a niche product in the nut sector, albeit with a growing market base.[55]

However, experts still see growth opportunities for macadamia sales in Europe, which will also provide opportunities for Kenya if the quality standards of buyers can be fulfilled. This applies to the more established markets in Western Europe as well as Southern European countries and the growing consumer markets in Baltic countries and Central and Eastern Europe.[e]

Macadamia nuts are often processed by roasting and salting them after arrival in consumer markets. While no detailed figures on macadamia volumes in prepared and preserved nuts segments are available, production of these types of products is showing a continuous increase in the EU. Increased consumption of all tree nuts that are considered a healthy source of protein is driving the processing of macadamia nuts in Europe (see Section 1.6). The conclusion from expert interviews is that buyers see less potential for imports of value-added products like confectionary or savoury snacks.

Growing demand is expected for organic snacks, although the basis for this is smaller than for conventional products. On the other end of the retail market, macadamia have in recent years also entered discounters like Lidl and Aldi. Sector experts see opportunities for use as an ingredient, referring to the potential for macadamia oil as a high-quality ingredient in cosmetics as well as in the food industry, where it can be used in nut butters, confectioneries or sports foods.[56] Its use as oil is also expected to remain limited compared to other oils due to the high price. However, it presents a convenient way to use lower-quality nuts. The processing and exporting of oils may provide opportunities, as the refining process gives them a longer shelf life. Other processed foods segments like nut butters will have limited growth potential while prices for macadamia nuts remain at the current high level. Cashews, almonds and other tree nuts are alternatives at half the price.

1.4.4 Main European buyers of macadamia

Nut and dried fruit importers, mostly based in the Netherlands and Germany, and producers of snack products as the key product segment for the expensive nuts are important buyers of macadamia. Companies tend to keep information on traded volumes confidential. Industry stakeholders involved in the supply chain of macadamia nuts to Europe (not necessarily from Kenya) include, among others:

- Catz International (NL, part ACOMO);
- C. W. Clasen (DE);
- Delphi Organic (DE, only organic);
- Freeworld Trading (UK);
- Global Trading & Agency (GTA) and Trade Development International (TD) (NL);
- HWB Nussfrucht (DE);
- Limbua (DE/KE, only organic);
- Orienco (FR);
- Richard Janssen (DE);
- Voicevale (UK).

Leading producers of savoury snacks are Intersnack (DE) and Snack Connection (NL).

1.5 Developments in other important markets

[e] Despite the Kenyan macadamia project involving SlovakAid, total kernel imports to the country remain small, with around 100 tonnes in 2017 (mostly from Germany) and around 40 tonnes in 2018.

Globally, the macadamia market is expected to grow at a CAGR of 7.5 percent based on value over the 10-year period of 2018 – 2028, according to the Future Market Insights analysis. Asia Pacific as the top consumer market will likely register a higher growth rate and remain the largest market through 2028, followed by the Middle East & Africa and North America.[57]

1.5.1 U.S.

According to INC estimates, the U.S. has the second-highest per capita consumption of macadamia after Australia. U.S. domestic production of macadamia reached 4,239 tonnes (kernel weight) in 2018, making it the fifth-largest producer globally.[58] In addition, the U.S. is the leading importer of macadamia kernel globally. In 2018, the country imported 11,215 tonnes of macadamia kernel, accounting for around one third of global macadamia kernel trade. NIS imports totalled 1,027 tonnes, around 98 percent of which came from Brazil, giving it only a small role in a market segment dominated by Asian countries. Kenya accounted for a share of around 46 percent of kernel imports in 2018, followed by Brazil with a share of 30 percent.[59]

There are 2 main reasons for the larger market share of Kenyan macadamia in the U.S. Firstly, the African Growth and Opportunity Act (AGOA) came into effect in 2000. Export promotion by USAID under the East Africa Trade + Investment Hub (EA Hub) and quality improvements led to a continuous growth in U.S. import volume and the value of Kenyan macadamia since 2000.[60] The AGOA aims to increase the competitiveness of eligible sub-Saharan Africa countries and to establish stronger commercial ties between the U.S. and relevant countries by reducing tariffs on select goods. Total AGOA exports from Kenya reached US$408.2 million in 2018, with 70 percent being from firms assisted by the USAID Hub. Under the AGOA, macadamia nuts are categorised as a 'specialty food' and qualify for duty-free access to the U.S. Specialty foods are high-value, low-volume products with particular qualities (e.g. uniqueness, origin, health or restorative properties, unusual application or extraordinary packaging). In 2017, the specialty foods market in the U.S. reached US$80 billion in total sales and grew at 3 or 4 times the rate of standard grocery store products.

The second reason for Kenya's high market share is the high per capita consumption of macadamia. As with Australia, there is high consumer awareness of the product. In comparison with these 2 markets, macadamia is still a rather exotic product with low consumer awareness in Europe.[61] Additionally, the more important use of macadamia as an ingredient in the U.S. food industry, contrary to the predominant snack segment in Europe, means that quality requirements are lower than in other important tree nut markets.

Market growth for macadamia in the U.S. is currently slow due to the high prices of raw materials. This is expected to change once prices come down, making them more competitive with other nuts.

Industry stakeholders involved in the supply chain of macadamia to the U.S. include, among others:

- Golden Peanut & Tree Nuts (part of ADM), leading U.S. importer of Kenyan macadamia;
- Hawaiian Host;
- Red River Foods.

1.5.2 China/Hong Kong

Asian countries and especially China prefer NIS. China and Hong Kong are by far the most important destinations for NIS exports globally.[f] In 2018, China and Hong Kong accounted for a total of around 31,000 tonnes (85 percent) of globally traded NIS. Imports of kernels only reached 1,300 tonnes to mainland China and 1,060 tonnes to Hong Kong in 2018.[62] China is known as a nut processor, which means that a share of the shelled nuts is re-exported.[63] In trade statistics, NIS imports from Kenya are negligible at a total of around 150 tonnes in 2018. However, this does not take illegal exports of NIS to China into account, be it via Kenyan export routes or via neighbouring countries (Section 1.2.4).

China is also producing macadamia itself and is expanding that production rapidly. Production (in-shell basis) was forecast at nearly 20,000 tonnes in 2018/19, twice as much as in the previous year due to increased bearings. According to estimates, Chinese kernel production is expected to at least triple in the period from 2019 to 2022. Due to increasing consumption, the increasing domestic supply is likely to be absorbed within the domestic market, without much impact on the import appetite.[64]

1.6 Trends influencing the macadamia market

Key trends with relevance to the EU, U.S. and global macadamia and tree nuts markets can be summarised using the STEEP (**S**ocial, **T**echnological, **E**conomic, **E**cological and **P**olitical trends) model. It is not always possible to make a clear-cut distinction between the different categories.

1.6.1 Social trends

Marketing of health benefits

Macadamia nuts have the highest levels of monounsaturated fats of any seed and high levels of omega-7. They are gluten-free, rich in vitamins, amino acids and other nutrients and provide a rich source of energy.[65] These traits serve to market macadamia as a high-value, low-volume 'superfood'. The INC promotes, among other things, studies on the ability of the tree nuts to lower cholesterol.[66]

In 2018, the global macadamia industry launched a €200,000 research project to provide evidence on the role of the nuts in a healthy diet.[g] The project investigates claims that regularly eating macadamia and other tree nuts protects against coronary heart disease, decreases the risk of type-2 diabetes and helps with weight management. The outcomes of the study are expected to help the global industry capitalise on the health diet trend.[67]

[f] It cannot be determined from trade statistics how much of the volume entering through Hong Kong is destined for the mainland market. Agribusiness companies with a strong presence in mainland China are also operating in Hong Kong.

[g] With copious financial contributions from key producing countries Australia, South Africa, Kenya, Brazil and Malawi.

Demand for healthy foods is thriving

Vegan, vegetarian and health-conscious food choices have been on the rise in mature consumer markets for several years already, and the trend is expected to continue.[68] In these dietary choices, macadamia is promoted as a healthy, energy-rich snack and as a dairy alternative in pastes and butters. Nuts, including macadamia nuts, are well reputed among European consumers. Consumption of nuts is expected to reach the highest growth in the snack segment. In major macadamia nut-consuming countries, the nuts are considered a healthier alternative to other savoury snacks like crisps and extruded snacks, and healthier than peanuts.[69]

Among healthier and more natural food choices, organic products are also seeing strong market growth. Companies like DOB Equity see this trend as reason to invest in the sector (Ten Senses in Kenya). As stated by DOB Equity's CEO, "*[a]s one of the largest certified organic producers in Kenya, Ten Senses is well-positioned to benefit from these trends.*"[70]

Natural cosmetics

With environmental and health awareness as an important trend, the use of natural products as well as environmentally friendly production methods in the cosmetics industry is increasing and is expected to grow further in the future.[71] The chemical composition of macadamia nuts with high levels of palmitoleic acids and oleic acids also makes them a desirable ingredient in various cosmetic products, from skincare products to shampoos and sunscreen.[72]

1.6.2 Technological trends

Transparency and traceability

Traceability, transparency and integrity are increasingly important features in today's supply chains. In order to build trust and credibility, companies are under pressure from consumers, NGOs, governments and other stakeholders to disclose more information about their supply chains. For example, food companies encounter increasingly more demand for information about ingredients, food fraud, child labour or animal welfare. Failure to meet these demands carries the risk of severe reputational damage.[73] While the issue has traditionally been stronger in Europe, awareness in other mature markets like the U.S. is also increasing. As shares of packaged food grow, it is expected that consumers in emerging markets will also demand more transparency.[74]

Digital technology for transparency

Digital technologies are increasingly leveraged to manage risks and drive engagement across value chains.[75] In recent years, blockchain has been presented as the answer by different parties, particularly in low-trust environments where participants cannot trade directly or lack a reliable intermediary. Blockchain allows information to be verified and value to be exchanged without the involvement of a third party. The initially expected benefit for agriculture is cost reduction, as it is expected to drive operational efficiencies.[76] Blockchain could also play a role in complementing existing certification schemes, as the traceability aspect is made easier and cheaper to handle.[77] However, as with other technological solutions, the system is only as good as the quality of the data that are being added.

Mobile technology

Mobile phones and business-related applications, e.g. for money transfer or to obtain market information, have rapidly spread over the past decade, also in low-resource settings. In this field, Kenya is seen as a leader on the African continent, where the revolutionary mobile money service M-Pesa was already introduced a decade ago. It is now used by 2 in 5 Kenyans. While access to

formal borrowing through loans remains a problem for many Kenyans, access to financial services has quickly grown, not least due to M-Pesa.[78] In the course of 2019, the same company plans to launch Agrikore, a blockchain-based digital payment, contracting and marketplace system that aims to connect small-scale farmers with large commercial customers.[79]

1.6.3 Ecological trends

Effects of climate change

Agriculture is one of Kenya's most important economic sectors and key to food security, economic growth, job creation, off-farm employment and foreign exchange earnings. The sector is dominated by small-scale farmers, with 75 percent of total output produced on rain-fed lands on farms averaging 0.3 to 3 hectares.[80] The sector is highly sensitive to climate change and its impact can already be felt through increased frequency and intensity of extreme weather events. However, agriculture also contributes to the problem as the largest source of GHG emissions; it was responsible for one third of Kenya's total emissions in 2010, and an increase by 30 percent is expected by 2030.[81] The effects of extreme weather events on macadamia production can already be observed (see Section 2.3.7).

Sustainability certification

Voluntary certification schemes mirror the growing consumer awareness and the resulting changing industry profile towards sustainability. Key sustainability issues that affect public perception relate to the working conditions of farmers (health, safety, fair wages and pricing), biodiversity and climate change. For macadamia, organic and Fairtrade certification are the most important certifications linked to sustainability issues.

Organic retail sales in the EU reached a value of €37.4 billion in 2017, a y-o-y increase of around 20 percent. The EU is the second-largest market for organic products after the U.S., accounting for 40 percent of the total consumption by value of organic products worldwide. Interviewees confirmed that the popularity of organic certification for macadamia nuts follows the general market for organic products in Europe, where the largest national organic foods markets by value are Germany (29 percent of the European market), France (23 percent) and Italy (8 percent).[82]

According to 2015 figures, Europe accounts for around 80 percent of retail sales of Fairtrade-certified products, followed by the U.S. with a 16-percent share. Due to the common practice of double certification reaching an overlap of up to 60 percent for certain products, it is not possible to report a single global figure for Fairtrade and organic.[83]

1.6.4 Economic trends

Macadamia market continues to grow

The macadamia market is expected to experience rapid growth in the coming years in many markets around the world. This includes the EU, the U.S. and Asian and Middle Eastern countries.[84]

Macadamia production is also growing

In line with increasing market demand, the outlook for future macadamia production is also positive, including in Kenya. It has been observed that farmers are increasingly planting macadamia trees, partly replacing coffee trees due to the more attractive earnings achieved (see Section 1.2.5). However, the yields of Kenyan farmers are still significantly lower than in other producing countries.

1.6.5 Political trends

Socio-political developments

Several emerging macadamia-producing countries with potential to expand production are experiencing civil unrest or are politically unstable. This includes countries such as Zimbabwe and Malawi, but also Kenya.[85] Political stability is a key factor in economic development and resulting concerns can have wide-reaching impacts. On a country level, socio-political developments are key underlying factors for the development of a commercial sector like macadamia, e.g. in relation to the eradication of poverty and inequality, the provision of resources to increase agricultural productivity or access to land. In a globalised world, such developments can impact across country borders.

Trade

On a macro-economic level, global trade accelerated for several years both in volume and in complexity, with the World Trade Organisation (WTO) forecasting a continuously strong development until last year.[86] However, this outlook became more modest in the last year, with escalating trade tensions, the global economy slowing down and increasing insecurity leading to a sharp downgrade by economists for 2019 and 2020.[87] The growing complexity in international trade is driven by the rapidly increasing trade volumes, as well as the need to comply with multifaceted regulatory and licensing requirements, ongoing trade agreement revisions, political unrest, mounting protectionist measures and the explosive growth in e-commerce.[88] Kenya is among the fastest-growing African economies, where agriculture provides an income for about 75 percent of Kenyans and accounts for a considerable share of the growing volume of traded goods. However, nearly half of the 50 million residents still live below the poverty line.[89]

1.7 European requirements

The following sections briefly look at key EU legal requirements, covering legislative as well as private standards and additional requirements by buyers in relation to macadamia as a commodity.

Buyer requirements can be divided into 2 groups:

- *legal and additional requirements,* which apply to all macadamia and tree nut exporters; and
- *niche requirements*, for nut exporters aiming to access specific segments.

1.7.1 Food safety requirements in the EU

Food safety is an important focus in legislative and additional requirements in the EU, including prevention of contamination. The EU has defined general objectives of food and feed law that aim to ensure a high level of consumer protection.[90] Harmful contaminants, such as pesticide residues, and excessive levels of mycotoxins or preservatives are banned.

Food safety: traceability, hygiene and control

The General Food Law (European Commission Regulation 178/2002) is the legislative framework for the subject of food safety.[91] Food products must be traceable throughout the entire supply chain to guarantee food safety, as well as to allow appropriate action in cases of unsafe food and to limit risks of contamination. An important part of controlling food safety hazards is defining critical control points (HACCP) by implementing food management principles and subjecting food products to official controls. Products that are not considered safe will be denied access to the EU.

Food safety control for contamination of food imported to Europe

Checking for the occurrence of mycotoxins, including aflatoxins, is a key part of food safety controls for nut imports. However, the incidence of mycotoxins is rare in macadamia nuts compared to other crops, such as groundnuts or maize. According to CBI research, aflatoxins are not an issue in macadamia nut production. However, macadamia nuts must comply with the increasingly strict legislation regarding the maximum allowed levels of contaminants in products.[92] Several new pieces of legislation concerning various pesticide residues have been introduced or announced in recent years, including additional residue limits that are relevant for tree nuts. In total, maximum residue levels (MRLs) for 490 pesticides are applicable for macadamia nuts.[93]

General requirements for packaging and liability

Non-product-specific EU legislation relates to packaging and labelling of food under Regulation 1169/2011. Since 2016, a nutrition declaration is mandatory for all goods marketed in the EU.[94] In addition, labels need to declare allergens. Macadamia nuts are included in the list of allergens.[95]

1.7.2 Additional buyer requirements

Food safety and sustainability

Through contact with the orchard floor, insects or other external factors, nuts are at risk of contamination with microorganisms. This exposure may lead to spoilage and can infest the nuts with pathogens. European and U.S. buyers generally require guidelines for prevention and control of the spread of the bacteria from the orchard through packing. Drying and UV sanitation are means to remove micro contamination.[96] The most common food safety certification schemes requested by European importers include the International Food Standard (IFS), Food Safety System Certification (FSSC22000) and British Retail Consortium (BRC). Certification under one of the commonly recognised sustainability certification systems is a competitive advantage. Useful schemes for access to retail markets are organic, Fairtrade, SMETA and BSCI or ISO 26000, kosher and halal. [97]

As food safety is a top priority in all European food sectors, many EU players may request extra guarantees, such as regarding the implementation of product-specific quality standards or Quality Management Systems (QMS) for the production and handling processes. Nut buyers may also require exporters to comply with a food safety management system (e.g. ISO 9001 or ISO 22000, which are based on HACCP principles).[98] The macadamia processors in Kenya are largely certified under one or more of the common schemes accepted on the European markets, like FSSC22000 or BRC.

Quality classification

The basic quality requirements for macadamia nuts are defined by the following criteria:

- Style: whole, mixture of whole and pieces;
- Absence of insects, mould, rancidity or damage;
- Characteristic taste and flavour free from foreign smell or taste;
- Moisture content of kernels not exceeding 2 percent.[99]

Quality is the result of many factors, including agronomic management, the harvest and post-harvesting processes and the processing of the nuts. Specific macadamia-nut quality requirements are defined in the classification by the United Nations Economic Commission for Europe (UNECE), including class, sizing and special characteristics (Table 11).

Corporate, social and environmental responsibility

European buyers may expect suppliers to comply with their supplier codes of conduct regarding social and environmental responsibility, which are often based on the International Labour Organisation (ILO) standards. This can be the importer's own code of conduct or a code of conduct that is part of an initiative in which the importer is participating. Adherence may be investigated through company audits carried out by a buyer/potential buyer or a contracted third party.

Third-party certification under one of the voluntary, broadly recognised schemes is the most common way to show compliance with CSR criteria, such as organic or Fairtrade certifications.

1.7.3 Ability of Kenyan macadamia producers to meet EU buyer requirements

With adequate training and support, Kenyan macadamia processors could meet the demands under EU regulations for food safety. Furthermore, no notifications related to any type of nut imports from Kenya are registered in the EU Rapid Alert System for Food and Feed Safety Alerts (RASFF).[100]

Overall, macadamia demand on the global market is outstripping supply, so an increase in supply of good quality produce has a good chance to find a market. However, the quality requirements of buyers of macadamia relating to the provision of fully mature nuts with consistent taste, colour and size remain challenging for Kenyan producers. These issues are discussed further in Section 1.9.

1.8 U.S. requirements

1.8.1 Food safety requirements in the U.S.

The U.S. regulatory system has a laxer approach to the use of food additives and chemicals in the growing, making and preserving of food products. This also refers, for example, to the use of pesticides, as the EU regulations exclude a broader range of chemicals than the U.S. regulations.[101] In addition, fewer food additives need to be declared on product labels.[102] In relation to macadamia nuts, permitted levels of aflatoxins are also higher in the U.S. While the EU handles a maximum level of 4 ppb for total aflatoxin presence, the U.S. has set this level at 20 ppb.[103] However, increased levels of aflatoxins seem to be less of an issue in macadamia than in other crops, such as groundnuts.[104]

Hygiene-related requirements are on similar levels though. Facilities that manufacture, process, pack or hold food for human consumption in the U.S. are required to register with the U.S. Food and Drug Administration (FDA). In addition, exporters must write and implement Food Safety Plans in compliance with the Food Safety Modernization Act (FSMA). Under this Act, since 2017, the Foreign Supplier Verification Programs (FSVP) for Importers of Food for Humans and Animals require importers to perform certain risk-based activities to verify that food imported into the U.S. has been produced in a manner that meets applicable U.S. safety standards.[105] In addition to HACCP self-control, writing and implementing an FDA Food Safety Plan is a mandatory requirement.[106]

1.8.2 Ability of Kenyan processors to meet U.S. import requirements

The U.S. is the largest buyer of Kenyan macadamia, so the food safety and quality requirements of U.S. buyers are broadly attainable. This does not account for all processors though, as only some producers export to the U.S. Interviewees mentioned that the quality of the installed equipment and the ability to fulfil food safety standards have increased in recent years. As regards the kernel quality, the requirements of U.S. buyers may in part be somewhat lower than those of European

buyers, as the share of nuts used as ingredients is higher. Nuts used in products such as cookies, ice cream or chocolates have somewhat lower quality requirements, for example in terms of kernel size and colour. As mentioned above, the strong market demand for macadamia nuts opens up opportunities on EU markets, but it may be easier still for some Kenyan producers to fulfil the requirements of U.S. customers.

1.9 Comparative and competitive position of Kenya in the macadamia sector

Kenya's performance in the macadamia sector and more generally in trade can be evaluated and compared with other producing countries, including established producers like South Africa and Australia as well as other emerging producers like Malawi or Guatemala.

1.9.1 Kenya's position among key competitors in macadamia production

Kenya has remained the third-largest macadamia nuts producer for several years now, with a share of around 13 percent of global production. South Africa and Australia clearly produce the most, with shares of 29 percent and 25 percent, respectively, in 2018. This makes them Kenya's key competitors. China currently accounts for around 10 percent of global production. The country intends to massively increase macadamia production in the coming years; however, this additional supply is expected to be consumed on the domestic market. Other emerging producing countries like Guatemala and Malawi have also continuously increased production, albeit from a smaller basis (the comparative and competitive position of these countries is discussed in Section 1.9.4). Kenya is also the third-largest exporter, with South Africa and Australia as the dominant forces in exports as well and emerging players such as Malawi and Guatemala with much smaller shares.

Table 4 Scoring of Kenya vs other macadamia producers on trading across borders, 2018

	Kenya	South Africa	Australia	Malawi	U.S.	Guatemala
Country rank – Trading[a]	**112**	**143**	**103**	**126**	**36**	**83**
Border compliance						
Time to export (hours)	16	92	36	78	2	36
Cost to export (US$)	143	1,257	766	243	175	310
Documentary compliance						
Time to export (hours)	19	68	7	75	2	48
Cost to export (US$)	191	55	264	342	60	105

[a] Score on a scale from 1 to 189, where 1 represents the highest and 189 the lowest performance.
World Bank (n.d.), 'Doing Business – Trading across borders'.

In terms of ease of doing business, Kenya achieves a medium score in the World Bank (WB) scoring, at rank 61 out of 190. This is lower than Australia and the U.S., but higher than other African producers, including South Africa.[107] The WB's *Doing Business* also analyses the logistical process of exporting and importing goods from and to a country, giving an indication of the time

and cost (excluding tariffs) associated with documentary compliance, border compliance and domestic transport procedures.[h, 108] Kenya ranks in between its key competitors – higher than Malawi and South Africa but lower than the U.S., Australia and Guatemala (Table 4). For border compliance, Kenya scores the best in comparison with the other 5 countries, with comparatively little time and money needed. In documentary compliance, the time to export is comparatively low, but the costs are considerably higher than in the U.S., South Africa and Guatemala.

1.9.2 Factors that differentiate Kenya from other producing countries

Dominance of small-scale production and low inputs

Compared with its competitors in macadamia production, like South Africa, Australia, China and Malawi, Kenya shows a different structure in the macadamia sector. Where the other producers are characterised by large-scale plantations, this is still a rare sight in Kenya, where small-scale production dominates, often in mixed cropping systems. There are only a handful of larger macadamia producers. As explained by interview partners, the establishment of larger estates is one of the factors hampered by the scarce availability of larger stretches of suitable land and, where this land is available, by high land prices. In addition, credit is expensive. China is still struggling with low productivity, but government support nonetheless enables quick growth.

The Kenyan sector is marked by a low level of mechanisation, inputs and extension services. Farmers are often not aware of the care that the trees require and feel that they are left to their own devices. Meanwhile, macadamia estates in South Africa and Australia are marked by a more high-tech approach and the use of higher-quality seedlings.[109] Interviewees also noted that macadamia trees of the rough-shelled species, *Macadamia tetraphylla,* are frequently grown in Kenya. Unlike the smooth-shelled species *M. integrifolia* that dominates commercial production in Australia and South Africa, *M. tetraphylla* produces nuts with a somewhat different flavour due to a higher sugar content. They also acquire a browner colour during roasting, lacking the distinct creamy colour that macadamia nuts are known for. However, this could also be turned into an opportunity, for example by using their slightly sweeter taste in nut butters or other processed products. The colour difference is less significant in snack mixes and raw nuts.

Quality issues

There are enormous quality differences in Kenyan production, but the sector is marked by low average yields, with trees producing only 50 percent of the crop of Australian trees on average.[110] Moreover, the practice of immature harvesting despite regulatory measures to counteract this (see Section 1.2.4) means that the nuts may not reach their potential when fully grown. Kernel sizes are smaller, and the moisture level is higher. This is particularly damaging when immature nuts are mixed into and spoil larger deliveries of ripe nuts. The occurrence of these quality issues leads to

[h] Documentary compliance: captures the time and cost associated with compliance with the documentary requirements of all government agencies of the origin economy, the destination economy and any transit economies.
Border compliance: captures the time and cost associated with compliance with the economy's customs regulations and with regulations relating to other inspections that are mandatory in order for the shipment to cross the economy's border, as well as the time and cost for handling that takes place at its port or border.

buyers hesitating to source from the country, and the average prices achieved in recent years were often lower for Kenyan nuts, although an upward trend is visible.

Immature harvesting compromises the quality of the nuts and leads to rejection of shipments, with lasting consequences for the reputation of Kenya as a macadamia supplier among buyers (Section 1.9.3).[111] The practice is driven by the large number of intermediaries (brokers) who are described as being at times unscrupulous in their buying and selling practices.[112] Small-scale farmers are driven to sell their macadamia before maturity by the attraction of immediate cash payment by intermediaries who accept nuts before full maturity. Another factor that is closely connected is the significant processing overcapacity that marks the Kenyan sector, estimated at twice the available harvest. Significant investments are required for setting up a factory and fulfilling the common industry quality standards required by export markets. The need to obtain enough raw material on a market where supply is tight means that processors more easily accept poor-quality crop. Luring farmers into early harvesting means that more than 10 percent of the crop supplied was rejected in previous years, which also constituted a loss for farmers.[113] Nonetheless, there are also positive views on the huge overcapacity in the country. The CEO of NutPak sees the overcapacity as an opportunity for farmers to increase production. He observes that, "*[f]armers are quickly shifting to macadamia owing to the frustrations from other crops like tea, coffee, sugarcane and maize*".[114]

Potential to produce top-class nuts, but performance is lagging

Meanwhile, European industry stakeholders confirmed in interviews that, under good management and agricultural practices, the Kenyan macadamia sector has the potential to produce top-class nuts with highly competitive kernel recovery ratios that can contend with producers like South Africa or even Australia.

In addition, in contrast to other producing countries, Kenya has a comparatively large share of organic or otherwise more natural production with little use of chemical inputs. This can provide increased profit margins, more price stability and a competitive advantage in accessing the rapidly growing organic market in Europe as well as in the U.S. (see Section 1.6). Limbua is an example of a German-Kenyan company sourcing organic nuts from small-scale contract farmers who achieve good results through direct support and training.[115] However, due to various shortcomings, the broader organic subsector is also struggling with poor performance. As noted by the Kenya Organic Agriculture Network (KOAN), it is marked by an unconducive legal and regulatory framework, inadequate research and development, weak extension services for farmers, poor development of market and infrastructure and the lack of a clear distinction between conventional and organically produced products. Value addition and processing are poorly developed, consisting mainly of transport and handling as opposed to produce transformation. Moreover, organic certification costs are high and hinder entry for resource-poor farmers.[116]

1.9.3 European buyers and their perception of Kenya and its macadamia nuts

Kenya has become an important producer of macadamia nuts. However, there have been cases where substandard products were marketed to buyers in consumer markets. Such practices have the potential to harm the Kenyan industry as a whole.[117] While there are indeed quality challenges regarding Kenyan raw materials, as highlighted in the previous section, several industry stakeholders stated that they had no complaints about the quality of the nuts that they purchased from specific processors in Kenya. These processors install good equipment, comply with high food safety practices and meet the quality standards of buyers. This does not seem to be the case for all processors though.

While the quality of supplies has improved in recent years, cases of rejections of shipments in international markets have been reported in the past and have led to lasting reputational damage. Reportedly, it is not unusual for producers of consumer goods to specifically exclude Kenyan macadamia from their buying specifications, whether based on actual experiences or not. Other market players reporting such a case can already be considered reason for exclusion.

While prices for nuts from South Africa and Australia tend to be higher, industry stakeholders confirmed that clients often prefer to pay a somewhat higher price if they can be sure that they will receive the expected and required quality, so they can market their own product with consistent quality.

With processors improving their practices, interview partners pointed to the need for training, education and extension services for smallholder farmers. Some of the larger processors are already working on this, in some cases together with contract farmers. The possibility for exchange and feedback on the quality in these more direct relationships between farmers and processors, cutting out intermediaries, is perceived as beneficial for improving the quality of nuts. But there is still a lack of broader, structural support, also from the government.

1.9.4 Comparative and competitive advantages of Kenya's competitors

While more expensive, South African and Australian macadamia nuts are of much higher and more consistent quality, with higher kernel recovery ratios than nuts from Kenya, which range from 10 to 15 percent compared to the 40 percent achieved by some processors in Australia. These origins receive a fixed demand, as buyers specifically request them in expectation of reliable quality. Also, Australia has an advantage because it is the birthplace of macadamia as well as a source for high-quality nuts. The country recently also successfully expanded its supply chain to less established markets in Europe and Asia.[118]

Brazil is another emerging macadamia supplier. Its 2018 crop reached 7,000 tonnes NIS. For 2019, a 10-percent increase is expected due to higher yields driven by favourable weather and more trees reaching maturity. In contrast to the emerging producers in Africa, production in Brazil is taking place at the plantation level.[119]

Meanwhile, the U.S. is not only an important buyer but also a producer, producing around 4,239 tonnes (kernel weight) in 2018/19. However, a y-o-y volume loss of up to 30 percent is feared for 2019/20, primarily because of a delayed harvest due to heavy rains and resulting increased insect attacks. In addition, the Hawaiian industry is struggling with high labour costs and the need for increasing investment to improve productivity following the emergence of the Felted Coccid, an insect that has been a traditional pest in Australian macadamia nuts.[120]

Chinese macadamia production is undergoing a rapid expansion as new plantings begin to bear. Unlike in Kenya, macadamia production in China is a government-supported initiative. However, while production is growing, yields and quality remain relatively low due to variety selection and orchard management practices, fragmented production, often on steep hillsides, and a lack of modern processing facilities.[121] According to INC estimates, China's production of macadamia nuts might reach 190,000 tonnes NIS in 2022, around half of global production. The INC expects the growth to be largely absorbed by the huge domestic market, with little impact on import volumes.[122] However, NutPak sees a danger of China eating into Kenya's traditional market with cheaper nuts.[123]

Smaller emerging producers like Guatemala and Malawi are not yet seen as serious competitors on the global macadamia market in terms of volume. While Malawi is small compared to Kenya, the

investment in *M. integrifolia* and quality processing with good farm-to-factory traceability has led to it being seen as a reliable supplier of macadamia kernel to the European market. Production is growing in both countries though. Zimbabwe is currently only exporting NIS, catering to the Asian market. The predominantly small-scale Zimbabwean farmers have been struggling with the impacts of climate change, as they lack the financial means for drilling boreholes. Meanwhile, global warming and increasingly unreliable rainfall are making the need for irrigation more and more urgent.[124] The quality of a considerable portion of Zimbabwean production reportedly does not yet meet international standards.[125]

1.9.5 Local vs foreign-owned SMEs

Macadamia trading and exporting in Kenya are dominated by Kenyan-owned companies. While less numerous, small and medium-sized companies with over 50 percent foreign shareholding still play an important role, particularly as some of them are suppliers of organic macadamia to Europe.

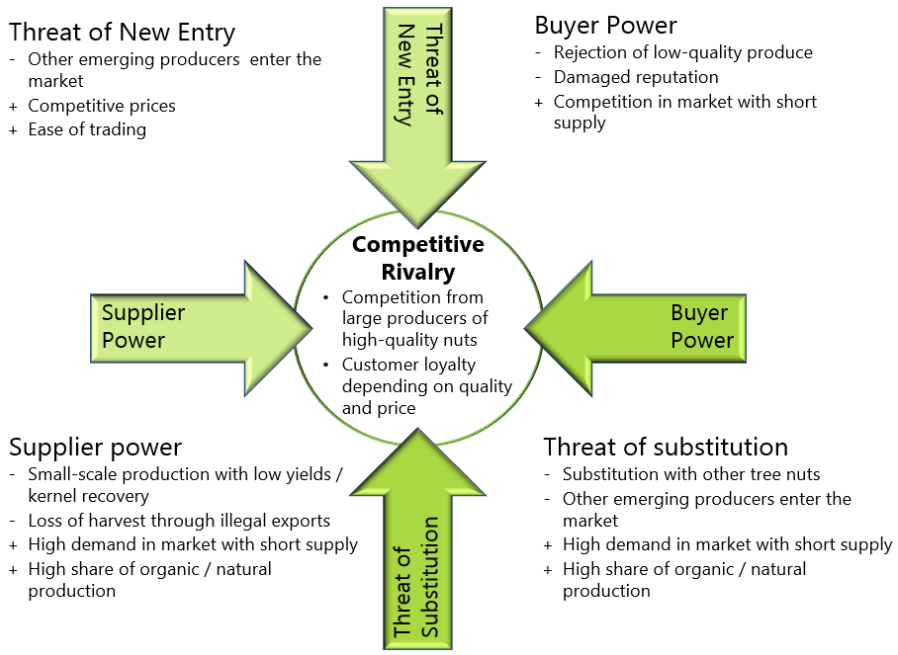
1.9.6 Competitive environment for the Kenyan macadamia sector

Using Porter's Five Forces analysis, some overarching conclusions on the competitiveness of the Kenyan macadamia sector can be drawn. The key findings on the positioning of the Kenyan sector relative to its competition are summarised in Figure 10 and described in the following sections.

Competitive rivalry in the industry

Macadamia nut products competition on the European market includes all other types of edible nuts. Macadamia being an expensive nut, the immediate competition on product level comes from other luxury or 'tree' nuts, such as almonds, pistachios and cashew nuts. Major competitors are from the primary producing countries such as Australia and South Africa, but also from all other emerging macadamia nut-producing countries.[126] Despite the tight supply, customer loyalty is strongly dependent on a convincing combination of quality and price.

Figure 10 Kenyan macadamia nuts, Five Forces analysis



Threat of substitution – medium force

Demand for macadamia on global markets is strong and these nuts are expected to remain in tight supply. This creates opportunities for the growing output from Kenya as well, provided that quality requirements are met by kernel processors. Kenyan nuts that are harvested at maturity and processed according to high standards can rival top origins like Australia and South Africa at very competitive prices. In addition, Kenya has a comparatively high output of certified organic produce and produce from smallholders that may only need limited support in converting to certified organic production.

On the downside, there is also increasing supply from other producing countries, aiming to profit from the high prices. While several of them may struggle with issues that are similar to those of Kenya, countries like Brazil that produce on larger-scale plantations may be able to more readily supply high-quality nuts if they have the kernel processing capacity. In addition, the rejection of shipments due to substandard quality has damaged the reputation of Kenya as a supplier. This has damaged buyer confidence in Kenya, so trust will need to be repaired and a long-term reputation as a reliable supplier will need to be established.

As macadamia nuts are the most expensive segment among tree nuts, competition from and substitution by other tree nuts is a risk, especially at times of high world market prices. This is the case for use in savoury and sweet snacks and as ingredients, since products like almonds, cashews and pistachios are considerably cheaper.

Threat of new entry – low to medium force

As mentioned above, several other countries have started to enter the lucrative macadamia market in recent years. If they manage to successfully achieve the quality standards of leading buyers, they may present serious competition for Kenya despite the tight supply situation on the world market. However, new entrants need to tackle the same issues as Kenya regarding agronomic systems, high-quality processing and other market requirements. Kenya can use its potential for high-quality produce, the high share of organic production and low-cost smallholder farming as a competitive advantage.

The overcapacity in processing may under certain circumstances provide a business opportunity for Kenya. As tree planting increases across the region, there will be periods when NIS supply exceeds local processing capacity. However, these periods will be of short duration, as transport costs will become an important factor when new capacity develops near to production.

In addition, compared to other emerging market players, Kenya scores comparatively well on factors that influence trading across borders.

Buyer power – medium force

Due to its ongoing growth, the global macadamia market has a limited supply with marginal stocks. This generally reduces buyer power, as it creates competition for supplies and pushes up prices. However, the Kenyan situation shows that produce that does not meet the high buyer requirements is still rejected.

The processing industry wants to lower the costs of supply and processing. Consequently, there is a search for partnerships, joint ventures and backward integration in order to ensure a constant quality and supply. This offers opportunities for suppliers from developing countries, under the precondition of constant quality and supply. In the light of increasing traceability demands, the same applies to processors who are able to effectively trace the supply chain of their produce all the way upstream.[127]

The fact that macadamia nuts are catering to a niche market means that buyers can more easily substitute them with alternative products if prices get too high or quality is unsatisfactory.

Supplier power – low to medium force

The Kenyan macadamia sector shows a divided picture. While the country has the potential to produce top-quality nuts and does so in parts already, the sector is also struggling with a number of shortcomings. These include low average productivity and very low kernel recovery ratios due to a lack of training and input, quality problems due to premature harvesting, insect damage and not all processors having high-quality equipment and food quality standards. Shipments of low-quality nuts have led to reputational damage that is difficult to repair.

Meanwhile, the currently strong demand for macadamia and the high prices on the global market, in combination with the potential for producing high-quality, organic nuts, offer interesting opportunities for the Kenyan sector.

Chapter 2 Structure, governance and sustainability of the Kenyan macadamia value chain

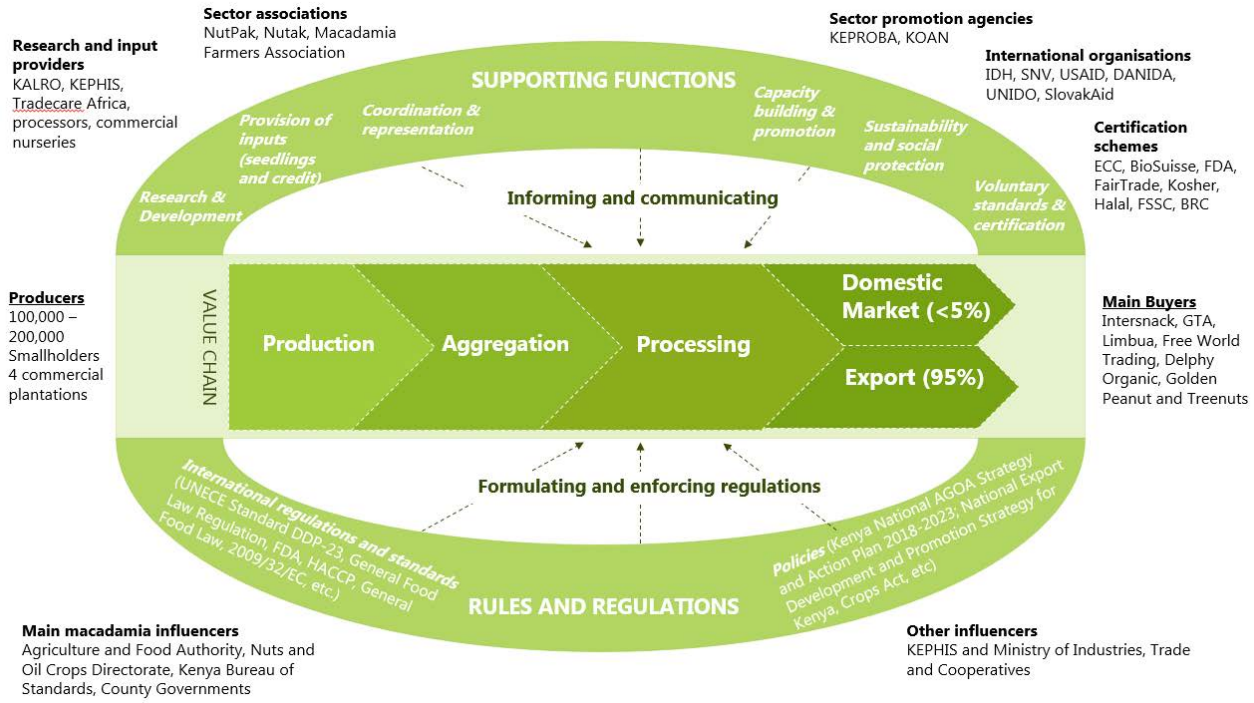
This chapter provides a textual analysis of the structure, governance and sustainability of the macadamia value chain in Kenya. It also presents a visual value chain mapping, showing the main actors, supporters and influencers in Kenya's macadamia value chain, as well as their interrelation.

2.1 Value chain actors, influencers and supporters

2.1.1 Kenya macadamia value chain mapping

The Kenyan macadamia value chain comprises producers (smallholders and macadamia processors' plantations), aggregators (traders and associations), processors (who also export), influencers and supporting organisations. Figure 11 shows a visual mapping of Kenya's macadamia value chain. A brief profile of actors, influencers and supporters is presented in Sections 2.1.2 to 2.1.4.

Figure 11 Kenyan macadamia value chain



2.1.2 Actors

- **Smallholders:** there is some uncertainty about the number of smallholders active in the Kenyan macadamia sector. In 2008, it was estimated that 100,000 farmers were involved in the sector.[128] In 2019, sector estimates vary between 100,000 and 200,000 farmers.[129] Nutak claims to have a registry of 200,000 macadamia farmers and believes that over a million farmers supply the sector. Most of these farmers have received basic education and are between 50 and 60 years old, indicating an aging farming population. However, there are indications that young people are increasingly adopting macadamia farming as a source of employment. Most farmers produce less than 100 kg of macadamia annually. This is due, in part, to poor Good Agricultural Practices (GAP), resulting in low yields. Moreover, they are primarily coffee or tea producers

who use macadamia trees as shade trees or windbreakers. With macadamia being a secondary crop for most farmers, smallholders tend to sell their nuts whenever opportunities arise (for example, whenever they need cash and there is a willing buyer) and not when the crop has reached maturity. The fact that smallholders are so numerous poses challenges to the enforcement of the moratorium on immature harvesting and the quality of macadamia, and to their organisation in farming cooperatives.

- **Plantations:** to have more control over the quality of macadamia nuts, Kenya's large macadamia processors, namely Kakuzi, Kenya Nut Company, Equatorial Nuts and Wondernut International, have set up or are in the process of setting up large landholdings dedicated to growing macadamia. Since 2007, Kakuzi has planted macadamia orchards on more than 1,000 hectares in the Kakuzi Hills. Production reached 229 tonnes in 2018 against 178 tonnes in 2017. In 2015, a macadamia cracking plant was added to the operations. Kakuzi is controlled by the UK-based Camellia Group, which also has macadamia orchards in Malawi and South Africa.[130] Camellia claims to be one of the largest privately-owned macadamia suppliers in the world.[131] Kenyan Nut is another larger player, producing macadamia and cashew nuts as well as coffee, cocoa and oils. The company operates 7 farms on over 3,000 hectares, with a complete production system from seedlings to ready-for-sale products and an international market. Of these 7 farms, 4 are macadamia plantations with a total surface area of 1,567 ha. Of these plantations, 2 are in Kirwara Township and Juja Town and the other 2 are located near Thika Town.[132] Lastly, Wondernut International started growing its own macadamia in 2017 on an 810-ha farm. Their first crop should be harvested in 2021.
- **Aggregators – individual agents and associations:**
  - **Traders:** traders buy macadamia nuts from farmers and sell them again to processors. They can be broken down into different roles: 1) small collecting agents, who buy small quantities directly from farmers; 2) collecting agents, who buy from small agents and number between 2,000 and 3,000, according to some sector stakeholders; and 3) AFA-licensed agents, who in turn buy from the collecting agents and of which there are 100. While collecting agents engage in trade as independent agents, AFA-licensed agents work on the basis of exclusivity contracts with processors. There is a rather negative attitude towards traders in the sector. Many stakeholders refer to them as "brokers" and accuse them, among other things, of holding the sector hostage, by setting the price and enabling the harvesting of immature macadamia. Nonetheless, traders also conduct the task of gathering small amounts of crop and collecting them in volumes that are large enough for processors to work with. In the current VC setting, processors are not in a position to engage in direct trade with all macadamia producers.
  - **Processors:** AFA's latest listing recognises 29 macadamia processors in Kenya with a joint installed capacity of 97,650 tonnes annually and an actual processing capacity of 34,645 tonnes. During this study, we found that: 1. some of the processors in AFA's list have in the meantime gone out of business or are currently dormant; and 2. some processors do not appear in AFA's listing (probably because they had not yet received their license at the time the list was elaborated). In 2018, according to our own market intelligence, there were 24 processors with a joint installed capacity of 97,360 tonnes and an actual capacity of 46,406 tonnes (see Appendix 4).

    Apart from adding value to macadamia by processing it, processors also act as traders, in that they aggregate small amounts of crop through their buying shops. Buying shops are

warehouses where small farmers can go to sell their crop. Most processors have buying shops at several locations in the macadamia-growing regions of Kenya.

Most macadamia processors have their own lorries (or rental lorries) to transport macadamia from farms or buying stores to the processing plants. Once processed, these processors contract the services of logistics companies to transport ready-to-export macadamia to the Port of Mombasa. Freight service providers include DHL, RHS Freight Services and Kuehne + Nagel. Larger processors have their own fleet to transport macadamia to its port of export.

- **Sector associations:**
  - **NutPak:** Nut Processors Association of Kenya is a nut sector platform (cashew, macadamia and peanuts) that provides a space for cooperation among sector stakeholders (particularly producers, processors and the government) and promotes investment and trade.[133] In recognition of the challenges facing the sector and in defence of its members' interests, NutPak has invested resources to address some of the root causes of immature harvesting by investing in the capacity building of macadamia farmers. Most macadamia processors are members of NutPak.
  - **Nutak:** the Nut Traders Association of Kenya is composed of 150 nut traders, 5 nut processors and about 250,000 farmers. Nutak's mandate is to champion better prices for farmers and to improve the quality of Kenyan nuts. As a sector association, Nutak claims to have tried to engage in decision processes concerning the nut sector in Kenya. However, according to Nutak, AFA does not fully recognise them even though they have existed since 2011 (however, they did not obtain their sector association license until 2018). Processor members have joined Nutak because they find NutPak's membership fees too high. Nutak has been engaged in building the capacity of macadamia farmers by organising roadshows in which farmers are informed about GAP.
  - **The Macadamia Farmers Association (MFAK)** links over 10,000 farmers in all of Kenya's macadamia growing regions. MFAK's mandate, like those of other sector associations, is to defend the interests of its members. In this context, MFAK has been announcing farm gate prices for macadamia at the beginning of every season. However, these prices have encountered opposition from other sector players. MFAK is part of the KENYA National Farmers' Federation (KENAFF), which is an umbrella federation of 36 actors in the crops, livestock, fisheries and forestry value chains in the country. As part of its efforts to address the sector's challenges, the association is also planning to do a census of macadamia farmers and nut production to help counteract the problem of immature harvesting.

2.1.3 Influencers

The main influencers in Kenya's macadamia value chain are the Agriculture and Food Authority and the Nuts and Oil Crops Directorate, the Kenya Bureau of Standards and county governments.

- **The Agriculture and Food Authority (AFA)** is responsible for agricultural policy and planning. It plays a key role in providing an enabling environment for macadamia production. Particularly, AFA's mandate is to administer the Crops Act in accordance with the provisions of the AFA Act 2013 and the Crops Act 2013 and to regulate the production, processing, marketing, grading, storage, collection, transportation and warehousing of agricultural products. Moreover, AFA advises the national government and the county governments on agricultural levies for purposes of planning, enhancing harmony and equity in the sector.[134]

- **The Nuts and Oil Crops Directorate (NOCD)** is an arm of AFA. Its mandate is to develop, promote and regulate the nuts and oil crops industry in Kenya. Before the enactment of the AFA Act 2013 and the Crops Act 2013, the role of developing, promoting and regulating the nuts and oil crops subsector was largely amorphous. The Kenya Coconut Development Authority was tasked with the responsibility of developing, promoting and regulating the coconut industry while the Horticultural Crops Development Authority, among other functions, focused on other horticultural crops, including macadamia. The Ministry of Agriculture, Livestock and Fisheries handled the rest of the nuts and oil crops. Since 2013, the NOCD's role has been to execute AFA's responsibilities, thereby becoming more prominent in the sector than AFA. Moreover, its work includes the establishment of a model nursery for nuts and oil crops and the establishment of a gene bank.
- **The Kenya Bureau of Standards (KEBS)** is the national standards organisation of the Republic of Kenya. During the development of Kenya Standards, documents are circulated for study within the technical committees or subcommittees. These documents pass through several stages before they can be approved as Kenya Standards. This procedure is designed to ensure that the result is acceptable to as many interest groups as possible.[135] In this context, KEBS' most influential standards for the Kenyan macadamia sector are CD-DEAS 20/09 Macadamia Kernel – Specification and CD-DEAS 20/09 1 Roasted Macadamia — Specification.
- **County governments** in each of the macadamia-producing regions are crucial to the development of the Kenyan macadamia sector. According to sector stakeholders, county governments are more influential than AFA. County governments work together with national and international governmental and non-governmental organisations to enhance regional development across several productive sectors. For example, the government of Meru County partnered with SlovakAid in 2019 to produce 200,000 macadamia seedlings annually to be distributed to farmers in the region in a bid to double the county's production from the current 5,000 tonnes yearly to 10,000 tonnes by 2022.[136]

Other stakeholders influence the macadamia value chain in one way or another, including KEPHIS and the Ministry of Industry, Trade and Cooperatives.

2.1.4 Supporters

There are several stakeholders that provide various forms of support both to macadamia farmers and for the development of the value chain. Only a few of them are highlighted below, while the others are presented in Section 2.4 and highlighted in Figure 11. As mentioned in Section 2.1.2, private sector associations (NutPak and Nutak) can also be considered as VC actors and supporters.

- **Kenya Agricultural and Livestock Research Association** (**KALRO):** KALRO is a corporate body created under the Kenya Agricultural and Livestock Research Act of 2013 to establish a suitable legal and institutional framework for coordination of agricultural research with the goals of promoting, streamlining, coordinating and regulating research into crops, livestock, genetic resources and biotechnology in Kenya.[137] One of KALRO's subprogrammes is macadamia research, which is organised in 3 research units: breeding, agronomy and crop protection. The research is carried out at the KARI-Macadamia subcentre in Kandara. Breeding work focuses on the development of superior varieties through introduction and selection, evaluation of crossbred lines and local adaptation trials in the various agroecological zones. Tissue culture propagation has been introduced with the aim of reducing the nursery stage duration and increasing seedling production to meet the increasing demand for macadamia seedlings. Laboratory rearing of the southern green stinkbug *Nezara viridula* (the host insect for

parasitoids of the Macadamia stinkbug *Bathycoelia distincta*) was initiated as a biological pest control agent.[138]

- **Tradecare Africa:** Tradecare Africa Limited is a social enterprise that taps the knowledge from global value chains to invest in services that have transformative impact on African smallholder farmers. Tradecare provides consultancy services to the private sector, the development sector and academic and research institutions in areas of organisational development, research and impact studies as well as joint implementation of long-term projects designed for sustainable positive impact on lives. Tradecare invests resources from its consultancy services in sustainable enterprises that have transformative impact at scale. The investments include React Cert Africa, which is a third-party product and management systems certification agency, Mazao Safi Division, which is a farmer extension enterprise, and Soko Safi, which is a wholesale market for Food Safety Assured Fresh Fruits and Vegetables, managed through a transparent aggregation system and promoted in the Kenyan domestic market.[139] Tradecare's involvement in the Kenyan macadamia sector is presented in Section 2.4.10.
- **KEPROBA:** the Kenya Export Promotion and Branding Agency is a 2019 merger of 2 Kenyan governmental offices: the Export Promotion Council and the Brand Kenya Board. Its mandate is to promote and brand Kenya as a supplier of high-quality goods and services and ensure harmonised application of the national mark of identity for Kenyan goods and services, while also being mandated with the task of collecting, collating, disseminating and serving as a repository of trade and Kenya brand information. It also encourages and monitors the observance of international standards and specifications by exporters.[140]
- **KOAN:** KOAN is a membership organisation with members across the country and unites producers, exporters, traders and NGOs. KOAN provides a platform for collaboration among stakeholders in the organic sector (i.e. work on advocacy issues that would lead to the sector's development), also to address challenges of certification. The organisation represents over 200,000 farmers and exporters across several sectors and works with partners throughout the country. As part of its activities, KOAN helps organic producers find markets for their produce both locally and internationally. According to KOAN, macadamia is one of Kenya's largest organic exports. In this context, they work with organic macadamia processors such as Ten Senses, Jungle Nuts and Macadamia Fans. KOAN does not conduct outreach and therefore only works with stakeholders who explicitly request their support. Aspiring macadamia processors such as Wondernuts and Superfine African Nuts have requested KOAN's support in the past.

Other national stakeholders active in the Kenyan macadamia sector include Fairtrade, which works with organised farmers of different sectors to help them become certified cooperatives, and Kenya's Agricultural Finance Corporation (AFC), which assists in the development of agriculture and agricultural industries by offering loans to farmers, cooperative societies, incorporated group representatives, private companies, public bodies, local authorities and other persons engaging in agriculture or agricultural industries. [141] Supporting international organisations and their programmes are discussed in Section 2.4.

2.2 Value chain governance structure and cooperation

The Kenyan government, through AFA and the NOCD, is at the centre of the governance of the macadamia sector in the country. The sector is regulated through 2 main instruments – the Kenyan Crops Act 2013 and the Kenya Agriculture and Livestock Research Act (particularly Section 43). AFA and the NOCD are the primary institutions responsible for leading the sector and implementing the development strategy and directive.

Despite the existence of a dedicated governmental body for nuts (the NOCD), the consensus among interviewed stakeholders was that these 2 main regulatory instruments have so far insufficiently championed progress for the sector. This is illustrated as follows:

- There is a misunderstanding about the mandates for the macadamia sector. Historically, the sector has mostly been self-regulated, which created quite a few problems. Only in 2014 did AFA become involved. Despite AFA's current involvement in the sector, the regulations in place are still adaptations from other sectors and are often not relevant or applicable to the macadamia sector.
- Funding for research and extension is necessary in order to improve macadamia varieties and the management practices of farmers but is nevertheless lacking. Currently, research is dormant due to the lack of funding. Extension is mostly done by the private sector (processors that invest in their suppliers (i.e. farmers)). While government-supported extension services do exist, these do not focus on macadamia.
- Kenya's ecological zones are a key defining factor for production; however, this factor is largely overlooked, for example, as demonstrated by sector-wide dissemination of biologically unsuitable varieties or by a moratorium on harvesting that disregards local agricultural calendars.
- While AFA has requested processors to devote resources to the sector (for example, by investing in improved seedlings), these measures remain insufficient.

Moreover, stakeholders have highlighted pressing issues facing the macadamia sector that need to be addressed through improved governance and collaboration. These issues are summarised below:

- While it is the obligation of all sector stakeholders to observe the harvesting period agreed in the sector, stakeholders feel that AFA has fallen short in enforcing the moratorium on harvesting of macadamia and the ban on NIS exports. While these accusations are not directed at AFA, stakeholders state that corruption is responsible for the failure of these policies.
- Stakeholders belong to many different associations, and there is often very little cooperation between these associations. Better cooperation in the sector needs to be encouraged and AFA should take a leadership role in this.
- There is a lot of fragmentation regarding the GoK's development objectives and the corresponding policy instruments to achieve those objectives. Existing policy instruments for the macadamia sector are sometimes conflicting. For example, the Crops Act offers conflicting guidelines for macadamia farming. This has resulted in tensions between county and national administrations that need to be addressed. This situation is exacerbated by flaws in governance, where private sector interests often influence public policies. For example, AFA's licensing rules push the overproduction of macadamia varieties (notably, *M. tetraphylla* varieties) that are not suitable to the different ecological zones of Kenya. According to KALRO, each variety has its own biotic and abiotic requirements, and these are not taken into account in the current setting.

Figure 12 shows a visual map of the interrelationship between key actors in Kenya's macadamia value chain.

Figure 12 Interrelationship between stakeholders in the Kenyan macadamia value chain

2.3 Value chain sustainability issues

2.3.1 Gender inequality

There are many indications of widespread gender-based inequalities in the Kenyan macadamia sector. Macadamia processing, and especially low-paid tasks such as sorting and grading, is predominantly done by women. When asked about the reasons for their choice of employees, most processors highlight women's patient 'nature' and keen eye to observe the quality parameters, as well as their ability to sit for long periods of time. In contrast, supervisory and management positions are generally dominated by men. Only one of the pre-audited companies is owned and led by women. Likewise, the cutthroat nature of the business, especially regarding the purchase of nuts, the heavy cash investment required and the inability to raise the collateral required to access loans, have served to prevent women from investing in the sector.

Moreover, according to ICTSD, farmers who sell from the farm gate and who are mostly women tend to get lower prices than farmers (usually men) who deliver to the factories or to buying centres. Moreover, in smallholder macadamia farming, duties and roles are not equally shared in the household. Women are largely involved in labour-intensive tasks such as planting, harvesting and de-husking the nuts, mostly by hand and using crude tools. As the women are largely responsible for household chores, they are unable to take on marketing functions that take them away from home. Both their husbands and their culture will literally discourage them from doing so. The agents who buy from the farms are usually men, and they very often take advantage of the women, buying at low prices and using false weights.[142]

2.3.2 Child labour

According to the 2018 report on the worst forms of child labour, by the US Bureau of International Labour Affairs, Kenyan children are victims of human trafficking within and outside the country, and they are exploited to engage in commercial sexual exploitation, domestic work, agricultural work, fishing, begging and street vending. In rural areas, poverty drives some families to engage in child trafficking, sending them to urban centres for domestic work. [143]

Section 56 of the Employment Act of 2007 allows employment of children between 13 to 16 years of age for light work. While this is in line with international regulations, it does not define light work and does not provide protection for children in such employment, leaving it to the discretion of the minister. Moreover, the minimum age restriction does not apply to employees who belong to the same family as the employer – unless the undertaking is dangerous to the life, health or morals of the persons employed. There is no legal minimum working age in the agricultural and services sectors, or for domestic work.[144] It is highly likely that macadamia farmers are not fully aware of the various protections that are required by international norms and conventions, i.e. ILO C138[145] and C182.[146] The U.S. Department of Labor's 2016 List of Goods Made with Forced Labor and Child Labor indicates that coffee is produced with child labour in Kenya.[147] As stated earlier, most macadamia farmers are primarily coffee or tea farmers, so child labour is likely prevalent in the macadamia sector.

Evidence gathered by University Canada West suggests that extending social health protection is directly relevant to efforts against child labour.[148] A study in western Kenya demonstrates the relevance of social health protection to child labour. The study examined how the supply of children's labour changed when HIV-positive adult household members gained access to antiretroviral (ARV) treatment.[149] Likewise, findings from a worldwide study suggest that achieving universal social protection that includes not only social health protection but also public employment programmes, social protection for people with disabilities, income security in old age and unemployment protection would effectively remove one important cause of child labour.[150]

No programmes were identified that focus on addressing child labour in Kenya's macadamia sector. However, there are programmes that focus on the agriculture sector in general and on the coffee sector in particular (which is relevant because most macadamia farmers are, above all, tea or coffee farmers). Table 5 provides an overview of organisations and their projects that focus on child labour.

Table 5 Organisations focusing on child labour

Organisation	Projects/activities on child labour
MEACL&SP	• In recognition of the high incidence of child labour in East Africa, the Ministry of East African Community, Labour and Social Protection (MEACL&SP), social partners, the private sector, development partners and other stakeholders developed the National Child Labour Policy. The Policy targets 3 broad groups of children: children at risk, children already harmed by exposure to child labour and children in the worst forms of child labour that require immediate direct action. A key component of the policy is the strong institutional framework and integrated implementation, monitoring and evaluation mechanism.[151] • On 6 October 2016, Kenya's parliament debated and passed the national policy on elimination of child labour, commonly known as Sessional Paper number 1 of 2015 on the National Policy on Elimination of Child Labour. [152]
ILO	• The ILO, through its International Programme on Elimination of Child Labour (IPEC), supported the development of Kenya's National Policy on Elimination of Child Labour, following the leadership of the National Steering Committee on Child Labour, the National Labour Board and the National Council for Children Services. In this context, technical assistance and financial support have been provided through various technical cooperation programmes, such as Combatting Child Labour in Agriculture (COMAGRI); Time Bound Programme on Elimination of Child Labour (TBP); Tackling Child Labour through Education (TACKLE); Support to the National Action Plan on elimination of child labour (SNAP); and Combatting Child Labour through Skills Training. [153]

Organisation	Projects/activities on child labour
World Vision Kenya (WVK)	• WVK implements several projects focusing on child protection and advocacy. In Kenya, WVK projects have benefitted over 100,000 children in 22 counties.[154]
Plan International Kenya	• Plan International applies a rights-based approach in working towards transformed institutions, laws and communities that respect the rights of children, especially girls, in Kenya. • PI works in 18 counties across the country: Nairobi, Machakos, Kajiado, Tharaka Nithi, Siaya, Bungoma, Busia, Taita Taveta, Kilifi, Mombasa, Kwale, Vihiga, Kakamega, Kisii, Migori, Homabay, Kisumu and Marsabit.[155]

CESVI, an Italian humanitarian organisation, with support from Sea Milano Network, worked on child labour issues in Kenya in the past.[156]

2.3.3 Low wages and farmers' price

The Kenyan economy is characterised by a large share of jobs in the informal sector, including small-scale farming. These constituted 83.6 percent of total employment in the country in 2018, an increase by 5.4 percent y-o-y.[157] In addition, family members are involved in farming, presumably without pay.

Kenya has a mandatory minimum wage set by the government. In contrast to countries with nation-wide minimum wages, the GoK sets minimum wages not only by age and skills level but also by location. Table 6 provides an overview of selected minimum wages set for the agricultural sector. The average minimum wage in the sector was KES 9,014 (US$90) in 2018.

Table 6 Monthly basic minimum wages in the agricultural sector in Kenya, 2018

Type of employee	Wage (KES)	Wage (US$)
Unskilled employees	6,736	67
Stockman, herdsman and watchman	7,779	78
Skilled and semi-skilled employees		
Farm foreman	12,152	122
Farm artisan	8,051	81
Lorry driver or car driver	9,871	99
Average across all types	**9,014**	**90**

Source: Kenya National Bureau of Statistics (2019), *Economic Survey 2019*, p. 39.

Most workers at macadamia processing units are hired seasonally and are often paid as low-skilled labour. Unskilled activities in urban areas that could compare with activities in processing plants had minimum wages between KES 11,603 and KES 13,975 (between US$116 and US$140).[158] These wages are meagre when considering that the living wage in Kenya is set at a monthly level of at least KES 20,900 (US$209) for an individual and KES 46,600 (US$466) for a family.[159]

Organisations working to ensure a living wage in commodity value chains include Global Living Wage Coalition, Fairtrade and True Price.

Small producers are particularly vulnerable to the negative effects of economic and climate-related shocks. The combination of macadamia and food-crop production can advance the livelihoods of these farmers through improved gross margins, food security and on-farm cash flows, especially since macadamia nuts have been able to achieve comparatively high farm gate prices in recent

years, e.g. in comparison with coffee. This has led to an increasing number of small-scale farmers turning to macadamia. Farmers' prices are, however, influenced by a range of factors, including nut quality and where in the value chain the buyer is located.

2.3.4 Contracts and working hours

Interviewed processors stated that all workers, both permanent and temporary, are given a contract, with an explanation of the tasks to be conducted as well as the period of employment, working times, perks and remuneration. It was not clarified, however, whether workers get a pay slip with their salary. At all pre-audited plants, workers are hired for 45 hours a week – working from Monday to Friday, from 7 AM to 4 PM, with an hour for lunch break, and from 7 AM to 12 PM on Saturday. The KUCFAW representative interviewed for this study was not able to confirm or refute the processors' claims regarding working hours and contracts.

2.3.5 Occupational health and safety (OHS)

With regards to the efforts of labour unions in the sector to assert workers' rights to a healthy and safe work environment, successful negotiations for better conditions for workers in the context of Collective Bargaining Agreements (CBAs) have only begun at Kakuzi and Kenya Nuts. These CBAs have achieved better conditions for working parents in particular, with the introduction of paid maternity and paternity leave (90 calendar days and 14 calendar days, respectively), breastfeeding breaks and on-site breastfeeding facilities. According to interviewed processors (and where there is no labour union presence), they guarantee their workers' rights to paid maternity leave and provide the workers with breastfeeding facilities. However, these facilities were not shown during the research team's visits to these plants.

Regarding accidents at the work site, the interviewed processors claim to provide ergonomically adequate working stations for employees, as well as regular mandatory breaks. The research team observed that employees are provided with the equipment necessary to ensure that macadamia is processed under strict hygienic conditions. However, the team did not find evidence that employees are provided with the personal protective equipment (PPE) they need for the tasks they conduct, such as safety shoes or glasses. At one of the sites visited, the team saw female employees loading a lorry with boxes of vacuum-packed macadamia (each weighing around 11 lbs or almost 5 kg), despite their employer's explanation that men are hired specifically for the purpose of load lifting.

Regarding compensation for accidents at the worksite, there are indications that point to workers being compensated when these occur. In this context, processors highlighted that, as part of the requirements to obtain a processing license, it is mandatory to acquire a WIBA (Work Injury Benefits Act) insurance to deal with workers' accidents while in the course of duty. According to KUCFAW, inspectors of the OHS Directorate (which is hosted by the Ministry of Labour) oversee that records of these accidents are kept (and that processors comply with their obligation to report) and conduct random audits to ensure that OHS policies are in place. However, these visits are hindered by the insufficient capacity of the OHS Directorate. Moreover, KUCFAW states that workers are often coerced into not reporting and that simple grievance mechanisms at the worksite are lacking, or that workers are altogether not aware of their right to report or be represented by a work safety committee.

2.3.6 Youth development

Farm succession is a problem worldwide and Kenya is no exception. The 2009 Kenyan population and housing census showed a decline in growth of households in rural areas of 1.5 percent per

annum,[160] a trend that remained unchanged in 2018.[161] The reason behind the ageing of Kenya's agriculture sector is the perceived lack of opportunities for young people, defined by the UN as persons between 15 and 24 years old.[162] This is remarkable, because agriculture is the single most important source of employment, income generation and food security for the country's rural population,[163] who make up 73 percent of the total population.[164]

Mercy Corps identified several constraints facing Kenyan rural youth seeking to enter agriculture:

- Rural youth are often far from markets, having less direct access to off-takers. This situation forces them to work through middlemen, reducing their profits.
- Youth are less likely to have exclusive ownership of land due to lack of capital and unfavourable inheritance practices. If they are able to obtain land, it is often of below-average quality and productivity. For example, young farmers in Kenya own and operate 0.7 and 1.0 hectares of land on average, while adult farmers (i.e. persons above 24 years of age, according to the UN) own and operate 2.7 and 3.2 hectares, respectively.
- The trends above are more pronounced for female youth, who face cultural barriers to ownership – women only hold 1 percent of all registered land in Kenya in their sole name and around 5 to 6 percent in joint names with a man. Moreover, female youth often do not have control over land unless widowed or separated; where they do, land sizes are small at 0.1 hectares or less.
- Youth receive uncompetitive loan terms (e.g. higher interest rates and shorter repayment periods) and for this reason often choose not to get loans.
- Existing educational and on-the-job training does not provide youth with all the practical skills they need, like agricultural, business or finance skills. In a similar vein, higher education opportunities in urban areas often require youth to stop farming.[165]

Recognising that access to smallholder agriculture for youth requires new ways of engagement and acceleration, Mercy Corps introduced the AgriFin Accelerate Programme in 2012. This is a US$25 million, 6-year initiative to support private sector actors in developing, prototyping and scaling digitally-enabled services for smallholder farmers across Kenya, Tanzania and Zambia. In this context, the programme contracted the Dalberg Group to assess learnings across these engagements and found that 90 percent of farmers aged 18 to 35 in Kenya have high levels of engagement with information and communication technology. They are active users of social media, particularly Facebook, Google and WhatsApp, and make use of digital financial services.[166] These findings point to the potential of digital technology to revamp agriculture as a modern and attractive employment sector and to offer youth a future in farming.

In 2018, FAO launched the 2-year project 'Reducing distress migration through local value chain development', which is implemented in Kiambu County. Its aim is to tackle some of the adverse causes of rural out-migration of youth, by creating employment and entrepreneurship opportunities in agri-businesses along selected local value chains, while strengthening linkages with the existing social protection programmes. Specifically, the FAO intervenes by strengthening the policy and institutional environment and by fostering the employability of young people (i.e. building their capacity, including cash transfer beneficiaries, to engage in productive activities along agro-food value chains, and supporting youth entrepreneurs to scale up their businesses along selected value chains).[167] Projects aiming to address the challenges that youth face in agriculture and the macadamia sector are included in the overview in Section 2.4.

2.3.7 Climate change

Generally, macadamia trees are comparatively easy to maintain at low inputs. Planting macadamia and other trees is seen as a strategy to adapt tea and coffee cultivation to changing weather patterns. In addition to additional income and improved nutrition, the trees provide shade and wind protection.[168] However, as highlighted in Section 1.6.3, climate change also threatens the feasibility of macadamia production. While droughts and wildfires already affect Australia and South Africa, heavy rains, which are bad for crop yields, have been affecting Kenya in recent years. In 2018, the rainy season started in April and continued until the end of September, without the usual break in August, when the trees start flowering. This resulted in a significant decrease in production.[169]

Several of the macadamia-focused projects in Kenya presented in Section 2.4 include a focus on climate change adaptation and resilience, namely Climate Resilient Agribusiness for Tomorrow (CRAFT) and Fresh & Ingredients. Despite the impact of climate change on food security, these programmes fail to address the increasing impacts on food crops from changing climate conditions. Food security as a broader issue is part of IDH's 'Farmfit – Business Support Facility'.

2.4 Organisations and their projects in Kenya's macadamia sector

Various national and international organisations are active in the Kenyan macadamia value chain, with projects involving public as well as private stakeholders. We present a non-exhaustive overview including short profiles of projects currently implemented (as of 2019) in Kenya. The focus areas of these projects are summarised in Table 7.

Table 7 Overview of organisations and their projects in the Kenyan macadamia sector

Project name	Lead Implementer	Productivity	Food Security	Processing	Women	Youth development	Climate change	Sustainability	Markets	Finance	Business Planning	Policies
Agri-Wallet	SNV/Dodore Kenya Ltd									x		
CRAFT (Climate Resilient Agribusiness for Tomorrow)	SNV				x	x	x			x		
East Africa Trade Investment Hub	USAID								x		x	x
EU-EAC Market access Upgrade Programme	UNIDO				x	x			x		x	x
Farmfit – Business Support Facility	IDH		x		x					x	x	x
Fresh & Ingredients Programme	IDH						x	x	x			
HortIMPACT (Kenya Market-led Horticulture Programme)	SNV	x										
KIEP (Kenya Industry and Entrepreneurship Project)	Ministry of Industry, Trade and Cooperatives/World	x								x	x	

Project name	Lead Implementer	Productivity	Food Security	Processing	Women	Youth development	Climate change	Sustainability	Markets	Finance	Business Planning	Policies
Agri-Transfer	Bank KALRO/NIAB International	x					x	x				
Kenya Export Market Development Programme	KEPROBA								x			
Kenyan macadamia	Tradecare Africa/Fairmatch Support	x								x		
EU Joint Programming in Africa	SlovakAid/EU	x						x		x		
Value Chain Greening and Financing Programme	DANIDA/Micro Enterprises Support Programme Trust				x	x		x	x	x		

2.4.1 KEPROBA – Kenya Export Market Development Programme

- *Focus area(s)*: markets;
- *Period*: 2018 – 2019;
- *Budget*: n/a;
- *Implementing agency/partners*: AFA;
- *Countries*: Kenya.

The Kenya Export Promotion and Branding Agency (KEPROBA) develops a yearly calendar of promotional events called the Kenya Export Market Development Programme (KEMDP) to guide its export market development activities. KEMDP supports the realisation of Kenya's Integrated National Export Promotion and Development Strategy.[170] Moreover, the KEMDP is a consultative process that involves public and private sector stakeholders who submit their activities to KEPROBA for collation and analysis in line with KEPROBA's goals of consolidating and enlarging Kenya's traditional export markets of the EAC, the COMESA and the EU and diversifying into new and emerging export markets such as Eastern Europe, North America, Asia and the rest of Africa. KEMDP also guides relevant stakeholders in planning and participation in the scheduled activities. In this context, KEPROBA has been promoting value-added macadamia in regional trade fairs under the brand 'Product from Kenya'. Specifically, KEPROBA has subsidised trips for different processors to attend these fairs. This kind of support, however, is limited by budgetary constraints. For this reason, but also in an effort to have beneficiaries regard their participation in trade fairs as their own investment, KEPROBA does not fully finance processors' promotion activities.

2.4.2 IDH – Farmfit Business Support Facility

- *Focus area(s)*: improved technology, digital finance, gender inclusion;
- *Period*: January 2019 to March 2023;
- *Budget*: €30,000,000;
- *Implementing agency/partners*: companies and banks;

- *Countries*: sub-Saharan Africa.

IDH's Farmfit Business Support is a 5-year programme funded by DFID and the Bill & Melinda Gates Foundation. Its purpose is to provide intelligence and technical support to companies and banks willing to build smallholder-inclusive supply chains. Of the interventions under this programme, 70 percent focus on staples (maize, beans and potato) that have significant bearing on food security but that still face many challenges. The remaining 30 percent focus on cash crops (e.g. macadamia, cacao and coffee). The programme is implemented following a 3-step approach:

1. Service Delivery Model Analysis (or Gap Analysis) takes 1 – 2 months. At this stage, IDH co-finances €80,000 – 100,000 (companies, or case owners, that take part in this programme are expected to contribute €15,000) to create an overview of all actors, services and goods and cash flows in the value chain. This analysis results in a baseline situation highlighting the benefits and costs for the farmer. Also, IDH assesses the costs and benefits of the main service operator, how the services are paid for and how they contribute to the commercial business of the service operator. Moreover, 2 case reports are delivered (1 for the case owner and IDH only and 1 to be shared in the public domain), as well as a customised Excel Tool to be used for M&E and continuous improvement.
2. Technical Assistance (TA) takes 1 – 3 years. TA can be provided at 3 different levels: the individual smallholder farmer (e.g. extension services, financial literacy training), the organisation (e.g. core business support to an SME or farmer organisation, or a financial institution moving into agricultural lending) and the enabling environment level (e.g. policies and regulations). At this stage, IDH intervenes through a 50/50 approach (meaning IDH and its partner take on 50 percent of the costs each) and considers contributions in kind as part of the company's 50 percent contribution to the TA. Here, sustainability is critical. According to IDH, TA helps enhance loyalty (farmers do not sell to just anyone and companies can purchase inputs when they need to without having to wait until they have enough capital to do so).
3. Blended Finance is the use of funds from public donors or philanthropic funds to attract additional funds from private sources, but sometimes also from public sources in case of international financial institutions. The purpose of this stage is to scale the model. This is done through instruments such as grants, loans and first-loss guarantees.

To date, IDH has partnered with Jungle Nuts and is currently exploring the possibility of collaborating with Equatorial Nuts, Exotic Nuts and Privamnuts. In Farmfit, Jungle Nuts is providing services to small farmers, such as access to inputs, extension, finance and training. SMEs must be nominated by a third private sector party to take part in Farmfit. In this case, Intersnack nominated Jungle Nuts for participation in the programme. Because the programme is directed at different sectors and other countries in the EAC, its steering committee has decided not to pursue more projects in the macadamia sector. However, IDH-Kenya believes there is scope for further support for the sector in the context of its Fresh & Ingredients Programme (see below).

2.4.3 IDH – Fresh & Ingredients Programme

- *Focus area(s)*: sustainability, agribusiness, trade, climate change;
- *Period*: 2016 – 2020;
- *Budget*: €10,000,000;
- *Implementing agency/partners*: SNI, Sustainable Juice Covenant, Floriculture Sustainability Initiative, Sustainable Spices Initiative, Sustainability Initiative Fruits and Vegetables;

- *Countries*: East, West and Southern Africa; Central and Latin America; India and Southeast Asia.

The Fresh & Ingredients Programme combines several agro-commodities and provides cross-sectoral solutions to critical issues. The programme builds on existing sector covenants that have been built by IDH and partners since 2016; i.e. Fruit & Vegetables (fresh and processed), Flowers & Plants, Nuts, Spices and Vanilla. To participate in the programme, interested partners must sign one of the global covenants. Each covenant includes a stepwise approach to sourcing and importing sustainable products over the coming years. IDH co-funds private investments in sustainable improvement programmes, implying that a private sector investment is required. At least once a year, participating partners can submit proposals for co-funding projects. For 2016 – 2020, the Fresh & Ingredients programme will focus on smallholder farmers, agrochemical use, climate change and working conditions.[171]

2.4.4 SNV – Climate Resilient Agri-Business for Tomorrow (CRAFT)

- *Focus area(s)*: climate change, finance, policy, gender and youth inclusion;
- *Period*: 2018 – 2022;
- *Budget*: n/a;
- *Implementing agency/partners*: Wageningen University and Research, CGIAR Research Program on Climate Change, Agriculture and Food Security, Agriterra and Rabo Partnerships;
- *Countries*: Kenya, Tanzania and Uganda.

This project conducts climate risk analyses of targeted value chains and identification of business opportunities that address climate change in agriculture. Also, it develops business cases and co-investment through the climate innovation and investment facility with the private sector, SMEs and farmer cooperatives. Moreover, it facilitates access to finance in collaboration with financial institutions and influences policy and operationalisation of climate plans. Lastly, it provides feedback on the practical applicability of climate-smart practices, technologies, models and climate services. Knowledge sharing and learning is a cross-cutting element of CRAFT. The primary target groups of the project include small and medium-sized entrepreneurial farmers, SME agribusinesses and service providers to these SMEs, as well as financial institutions and government agencies that play a key role in creating an enabling environment that can foster large-scale roll-out of climate-smart agriculture in East Africa.[172]

2.4.5 SNV – Kenya Market-led Horticulture Programme (HortIMPACT)

- *Focus area(s)*: productivity;
- *Period*: 2015 – 2019;
- *Budget*: n/a;
- *Implementing agency/partners*: SNV (lead implementing partner), Delphy and Solidaridad;
- *Countries*: Kenya.

HortIMPACT collaborates with commercial suppliers in selected horticulture value chains to address poor food safety, high post-harvest food losses and the exclusion of small and medium-sized farmers from value chains. The project trains farmers and farmer groups in innovative solutions and technologies from the private sector to improve production and storage of fruits and vegetables and compete in commercial value chains. HortIMPACT also promotes participation of women and young people in commercial horticulture value chains.

2.4.6 SNV/Dodore Kenya Ltd – Agri-wallet

- *Focus area(s)*: finance;
- *Period*: 2018 – present;
- *Budget*: n/a;
- *Implementing agency/partners*: Dodore Kenya Ltd;
- *Countries*: Kenya.

Dodore Kenya Ltd. is a social enterprise that supports NGOs with ideation, testing and implementation of programmes in the mobile domain. It is also one of SNV's local implementing partners in Kenya in the context of the HortIMPACT project. To address the problem of farmers' lack of access to finance, Dodore developed the Agri-wallet – a digital application that enables farmers to save money to buy inputs. When farmers' sales are paid via mobile transfers, Agri-wallet gives them an overdraft on their savings that allows them to pre-finance their inputs. To date, 24,000 Kenyan farmers and 23 buyers use Agri-wallet.

2.4.7 SNV/eProd – Food traceability

- *Focus area(s)*: business planning;
- *Period*: n/a;
- *Budget*: n/a;
- *Implementing agency/partners*: eProd;
- *Countries*: Kenya.

eProd, one of FNV's implementing partners in Kenya, was founded in Kenya by a chili pepper consolidator who was frustrated by the complexity of manually managing thousands of smallholder farmers and complying with the high standard requirements of the export market.[173] Although it was initially developed for their own use, they quickly received requests to expand functionality to meet the needs of other value chains, including those in SNV's HortIMPACT programme. SNV and eProd have worked together to try to operationalise national food standards for horticultural products.

2.4.8 KALRO/ NIAB International – Agri-Transfer

- *Focus area(s)*: productivity, sustainability, climate change;
- *Period*: 2015 – 2019;
- *Budget*: n/a;
- *Implementing agency/partners*: KALRO, National Institute of Agricultural Botany (NIAB International);
- *Countries*: Kenya.

As part of its extension services for producers, KALRO, in collaboration with the UK-based charity NIAB International, has developed a series of mobile applications for Android phones. The project, called Agri-Transfer, started in March 2015 after NIAB secured BBSRC funding to support the uptake of new wheat varieties by smallholder farmers and promote new agricultural and dissemination technologies. Agri-Transfer pulls together the diverse and complementary expertise of KALRO to develop a workable and sustainable dissemination model for agronomic data collected on new crop varieties (using wheat as the test crop) for smallholder farmers in Kenya. It addresses the widespread problem in developing countries that a full understanding of the potential benefits of improved crop varieties and advancements in agricultural technology is often not realised. One of the 31 mobile applications developed in this context to date includes an application for macadamia farmers that can be downloaded for free from Google Play.

2.4.9 Ministry of Industry, Trade and Cooperatives – Kenya Industry and Entrepreneurship Project (KIEP)

- *Focus area(s):* productivity, finance and business planning;
- *Period:* 2019 – 2024;
- *Budget:* US$50 million;
- *Implementing agency/partners:* World Bank, Ministry of Industry, Trade and Cooperatives;
- *Countries:* Kenya.

KIEP aims to increase innovation and productivity in select private sector firms in Kenya by strengthening the private sector through financial grants and technical assistance. The project consists of 3 components. Component 1 seeks to strengthen the innovation and entrepreneurship ecosystem in Kenya by building the capacity of incubators, accelerators and rapid technology skills providers (collectively called 'intermediaries'). It also seeks to connect the Kenyan ecosystem to international networks of talent and support infrastructure and to foster links between start-ups and traditional industry. In addition, this component aims to bridge the technical skills gaps in the market by linking young talent and academia to the private sector. Component 2 strives to increase productivity at the firm level by supporting small and medium-sized enterprises (SMEs) in improving their managerial and technical skills and their use and access to technology. Component 3 provides support for communications, M&E and implementation of the project. While still in its launching phase, the programme could potentially include macadamia processors (provided their annual turnover falls between US$0.5 and US$10 million), under Component 2 of the project.

2.4.10 TradeCare Africa/Fairmatch Support – Kenyan macadamia

- *Focus area(s)*: productivity and finance;
- *Period*: not specific;
- *Budget*: n/a;
- *Implementing agency/partners*: Tradecare Africa, FairMatch Support, IDH and Sustainable Nut Initiative;
- *Countries*: Global South.

FairMatch Support (FMS) programmes are funded by the private sector and funding agencies. FMS uses a consultancy business model to develop, improve and expand the sustainable value chains of various products, in developing countries worldwide. For this purpose, they connect investors with businesses to develop and finance strategies that increase their revenue and market opportunities. In Kenya, FMS' work started (and is so far limited) to supporting IDH's work with Jungle Nuts in the context of its SDM programme (see Section 2.4.2). Specifically, FMS supports Jungle Nuts in developing a strategy to organise the farmers and provide them with training and knowledge development. FMS supports Jungle Nuts with the implementation of a data-driven improvement set-up that will provide them with 100-percent traceable macadamia and allow them to offer tailor-made extension services for producers.

2.4.11 USAID – East Africa Trade and Investment Hub

- *Focus area(s)*: investment, technology, agriculture, agribusiness, trade policy and regulatory reform;
- *Period*: September 2014 to August 2019;
- *Budget*: US$64,000,000;

- *Implementing agency/partners*: DAI Global, LLC (implementing partner), EAC Partner States, the East African and U.S. private sector, U.S. government agencies, regional trade associations and other development partners;
- *Countries*: Burundi, Kenya, Rwanda, Tanzania, Uganda, Ethiopia, Madagascar and Mauritius.

The East Africa Trade and Investment Hub is an initiative that is funded by USAID and whose mandate is to be a facilitator of AGOA. Macadamia is one of 6,500 products that qualify for duty-free access to the U.S. under AGOA. One of the sectors on which the Hub focuses its technical assistance and market linkage support is specialty foods. This is because of U.S. demand and because specialty foods tend to offer higher margins to sellers. In this context, the Hub has been introducing Kenyan macadamia sellers to U.S. buyers through trade shows, buyers' missions and promotional videos.[174]

2.4.12 SlovakAid/European Development Fund – EU Joint Programming in Africa

- *Focus area(s):* productivity, sustainability, investment;
- *Period: 2014 onwards;*
- *Budget*: n/a;
- *Implementing agency/partners*: SlovakAid;
- *Countries*: Kenya.

In the context of the participation of the Visegrad countries (Poland, the Czech Republic, Hungary and Slovakia) in the EU Joint Programme in Africa, the Slovak Development Agency has been implementing a series of projects (mainly financing) in selected horticultural sectors in Kenya. Kenya became one of Slovakia's 3 priority countries (together with Afghanistan and Moldova) as stated in its development cooperation strategy for 2014 – 2018. With regards to the macadamia sector, SlovakAid has partnered with Ten Senses Africa and Meru County to increase the quality and number of macadamia seedlings that are distributed to macadamia farmers.

2.4.13 DANIDA – Value Chain Greening and Financing Programme

- *Focus area(s)*: climate, women, youth, employment, clean technologies, market linkages, access to finance;
- *Period*: 2016 – 2020;
- *Budget*: DKK 70,000,000 (ca. US$10,310,000);
- *Implementing agency/partners*: Micro Enterprises Support Programme Trust;
- *Countries*: Kenya.

This programme is implemented by the Micro Enterprises Support Programme Trust. Its focus is to build the capacity of farmers and link them to processors. Particularly, farmers and nursery operators willing to obtain organic certification receive coaching. In this context, plant material supplied to nurseries is obtained from KEPHIS (in the past, this was done through KALRO, which also provided training on grafting). Moreover, the credit arm of the project provides funds to micro-finance institutions (such as Universal Traders Sacco) to support farmers organised in cooperatives for the purpose of accessing finance. Until 2015, DANIDA worked with macadamia processors, coaching them to improve their processes and obtain ISO certification.

2.4.14 UNIDO – EU-EAC Market Access Upgrade programme (MARKUP)

- *Focus area(s):* women, youth, agribusiness, rural development, policies, markets;

- *Period:* February 2019 – December 2022;
- *Budget:* €3,730,000;
- *Implementing agency/partners:* UNIDO, GIZ, ITC, Ministry of Industry, Trade and Cooperatives of Kenya, AFA, KEBS, KEPHIS, HCD, KEPROBA, EU Delegation to Kenya;
- *Countries:* East African Community.

This project is still in its initial stage. The main objective of MARKUP Kenya is to contribute to the economic development of Kenya by increasing the value of both extra and intra-regional agricultural exports in selected horticulture subsectors (green beans and peas in pods, mangoes, passion fruit, chilies, herbs and spices, and nuts). In this context, MARKUP's interventions will focus on identifying and eliminating barriers to trade, improving competitiveness, strengthening value addition, ensuring compliance with international regulations and standards, providing access to trade finance and supporting the identification of opportunities for trade and foreign direct investments.[175] MARKUP interventions in the macadamia value chain will be as follows: 1) supporting the production and marketing systems to accelerate industry growth; 2) strengthening the capacity of farmers' and marketing associations to structure the industry to meet the competitive standards of EU and EAC markets; 3) collaborating with the GoK at national and county levels and other stakeholders in implementing policy reforms to create an enabling environment for competitive production and marketing.

2.5 Opportunities and synergies

In addition to the activities described in Section 2.4, the stakeholders interviewed for this study have identified the following possibilities to contribute to the further development of the Kenyan macadamia sector:

- Tradecare Africa could help connect farmers with buyers and improve business cases at the farm level. It could also provide technical assistance to innovation platforms on macadamia.
- NutPak, Nutak and MFAK could aggregate data capture to improve traceability.
- MFAK could engage its members to adopt GAP.
- AFA could lead the process to develop and improve in-shell macadamia standards.
- Fairtrade recognises that, for the time being, there are no plans to develop Fairtrade macadamia standards; however, they could explore venues to use Fairtrade standards to help farmers obtain certification.
- KALRO, in the context of an existing programme with the University of Nairobi and CAB International – Plant Clinics, could further develop methods to deal with macadamia plant diseases.
- KOAN could try to organise organic macadamia farmers that are already certified to address the challenge of maintaining their certification (complying with yearly internal inspections, updating systems and documentation, etc.). KOAN can also provide training for the processing units' staff, but only on request from SMEs (no outreach). They can organise training for auditors, but companies must pay for the certification themselves.

Chapter 3 Analysis of value chain obstacles and opportunities

This chapter provides a textual analysis of the opportunities and obstacles identified in Kenya's macadamia value chain. It also shows a visual map of all the identified obstacles and stakeholders that may be involved in providing business solutions.

3.1 Kenya macadamia value chain obstacles

Sections 3.1.1 to 3.1.8 describe the obstacles identified in Kenya's macadamia value chain.

3.1.1 Low productivity

Several factors affect the low productivity of Kenyan macadamia farmers. Based on stakeholders' interviews and FGDs, some of the factors are summarised below.

Effect of climate change: Kenya's good arable land and favourable weather conditions render macadamia production a promising sector. Part of the reason why the sector does not live up to its full potential is the impacts of climate change. Specifically, irregular rainfall and drought have been highlighted by key informants. Changing climatic conditions cause low and unstable productivity in the macadamia sector. Farmers argue that they are less resilient to climate effects due to a lack of governmental support for climate adaptation and mitigation. To address the problem of drought, KMFA suggests introducing irrigation to macadamia farming.

Pests and diseases: contrary to the common belief that Kenyan macadamia is not prone to pests and diseases, insect damage has always been present, but has worsened in the past years. According to KALRO, root rot, stem canker and leaf borer are the most pressing pest problems in Kenyan macadamia production. Moreover, apart from being a major contributor to low quality, insect damage such as early and late stinkbug and borer damage is the second cause of Kenya's low macadamia recovery percentage (which is less than 15 percent). While insect damage can be controlled if farmers use treatments, the likelihood of them implementing this practice is low, given that they know the product will be sold regardless. The competitive advantage of organic macadamia is another reason why pest and disease control using pesticides is unlikely, but alternative control mechanisms, such as push-pull intercropping, are necessary.

Use of unsuitable and/or old varieties: Kenya's ecological zones are a key defining factor for production. However, this factor is largely overlooked by farmers and some nursery operators. Unsuitable varieties are grown where they cannot thrive.

Immature harvesting: as stated in Section 3.1.6, the methods used to harvest nuts by inexperienced farmers compromise the viability of flowers to yield nuts.

3.1.2 Low-quality nuts

The low quality of Kenyan macadamia is perhaps the largest problem facing the sector.

Immature harvesting: many of the value chain obstacles are a cause or an effect of the immature harvesting of macadamia. As explained in Section 1.2.4, immature harvesting is an issue that has influenced nut quality for years, leading to reputational damage for the country as a producer (Section 1.9.3). According to NutPak, as the sector began to grow (around 2009), there was a lot of hostility from pioneering processors and producers. These pioneers, feeling threatened by newcomers, displayed a predatory attitude (e.g. buying crop ahead of the opening of the season or offering higher prices than those set by AFA), which lead to many uncertainties.

Inadequate machinery: according to a few macadamia processors, the inadequacy of the machinery they purchase for their operations is a big problem. Inadequate machines cannot crack the nut without cracking the kernel. This not only makes it difficult for the sector to prove its capability to supply the international market with A-grade nuts, but also reduces the processors' profits, as they must sell cracked kernels for a lower price.

3.1.3 Speculation and volatile domestic prices

Most stakeholders interviewed in Kenya pointed to the damaging effect of speculation and volatile domestic macadamia prices on the sector. Stakeholders raised 2 main issues that contribute to this situation.

- **Farmers' need for quick, additional income**: farmers' need for quick, additional income is not only a driver of poor macadamia nut quality, but also of speculation and volatile domestic prices. Both NutPak and Nutak have invested in building farmers' capacity. However, as both sector associations have pointed out, the effect on the quality of macadamia has been minimal. NutPak believes that, even if farmers improve their practices, the motivation for farmers to harvest earlier in order to earn extra income (or to absorb shocks) will remain if AFA fails to implement stricter controls regarding harvesting times. Similarly, if there are no regulations regarding farm gate prices of macadamia nuts, speculation will continue. As processors rush to fill their storage, Nutak claims that intermediaries buy the commodity before full maturity as well, at prices between KES 60 and KES 100 a kilo, significantly below the farm gate prices achieved for fully mature nuts.[176] NutPak has repeatedly offered financial and technical support to AFA to address this situation, but AFA has not accepted their help, citing the lack of a framework agreement for this purpose.
- **New processors' desire to remain in the market**: according to some pioneer processors, newcomers are driving price speculation because they buy macadamia at high price locally and sell at low price internationally. Even though they make losses with this strategy, they do this to gain a presence in the industry. By the same token, many processors (pioneers or not) are forced to buy immature macadamia at any price because they have contracts that they must comply with. They are obliged to source any macadamia in order to meet the quantity requirements of their customers so as not to default on the contract.

According to key informants, speculation and price volatility pose great risks to the macadamia sector and make the sector unattractive for banks wanting to lend to macadamia entrepreneurs.

3.1.4 Lack of traceability

In the past 20 years, traceability systems have changed their focus from guaranteeing the origin of high-value products to ensuring product safety towards retailers and consumers. In Kenya, traceability has gained ground with ever-improving global food safety standards in combination with the collective efforts of Kenyan producers and policymakers to influence the competitiveness of the agricultural sector in the global economy.[177] A handful of traceability systems have emerged as a result of this trend, such as the national horticulture traceability system (HTS), which was established with the aim of improving information relating to the production and handling of fresh produce in Kenya;[178] Farmforce, which is commercialised by Farmforce (Norway); and eProd (see Section 2.4.7). There is no doubt that traceability systems are helping the Kenyan food industry deliver goods and services tailored to the tastes and preferences of various groups of consumers and are proof of value, especially in terms of the quality and safety of the product.[179]

In the Kenyan macadamia sector, food safety is assured through rigorous laboratory tests. Most processors visited for this study feature fully equipped laboratories, where batches of macadamia are subject to chemical and bacteriological tests (see Section 1.2.4). In addition, processors are obliged to have their macadamia tested by an independent laboratory. However, quality remains problematic, especially considering the large number of smallholder farmers and independent traders. While Kenyan food products destined for export markets often use some systematic way of tracking and tracing the product back to its source, the value and importance of traceability systems is diluted as the food systems become more fragmented and populated by resource-poor actors. Moreover, most smallholder farmers do not realise that traceability systems exist or even understand the importance of implementing traceability.[180]

Lack of information and insufficient knowledge or skills to implement traceability systems limit their effectiveness.[181] Even with the little data or information available, there is a lack of adequate standardised data and ways to exchange data and information between the various actors in the supply chain, as well as between the various traceability systems.[182] For a traceability system to effectively provide food safety and quality assurance, it is paramount that all players commit and participate actively, that data and information be shared freely and that there be value for money so that there is a return on the investment.

3.1.5 Processing capacity

SMEs' limited export supply capacities for large export markets has been recognised as a challenge for the successful implementation of international trade agreements such as AGOA (USA) and the Economic Partnership Agreement (EPA) between the EAC and the EU. Low productivity and limited resources in key sectors make it difficult for SMEs to fulfil export orders and result in the misconception that these agreements are only possible for big, established firms.[183] In the macadamia sector specifically, processors are idle for most of the year, which translates into economic unviability for many of these processors. Often, the lack of production renders processors incapable of repaying their loans. In turn, the prospect of not being able to repay loans exacerbates the problem of immature harvesting, as processors will try to source macadamia to process and eventually sell to generate the needed income. Moreover, this problem is compounded by ambitious licensing of new processors, which has been done without much understanding of the actual supply of macadamia. In this context, there is a common belief that licensing comes with increased income, motivating entrepreneurs to become licensed macadamia processors. However, these newcomers often drop out quickly when they realise there are several investments and requirements that they must, but are not able or willing, to make and fulfil.

3.1.6 Crop theft

While macadamia farming is increasingly being adopted by farmers, pioneering macadamia farmers are dropping out of the business. This is, in great measure, due to macadamia theft, which accounts for up to 40 percent of crop losses in households in Embu County, according to Tradecare Africa. While this percentage is contested by NutPak, there is consensus among most stakeholders that macadamia theft is one of the factors contributing to low-quality macadamia. According to the Macadamia Farmers Association, nut theft occurs predominantly at the family level. The culprits are usually farmers' children who are inexperienced farmers and who steal from their parents during the short crop season in order to get some cash. Despite being considered petty theft, stealing macadamia compromises the viability of flowers, which become damaged by the action of knocking nuts off the tree by shaking branches or beating the trunk. Moreover, petty theft also occurs while macadamia nuts are still immature, thus contributing to macadamia scarcity and low

quality. There are also reports that theft affects larger landholdings, but the extent of the problem at this level is uncertain.[184]

3.1.7 Illegal NIS exports

According to NutPak figures from 2018, an estimated 20 percent of the harvest is lost to smugglers, despite the illegality of the practice (see Section 1.2.4 for details on the regulation and the reasons behind it).[185] While it is difficult to confirm this figure, it is clear that these exports cause a considerable loss of value addition potential.

3.1.8 Stakeholder antagonisms

Kenyan macadamia stakeholders report situations that have pushed them into a defensive dialogue with their counterparts, leading to a significant and long-lasting loss of reputation. These stakeholders have at some point been forced to actively engage in some processes through government regulations. At other times, stakeholders wanted to actively engage in consultation processes and decision-making but were locked out. In response, they have looked for ways to gain more representation by forming networks with other neglected stakeholders. This type of interaction has led to antagonistic engagement in the sector and damaged the trust of some stakeholders in their peers.

Some examples of stakeholders' antagonistic attitudes are summarised below:

- In order to be licensed, all macadamia processors are obliged to comply with certain requirements (such as producing and distributing macadamia seedlings to farmers, or they must join a sector association such as NutPak or Nutak). However, processors often question the cost efficiency and, ultimately, the effectiveness of setting up nurseries, or they do not sympathise with either of the only 2 sector associations.
- Farmers' associations are underfunded. While NutPak provided funding initially, this support stopped because farmers suspected that accepting NutPak's help would cost them their ability to take independent decisions and assert their interests.
- Among most sectors' actors and influencers, the terms 'broker' (as explained in Section 2.1.2, this term is commonly used to refer to traders) and 'newcomer' (this is used to refer to processors who joined the sector after 2009) hold negative connotations. Only one pioneering processor interviewed for this study was positive about the rise in numbers of new processors, and another new processor stressed the importance of not calling traders 'brokers'.
- In the context of organic production, a lot of exporters force farmers not to sell to certain processors. Organic certification is a big investment, which is why processors have adopted this predatory behaviour (i.e. they see it as a loss to invest in farmer training and not to cash in on those investments).

3.2 Kenya macadamia value chain opportunities

Despite the challenges facing the macadamia sector in Kenya, there are promising opportunities for macadamia farming, as its popularity is increasing among farmers due to the good prices in the market. Sections 3.2.1 to 3.2.6 present some of the opportunities in the production, processing and export stages of Kenya's macadamia value chain.

3.2.1 Improved extension services

There is consensus among stakeholders in Kenya that the macadamia sector could greatly profit from training services for farmers. Currently, government-supported extension services do not

focus on macadamia, but on horticultural crops in general and on tea and coffee in particular. Improved extension services would enable farmers to provide better-quality macadamia nuts, produce more and receive better prices for their crop. Improved extension services require a dedicated team of trainers to build the capacity of public extension officials. Another important aspect to consider is that improving extension services should be done with improved macadamia varieties that are better suited to Kenya's different agroecological zones. For many years, KALRO has been conducting research on macadamia and providing extension services. However, its capacity is reduced because of a lack of funding. Therefore, KALRO's activities need to be funded and its capacity to develop its improved seedlings needs to be increased.

Similarly, AFA recently required macadamia processors to disseminate the seedlings to farmers for subsidised prices (to secure future supply and for the increasing number of new processors). However, the distribution of seedlings has not yet helped in solving the effects and causes of immature harvesting. While processors' capacity to produce and disseminate improved seedlings per year could potentially meet farmers' increasing demand, improved seedlings will do little for the industry without investments in farmers' GAP. Therefore, AFA, KALRO, macadamia processors and NutPak and Nutak (who invest in farmers' capacity building) should all join and coordinate efforts to improve extension services. CBI could consider facilitating a partnership for this, with possible collaborators from the Netherlands, including Wageningen University and Research and the Ministry of Foreign Affairs.

3.2.2 Quality improvement

As stated earlier, the failure of farmers to adopt GAP in their production of macadamia is one of the biggest challenges facing the sector. There are several reasons for this, including the lack of access to inputs (such as fertilisers and suitable macadamia varieties) as well as to information regarding yield-increasing practices (such as pruning and pest-control techniques). Moreover, the sector and farmers, in particular, lack an early warning system that informs them about pests, drought (macadamia production in Kenya is rain-fed), market demand, etc. To address this situation, the stakeholders interviewed for this study suggested a few measures. 1) A reliable study is required to get figures and facts straight and to better inform decision makers, as well as a sustentative document on health checks for the macadamia sector. 2) To obtain a license, processors should consider that it takes 4 years for a seedling to become a crop (consequently, new licenses should not be given before there is an actual crop to process). 3) A registry of farmers and licensed traders (who work on exclusivity contracts with buyers) should be established. This last measure would require improved governance, particularly with regards to who can access and who controls this database. Moreover, it would come with the trade-off of leaving some traders out of business.

3.2.3 Improved stakeholder collaboration

Linked to the improvement of governance (Section 3.2.5) is the issue of improved stakeholder collaboration. Sector associations agree that farmers are the macadamia sector's best partners. Their capacity constraint needs to be addressed with particular attention to market dynamics. For that purpose, a pilot programme should be created which enables farmers to sell directly to processors. Moreover, strengthening farmers' associations might be a feasible alternative to farmers' cooperatives for farmers to self-organise. Similarly, stakeholders could explore the potential and feasibility of setting up a sector-wide information exchange system that is managed by one representative of each stakeholder group and, where possible, by different constituencies (e.g. women, youth, unionised workers).

3.2.4 Enabling environment

Arguably, 2 of the GoK's most remarkable efforts to stimulate the macadamia sector are the licensing of new processors and the creation of the EPZ Act (although this initiative was not meant to serve the macadamia sector only, but the manufacturing sector in general). While the former has fallen short of being effective (see Sections 3.1.2, 3.1.3 and 3.1.5), the second is cited by EPZ and other processors as the main reason for choosing their units' locations. With these, there are still areas of improvement which should be considered to further create an enabling environment in which the macadamia sector can thrive. Production costs, particularly the cost of electricity, could be reduced. While it is unlikely and perhaps undesirable to reduce the cost of electricity via subsidies, national and local government authorities could invest in renewable energies (this would also be in line with Kenya's adoption of the Agenda 2030 and its commitment to achieve Priority No. 6: Manufacturing of its National Climate Change Action Plan 2018-2022,[186] which emphasises the promotion of clean energy in the industry sector) by encouraging private sector investments or international finance of centralised power plants (wind or solar farms) or of subsidised solar panels at industrial parks.

While the formation of cooperatives has been suggested by some actors as a means to achieve better prices for farmers and to improve traceability, its actual impact will likely be limited. Mobile money is the most commonly used method by farmers (to receive payments for their crop) and it challenges the formation of cooperatives as it gives farmers the liquidity that cooperatives usually fail to provide. Moreover, the use of mobile money does not unlock benefits such as loans, since this money is not stored in banks. The GoK could devote more resources to stimulate more micro-financing programmes, through the Agricultural Finance Corporation (AFC), international organisations or the private sector.

Lastly, the implementation of national laws often causes problems at the local level. This is due to the lack of alignment of legislation at the local and national levels as well as the existence of gaps in relevant sector strategies. However, this problem is not endemic to the macadamia sector and also applies to other commodities. To address this situation, actors should convene a high-level strategic roundtable meeting with development partners, the GoK and other key macadamia stakeholders, to support the GoK in assessing and addressing the gaps in the National AGOA Strategy and Action Plan 2018-2023; National Export Development and Promotion Strategy for Kenya.

3.2.5 Improved governance

As stated previously, the problem of immature harvesting is one of the most pressing challenges in Kenya's macadamia sector. While poor GAP and farmers' need to absorb economic shocks contribute to this situation, traders play their part as well. In this regard, the Kenyan macadamia value chain is trader driven. While traders usually have no money, they hold power. They do not get loans from banks, but receive advances from processors, who basically finance their purchases. It is true that traders' *modus operandus* can be conflictive, but they are still necessary (without them, farmers can hardly engage in direct trade with processors). However, their participation in the sector needs to be regulated. Most macadamia stakeholders agree that traders should have a certificate (that would allow for stricter controls) in order to be able to trade macadamia. AFA tried to have traders acquire a trading license, but this initiative is yet to be upscaled (to date, there are only 100 AFA-registered traders), and this is largely due to the antagonistic attitudes discussed in Section 3.1.8. Unless corruption is drastically reduced, VC governance will be in peril. One way to address this challenge is to help trade associations establish, adopt and enforce codes of conduct to regulate conduct of sector players.

3.2.6 Market readiness

Market opportunities for the Kenyan macadamia value chain include the following:

- The number of macadamia-producing counties has increased in 10 years from 16 in 2010 to 22 in 2019. The same trend is visible in the processing segment of the VC: the number of macadamia processors increases yearly. There is a clear interest in investing in the sector.
- Several stakeholders in Kenya (and, notably, most European buyers) suggest the adoption of contract farming as a measure to improve the quality of macadamia. According to these informants, farmers will be more motivated to care for the crop (by adopting GAP or joining partnerships that enable them to access credit and loans for inputs) if prices and buyers are secured.
- There are different production peaks in the different regions where macadamia is produced. In some counties, the peak is between October and December, whereas in others, it is between March and May.

3.2.7 Other opportunities

Other opportunities that arise from trends in European markets include:

- The growing demand for macadamia and macadamia-based products in Europe, and particularly for organic macadamia the supply of which is insufficient;
- Kenya's distance to Europe compared to the distance to Europe of other macadamia-producing countries;
- The existence of several development programmes targeting the Kenyan horticultural sector, which could be harnessed to focus on macadamia.

Chapter 4 Possible interventions and support activities in the value chain

This chapter provides an overview of the possible interventions which could be part of a macadamia sector project in Kenya, and of the stakeholders who could be part of implementing them. Furthermore, it presents an assessment of the risks for a potential project.

4.1 Possible interventions for a macadamia sector project

Table 8 presents an overview of possible intervention areas for a potential macadamia sector project in Kenya as well as an indication of possible partners and their potential contribution. Not all partners indicated in the overview are necessarily willing to collaborate on the outlined interventions. Some of the partners have indicated that they are willing to collaborate in a project, while the others are named based on an assumption that they could potentially be interested in such interventions.

Table 8 Intervention areas for a potential macadamia project in Kenya

Value chain opportunities/ obstacles	Interventions	Critical opportunity	Short-term benefit	Partners' potential contribution

Value chain opportunities/ obstacles	Interventions	Critical opportunity	Short-term benefit	Partners' potential contribution
Improving extension services *(Address the use of old and low-yielding, disease-prone varieties, insufficient agricultural extension officers and poor GAP)*	• Provide financial assistance to KALRO to improve its multiplication, supply and dissemination of high-yield, disease-resistant hybrid seedlings to processors, nursery operators and farmers.	Y	Y	• KALRO could further develop knowledge products for macadamia farmers and obtain funding needed for research and extension services. • MFAK could engage its members to adopt GAP. • Processors who already invest in research and development of macadamia varieties could outsource their R&D activities to KALRO. • WUR could support KALRO's and other sector partner's R&D activities through partnerships with these stakeholders. • SNV could support research and extension activities of processors in the context of CRAFT. • DANIDA could increase the number of trained nursery operators and KEPHIS could provide more plant material to DANIDA. • CBI could facilitate a partnership for this.
	• Support the provision of specialised training for public agricultural extension officers. • Generate feedback mechanisms to inform R&D and to improve macadamia varieties. • Support the provision of tailored training courses on GAP to farmers.			• AFA could set up a dedicated team to training trainers for macadamia extension services. • KALRO could conduct longitudinal studies to assess the impact of improved varieties. • KALRO, AFA, processors, NutPak and Nutak could contribute to supporting farmers' GAP training courses. Tradecare Africa could help connect farmers with buyers and improve business cases at the farm level. It could also provide technical assistance to innovation platforms on macadamia. • Processors and sector associations could keep, record and generate data on varieties, numbers of seedlings and yields of macadamia seedlings distributed to farmers in order to provide feedback to KALRO or other stakeholders conducting R&D and to increase the suitability of macadamia varieties.

Value chain opportunities/ obstacles	Interventions	Critical opportunity	Short-term benefit	Partners' potential contribution
				• CBI could facilitate a partnership for this.
Quality improvement *(Address the driving causes of immature harvesting)*	• Provide financial means for farmers and farmers' unions to obtain affordable inputs and tools to achieve GAP. • Encourage the creation of region-relevant moratoria on harvesting that involve consultation with local macadamia stakeholders. • Support the creation of a registry of farmers (including data such as landholding size and age, number of macadamia trees and macadamia varieties) and traders.	Y	Y	• Nutak could take the lead in setting up the registry elaborating on its 200,000 farmers registry and both NutPak and Nutak could aggregate data capture to improve traceability. • AFA leads the process to develop and improve in-shell macadamia standards. • AFA could conduct yearly sector health checks in order to set and correct upper and lower limits for farm gate prices. • Local governments, farmers' associations, traders and processors could renegotiate moratoria periodically. • CBI could facilitate the stakeholder consultation to set region-relevant moratoria on harvesting.
Enabling environment *(Invest in renewable energies to make macadamia processing more cost effective)*	• Convene multi-stakeholder meetings to set up a strategy to achieve Priority Action No. 6 of the National Climate Change Action Plan.	N	Y	• The GoK, AFA, USAID, UNIDO, NL Embassy, NutPak and Nutak could commit resources (either monetary or in kind, in order to attract investment or financing) to increase investment in renewable energies that are affordable and that improve environmental performance of the industrial sector. • CBI and NL Embassy could facilitate this.
Enabling Environment *(Address the implementation gaps in the National Export Development and Promotion Strategy for Kenya)*	• Convene a high-level strategic roundtable meeting with development partners, the GoK and other key macadamia stakeholders, to support the GoK in assessing and addressing the gaps in the National Export Development and Promotion Strategy for Kenya.	N	Y	• The GoK and relevant governmental actors could revise goals, actions and achievements of the National Export Development and Promotion Strategy for Kenya and receive feedback from relevant non-governmental actors. • All relevant actors could advise and support the GoK on implementing export-related aspects of the National Export Development and Promotion Strategy for Kenya. • CBI could facilitate this.

Value chain opportunities/ obstacles	Interventions	Critical opportunity	Short-term benefit	Partners' potential contribution
Enabling environment *(Enable farmers' access to micro-finance)*	• Support the GoK in improving access to micro-finance.	Y	Y	• The GoK could devote more resources to stimulate more micro-financing programmes, through the Agricultural Finance Corporation (AFC), international organisations or the private sector. • CBI could promote investment opportunities for Dutch/EU financiers in the Kenyan macadamia sector.
Improved Governance *(Address the challenges of accountability, antagonism, lack of trust and lack of transparency)*	• Set up a sector-wide information exchange system that is managed by one representative of each stakeholder group and, where possible, by different constituencies (e.g. women, youth, unionised workers). • Assist sector associations in establishing, adopting and enforcing codes of conduct to regulate the conduct of sector players.	Y	Y	• All stakeholders could get together to discuss a multi-stakeholder strategy to address the challenges facing the macadamia sector. • All stakeholders could commit to engaging in dialogue to solve disputes or rivalry. • All stakeholders could commit to holding periodic meetings to inform about plans or to discuss changes in legislation or national and international trends. • CBI could facilitate this.
Market Readiness (*Address the lack of access to market information and market potential, the lack of understanding of EU export requirements and the poor promotion, marketing and branding of Kenyan macadamia)*	• Coach Kenyan processors to improve practices to meet EU market requirements. • Introduce and promote Kenya as a macadamia producer. • Explore the creation and marketing of a Kenyan macadamia brand. • Link macadamia processors with importers in Europe. • Provide financial support so Kenyan macadamia processors can attend global nuts and dried fruits exhibitions and fairs. • Revamp Kenya's image as a producer and exporter of macadamia during the 9th international macadamia symposium (to be held in Kenya in August 2021).[187]	Y	Y	• KEPROBA and CBI could promote Kenya as a macadamia producer. • KEPROBA, NutPak and Nutak in consultation with KOAN, Fairtrade and Tradecare could develop a Kenyan macadamia brand/quality label. • UNIDO and KEPROBA could support traders to let them attend trade fairs. • CBI could facilitate matchmaking between EU importers and Kenyan processors.

4.2 Potential for export of macadamia value-added products

All the processors interviewed expressed eagerness to export macadamia value-added products. Currently, only pioneering processors produce roasted macadamia (savoury or sweet) or macadamia-chocolate pralines. However, this production is only for the domestic market. Processors would be eager to supply retailers in Europe with macadamia snacks. One way to realise this could be to use the retailers' packaging to produce these snacks in Kenya. While this could be feasible for the Kenyan segment of the VC, the potential of this is questionable and would require a scoping study into the interest of European retailers (as well as the enabling framework) in purchasing Kenyan-made macadamia snacks.

With regards to the production of macadamia oil, all processors interviewed for this study produce marginal amounts of this value-added product. Macadamia processors produce oil as a way to make use of bad-quality macadamia nuts, but considering the relatively limited international demand for macadamia oil, they see it as more profitable to sell macadamia kernel.

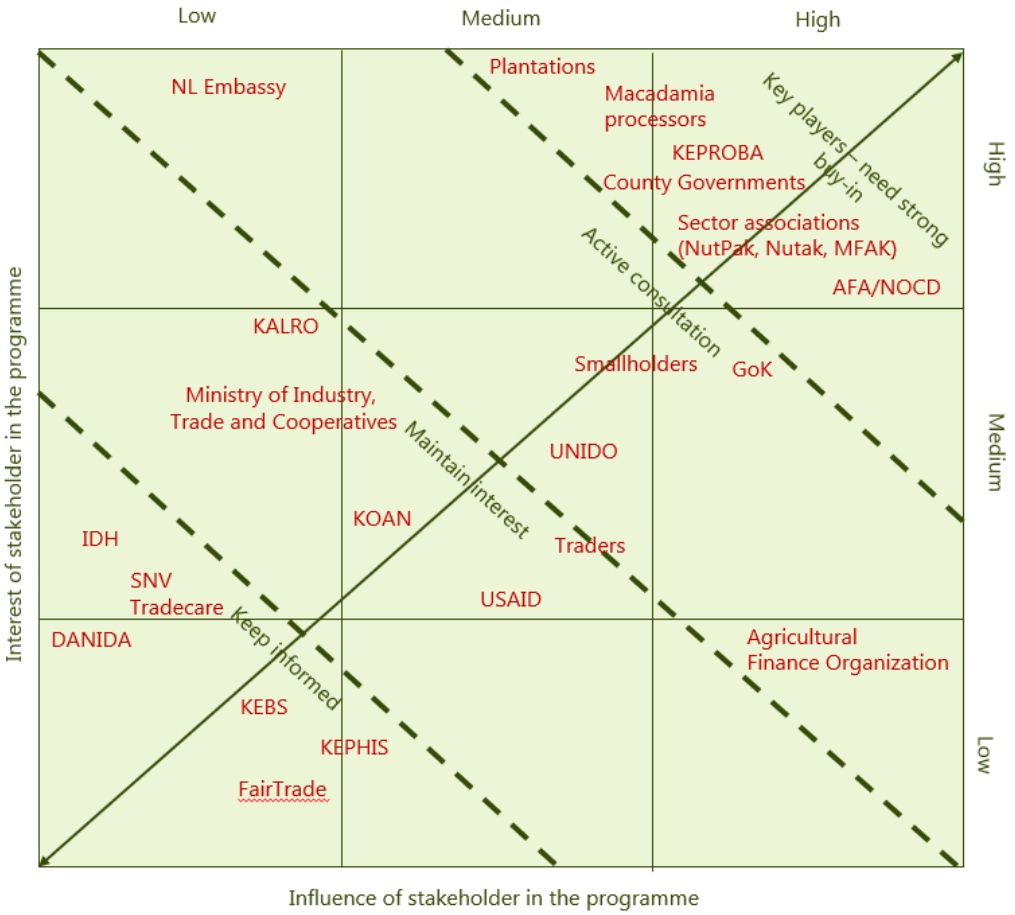
Lastly, there is little potential for supporting the export of cashew nuts as a product combination with macadamia. Only a few processors export cashew nuts in addition to macadamia. According to processors interviewed for this study, the reason for this is that cashew trees are very old in Kenya and have not been replaced. Kenya currently produces less than 45,000 tonnes of cashew. An ageing cashew market population is observed too.

4.3 Stakeholder interest in and influence on a possible Kenyan macadamia project

Figure 13 presents a model to illustrate the interest in and influence of stakeholders on a possible project in the Kenyan macadamia sector. It is important to stress that not all the sector's stakeholders are represented in the model.

AFA and the Nuts and Oil Crops Directorate are key stakeholders that will require a strong buy-in into any project intervention. Considering the role they play in trade and in the economy, other ministries and governmental agencies such as KEPROBA, KEPHIS and the Ministry of Industry, Trade and Cooperatives of the Republic of Kenya need to be actively consulted. Sector associations such as NutPak and Nutak should be actively consulted and involved as well. Moreover, there should be active consultation of and collaboration with international organisations with actual or potential stakes in the macadamia sector. SNV's programmes and IDH's Fresh and Ingredients, which focus on the horticultural sector and on sourcing sustainable nuts, respectively, are examples of the latter. Other stakeholders can be crucial partners and, as such, should be kept informed of the plans and intentions for any possible projects.

Figure 13 Overview of stakeholder interest in and influence on a possible Kenyan macadamia project



4.4 Risks for a Kenyan macadamia project

This section outlines the main risks identified for each of the 6 intervention areas for a possible project in the Kenyan macadamia value chain. It also indicates the level of impact, the likelihood of the risks occurring and some recommendations for prevention or mitigation. The overview is presented in Table 9.

Table 9 Main risks for a potential macadamia project in Kenya

Interventions	Risk	Impact	Likeli-hood	Prevention (P) or Mitigation (M)
Improved extension services	Farmers and agricultural extension officers are unwilling to participate in GAP training courses and other knowledge-sharing programmes.	H	L	• **(P)** Include farmers and agricultural extension officers in needs assessments at inception to ensure project ownership and participation. • **(P)** Involve community leaders and local government officials to further stimulate participation of farmers and extension officers.
	Processors' varieties fail to meet desired expectations for yield improvement and dissemination/supply to farmers.	H	L	• **(P)** Develop detailed project plans with specific milestones and several M&E moments throughout the project duration. • **(P)** Encourage processors to involve agricultural experts at Wageningen University and Research and KALRO (SUA).

Interventions	Risk	Impact	Likeli-hood	Prevention (P) or Mitigation (M)
Quality Improvement	EU investors are unwilling to invest in improving the quality of Kenyan macadamia.	M	M	• **(P)** Prepare a detailed and convincing business case and investment memo (clearly specifying return on investment). • **(M)** Identify alternative investment sources, for example, local banks and financial institutions, local investors and donors & development partners.
	Corruption and embezzlement of funds by stakeholders meant for quality improvement.	H	H	• **(P)** Develop detailed project plans, impose clear contractual obligations regarding anti-corruption and request periodic independent financial audits and M&E.
	Quality still fails to meet desired standards.	M	L	• **(P)** Involve EU buyers at an early stage in the design of and support for the project. • **(M)** Establish periodic evaluations and use the outcomes to address bottlenecks, and implement the associated solutions identified.
Enabling Environment	The GoK refuses to engage with CBI and other development partners.	H	H	• **(P)** Develop a medium-long term engagement and communications strategy. Assign a focal point who will be in regular contact with principal officials at AFA, NutPak and Nutak.
Improved stakeholder collaboration	Corruption and embezzlement of funds by sector associations meant for enhancing their collaboration.	H	H	• **(P)** Develop detailed project plans, impose clear contractual obligations regarding anti-corruption and request periodic independent financial audits and M&E.
Improved governance	AFA and sector associations are unwilling to address underlying causes of immature harvesting.	H	L	• **(P)** Develop a medium-long term engagement strategy. Assign a focal point who will be in regular contact with the exporters and unions to address their challenges.
Market Readiness	There is no government buy-in (or support) for CBI project initiatives to develop and brand 'Kenya macadamia'.	H	H	• **(P)** Develop a medium-long term engagement strategy. Assign a focal point who will be in regular contact with principal officials at AFA and KEPROBA.
	There is no alignment on the project intervention specifics between CBI and the GoK.	H	H	• **(P)** Involve the GoK early on and throughout the project duration, e.g. in needs assessments, implementation plans, strategies and evaluations.

Conclusion

European demand for macadamia, and organic certified macadamia in particular, is growing. There is interest among EU consumers in healthy food products and natural cosmetics. Kenya can potentially meet the growing EU demand for macadamia. EU buyers would become more interested in buying Kenyan macadamia if Kenya could prove that there are no reasons for quality concerns.

CBI can contribute to further improving the Kenyan macadamia sector by partnering with macadamia stakeholders and intervening with activities or projects that address obstacles such as low productivity, low-quality nuts, poor traceability, a challenging enabling environment, poor governance and poor stakeholder collaboration, as well as poor market access.

Undoubtedly, no intervention will succeed until the agricultural practices of farmers are improved and their need to harvest and sell prematurely is addressed. Despite the interest and willingness of processors and knowledge institutions such as KALRO to address poor GAP, insufficient capacity and underfunding impede the improvement of extension services for farmers. To overcome this obstacle, AFA needs to lead sectoral efforts to improve macadamia production.

Appendix 1 Research approach

Project objective

This Value Chain Analysis for macadamia in Kenya is part of the CBI process towards approval and design of the proposed value chain project. The outcomes of this study will be used by CBI to adjust the Business Case Idea (BCI) and consequently develop a detailed Business Case for the Kenyan macadamia value chain. The VCA covers the following topics:

- European export market/segments: this builds on and concludes findings analysed during previous phases. The analysis identifies specific markets and/or segments for the proposed project;
- The composition of the VC, including an analysis of the key actors, chain supporters and influencers;
- Identification of salient CSR issues, including but not limited to child labour, labour conditions, waste and natural resource management;
- Opportunities for export growth to EU markets and main bottlenecks restricting this in the value chain;
- Interventions required to seize these opportunities, including an analysis of how these can be most effective in the short and long term;
- Identification of key actors and stakeholders that could enforce or carry out such interventions;
- Identification and description of the main risks for a potential CBI project and what actions can be taken to mitigate these risks.

The project objectives are achieved through the combination of several approaches. Using desktop research, information was collected from a broad range of resources. The analysis of this material was verified and supplemented with findings from key stakeholder interviews in both Kenya and Europe, as well as a validation workshop conducted at the end of the research phase.

Project elements

The research covers 4 key elements:

- Element 1: export market and value chain competitiveness;
- Element 2: structure, governance and sustainability of the macadamia value chain;
- Element 3: opportunities and obstacles in the value chain; and
- Element 4: possible interventions and support activities in the value chain.

The findings from the first 3 elements provide the basis for developing suggestions for possible interventions and support activities as part of the fourth element.

Key project phases

The Value Chain Analysis combines 3 key phases: desk research, field research and validation.

Desk research

CBI organised a kick-off session with the research team at the start of the VCA to identify and discuss key expected outcomes of the VCA. Taking the results from a discussion of the inception report with CBI staff into account, the desk research gathered and analysed data before and in parallel with the field research, developing a background report on market and production-related questions. The desk research consisted of baseline date collection on the macadamia VC in Kenya. Among other sources, the desk research made use of:

1. Written sources, including CBI documents related to the selection of the Kenyan macadamia sector for a potential project; existing VCAs and VC assessments; market studies, including CBI's own market research; trade and other statistical databases; local sector and industry reports; the Kenya National AGOA Strategy and Action Plan 2018 – 2023; the National Export Development and Promotion Strategy for Kenya 2017-2022; and other documentation recommended by the Government of Kenya for baseline analyses, such as the Vision 2030, the AFA Act, the Crops Act (Chapter 6-1), the AFA strategic Plan (2016 – 2022) and AFA's Crop-Specific Strategy, Ministry of Agriculture, Livestock and Fisheries policies, the Kenya Industrial Transformation Strategy, National Trade Policy (presented as a bill awaiting enactment), the Special Economic Zones Act – Inclusion as a virtual Economic Zone, the Value Addition Policy and the National Agricultural Policy. In addition, a range of national and international media were consulted;
2. Interviews with 7 European and U.S. companies or representatives of relevant European/U.S. trade or sector associations, including companies that import from Kenya at present and companies that do not. The interviews aim to understand their view on the competitiveness of Kenyan macadamia as well as their view on key obstacles in the value chain that hinder macadamia exports from Kenya to Europe and the U.S., including the potential impacts of recent policy changes in Kenya that are relevant for the macadamia sector.

Field Research

The field research phase in Kenya focused largely on the second, third and fourth elements of the VCA. This phase was implemented in 2 parts:

1. A pre-audit of 19 macadamia processors in Thika, Nyeri, Embu, Makuyu, Athi River and Nairobi (paying special attention to documenting the obstacles they encounter and what their supply chain looks like, including which improvements are needed in their supply chain); and
2. Focus Group Discussions (FGDs) with key institutional stakeholders (government agencies, ministries, certification bodies, sector associations and trade associations), key international stakeholders in Kenya (e.g. international governmental organisations active in the country and/or in the value chain and NGOs active in the country and/or the value chain) and other relevant private sector stakeholders (e.g. farmers, commercial service providers such as logistics companies, consultancy firms and financial service providers) on opportunities and challenges for the macadamia VCA as well as CSR issues.

In total, 25 stakeholders in 16 organisations took part in interviews and FGDs.

Validation

A 2-day roundtable validation workshop was organised in Nairobi to present and discuss the findings of the VCA, as well as to discuss a multi-stakeholder sectoral approach to address the challenges identified. A total of 33 stakeholders participated, with at least 1 person representing each of the different segments of the Kenyan macadamia value chain. A report of the validation workshop including the agenda, minutes and main conclusions was submitted to CBI.

Methodological issues and data gaps

Information was gathered from a wide range of sources and experts to provide the best available data in support of the value chain analysis. The research made use of both objective sources of data and more subjective information gathered from interviews. With this approach, we aimed to provide a comprehensive, balanced and insightful report. However, not all questions could be exhaustively answered based on the research information. Some issues encountered include:

Availability of market data

Due to their production volume and share in the global tree nut market, which are still comparatively small, the availability of product-specific and detailed trade and market data is limited. In interpreting production statistics, it is also important to keep in mind the difference between in-shell and shelled data. The harvesting of immature nuts and high rejection rates mean that the eventual kernel harvest may be lower than anticipated based on industry averages for recovery rates. An additional level of insecurity is added by the unknown volume of NIS leaving the country illegally.

Interviews with sector experts were used to obtain additional, macadamia-specific market insights and to identify influencing factors that may promote or limit the market for macadamia in the coming years. However, the illegal character of the activity makes it difficult to estimate the scope of the smuggling of NIS from Kenya and the influence on total production vs available harvest. Qualitative data have been included in the analysis to describe the market situation.

Availability and willingness of macadamia processors to accept a pre-audit

Based on our market intelligence, we had expected to pre-audit at least 29 out of 34 identified macadamia processors in Kenya. While we received a satisfactory number of positive responses to our requests to conduct pre-audits, 5 of the contacted processors declined our request; 6 were dormant, out of business or did not process macadamia nuts; and 4 more were impossible to locate, thus suggesting that they were out of business.

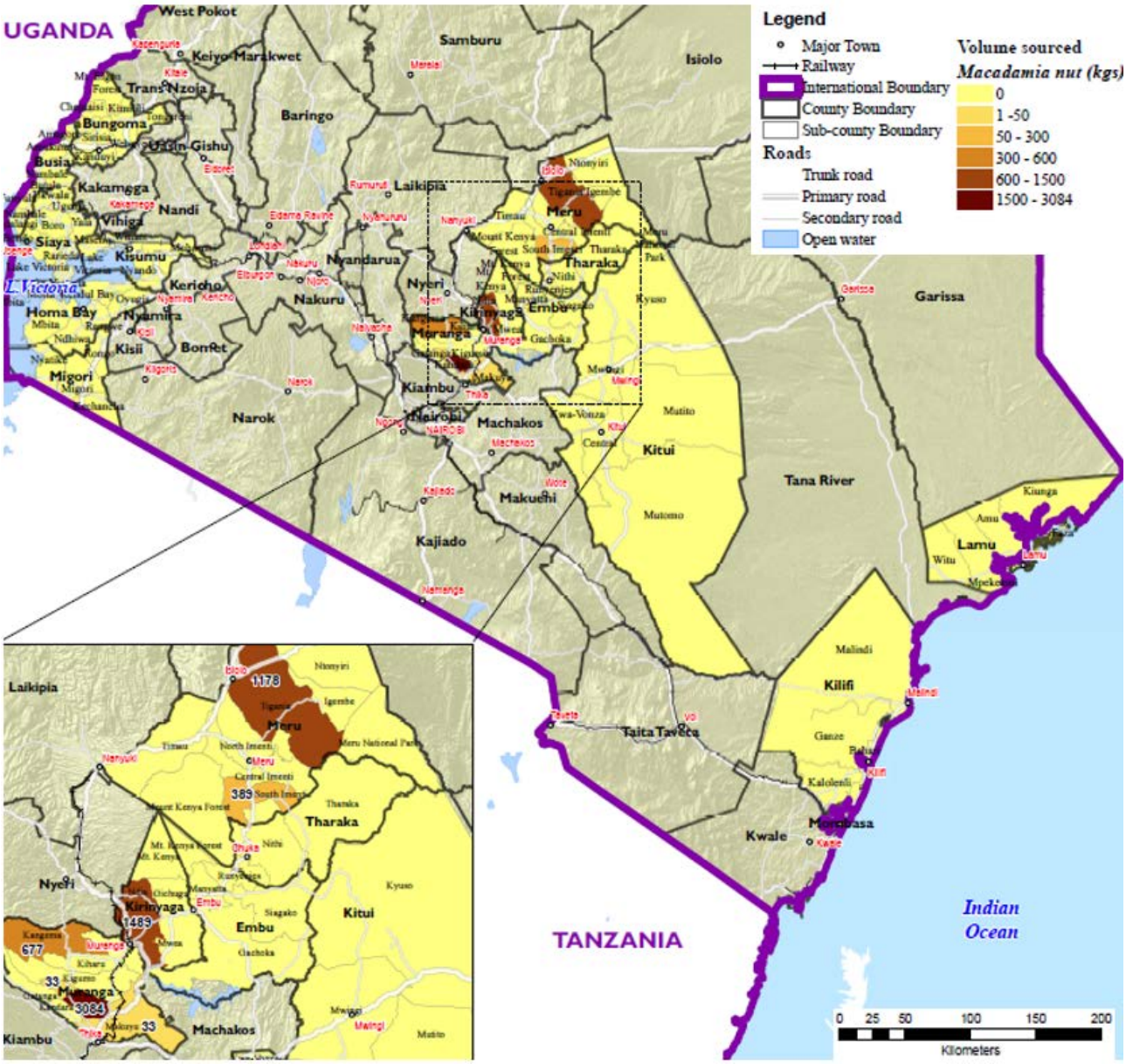
Outlook on market developments

Providing information on expected market developments in the future carries the inherent risk of being unable to predict influences that are still unknown. This is especially true for volatile markets for agricultural products. Interviews with sector experts were used to identify likely market developments and influences that may shape these events.

Appendix 2 Background information and data

The highland regions around Mount Kenya with their volcanic soil, known for the country's high-quality coffee production, are now the biggest producers of macadamia. This includes the counties of Kiambu, Meru, Embu, Murang'a and Kirinyaga.

Figure 14 Key macadamia production regions in Kenya



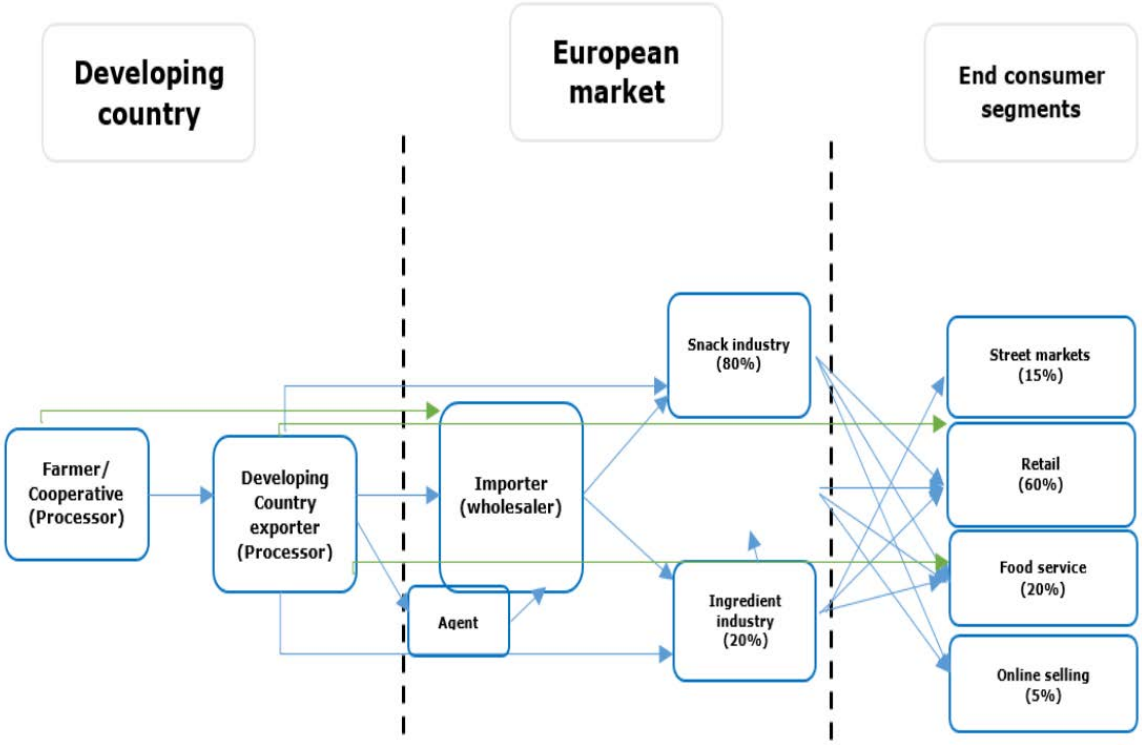
Source: TruTradeAfrica (2019, February), *Volumes Sourced for Tree Crops in Kenya - Macadamia Nut.*

Table 10 Key export destinations of macadamia from Kenya, 2014 to 2018

Country	2014	% of total	2015	% of total	2016	% of total	2017	% of total	2018	% of total
U.S.	3,514	66%	4,504	76%	2,721	56%	3,754	63%	3,997	63%
EU-28	1,268	24%	1,078	18%	1,412	29%	1,425	24%	1,654	26%
Japan	176	3%	114	2%	187	4%	225	4%	200	3%
Hong Kong	185	3%	25	0%	226	5%	272	5%	186	3%
Canada	73	1%	83	1%	34	1%	81	1%	130	2%
Others	144	3%	148	2%	262	5%	238	4%	160	3%
World	**5,360**		**5,952**		**4,842**		**5,995**		**6,327**	

Source: *ITC Trademap* (2019), 'List of importing markets for a product exported by Kenya - Product: 080262 Fresh or dried macadamia nuts, shelled'; *U.S. Census Bureau* (2019), 'Port-level imports: 080262 Macadamia Nuts, Shelled, Fresh Or Dried'; *Eurostat* (2019), 'EU trade since 1988 by HS6: 080262 - Fresh or dried macadamia nuts, shelled'.

Figure 15 European market channels for macadamia nuts



Note: in some cases, developing country exporters can also supply different segments directly, without the importer as intermediary. However, in most cases, specialised importers (wholesalers) serve the supply chain as the first entry point.
Source: CBI (2017, November), 'Exporting macadamia nuts to Europe'.

Table 11 Macadamia nut classifications

Class	Classification of macadamia nuts is not officially defined in the EU. However, the classification by the United Nations Economic Commission for Europe (UNECE) is widely used, in which macadamia nuts are classified into 2 main classes: 'Class I' and 'Class II'. This classification is made according to the allowed defects, which must not affect the general appearance of the produce as regards quality, keeping quality and presentation in the package.
Sizing	Grading categories for macadamia nuts are not officially defined in the European Union. The most frequently-used grading classification comes from UNECE. In this standard, size is determined by the maximum diameter of the equatorial section of the whole nut. A total of 8 different categories are defined for wholes and mixtures of wholes, halves and pieces (I to III), halves and pieces (IV), diced and chips (V to VII) and fines (VIII).
Special characteristics	In practice, product price and quality are usually determined by the characteristics of macadamia nuts, which combine style of the product (whole, mixtures or pieces), look of the kernel, grade and variety.

Source: United Nations (2011), *UNECE Standard DDP-23 Concerning the Marketing and Commercial Quality Control of Macadamia Kernels*, p. 4; CBI (2017, November), 'Exporting macadamia nuts to Europe'.

Appendix 3 Stakeholders interviewed in the EU

	Institution
1	**Global Trading/Trade Development International (NL)**
2	**Limbua (DE/KE)**
3	**Freeworld Trading (UK)**
4	**Intersnack**
5	**Catz International/ACOMO**
6	**Rabobank (NL)**
7	**Red River Foods (U.S.)**

Appendix 4 Stakeholders interviewed in Kenya

	Institution
1	**AFA**
2	**DANIDA**
3	**Embassy of the Netherlands in Kenya**
4	**FairTrade Africa**
5	**IDH**
6	**KALRO**
7	**KEPROBA**

	Institution
8	**KOAN**
9	**KUCFAW**
10	**Macadamia Farmers Association**
11	**Nutak**
12	**NutPak**
13	**SNV**
14	**Tradecare Africa**
15	**USAID**
16	**UNIDO**

Appendix 5 List of Kenyan macadamia processors

	Company name	Location
1	**Afrimac Nut Company**	Muranga
2	**Agro Group Kenya Limited**	Nairobi
3	**Amigos Nuts and Commodities Limited**	Kirinyaga
4	**Batian Nuts Limited**	Meru
5	**Equatorial Nuts Processors**	Muranga
6	**Eureka Nuts (EPZ) Limited**	Machakos
7	**Exotic EPZ Limited**	Nairobi
8	**Farmgate East Africa (EPZ) Limited**	Mombasa
9	**Jumbo Nuts Limited**	Embu
10	**Jungle Nuts/Jungle Macs EPZ Ltd**	Kiambu
11	**Kakuzi Limited**	Muranga
12	**Kenya Nut Company Limited**	Kiambu
13	**Lenana Processor**	Kiambu
14.	**Macadamia Fans Kenya Limited**	Kirinyaga
15	**MacNuts International EPZ Limited**	Machakos
16	**PAEM Nuts Limited**	Kiambu
17	**Privamnuts EPZ Kenya Limited**	Embu
18	**Rainsun Nuts Co. Limited**	Kirinyaga
19	**Sagana Nuts Limited**	Kirinyaga
20	**Superfine Africa Nuts**	Kiambu
21	**Ten Senses Africa**	Machakos

	Company name	Location
	Ltd EPZ	
22	**The Village Nut Company Limited**	Karatina
23	**Wish Kenya Limited**	Kiambu
24	**Wondernut International EPZ Limited**	Machakos

Note: the following processors appear in AFA's listings but were not included in this study either because they process nuts other than macadamia or because they are dormant or out of business: Treat of the Day (Ea) Limited, Superior MacNuts Limited, Qiwel Kanya Limited, Meru Equatorial, Green Forest Foods Limited, Avoil Industries. Data marked with * were obtained from AFA's listings.

Appendix 6 **Participants in the validation workshop**

	Institution
1	Agriculture and Food Authority
2	Amigos Nuts and Commodities Limited
3	Batian Nuts Limited
4	CBI
5	Embassy of the Netherlands in Kenya
6	Equatorial Nuts Processors
7	Eureka Nuts (EPZ) Limited
8	Exotic EPZ Limited
9	FairTrade Africa
10	IDH
11	Kenya Agricultural and Livestock Research Organization (KALRO)
12	Kenya Nut Company Limited
13	Kenya Export Promotion and Branding Agency (KEPROBA)
14	Kenyan Organic Agriculture Network (KOAN)
15	Kenyan Union of Commercial, Food and Allied Workers (KUCFAW)
16	Macadamia Farmers Association
17	MacNuts International EPZ Limited
18	Nutcellars Limited
19	Nut Traders Association of Kenya (Nutak)
20	Nut Processors Association of Kenya (NutPak)
21	PAEM Nuts Limited
22	PPD Consultants Limited
23	Privamnuts EPZ Kenya Limited
24	Profundo
25	Rainsun Nuts Co. Limited
26	Sagana Nuts Limited
27	SNV
28	TradeCare Africa
29	United Nations Industrial Development Organization (UNIDO)

	Institution
30	Wish Kenya Limited

Appendix 7 Value chain baseline measurement

Stakeholder	Indicator	Value (2019)
With SMEs	Number of SMEs operating in this sector	• Production: between 100,000 and 200,000 smallholders; 4 companies own 7,300 ha of macadamia plantations; • Aggregation: 100 AFA-licensed traders that work on exclusive buying contracts with processors; between 2,000 – 3,000 collecting agents that buy from smaller traders; unknown number of small traders that buy petty amounts of crop from smallholders; • Processing: 24 macadamia processors; • Export: all processors are involved in export (24).
	Number of SMEs with international business contacts (EU/EFTA and non-EU/EFTA)	All macadamia processors (24) have international business contacts, of which: • 3 processors are not yet exporting to EU/EFTA.
	Number of exporting SMEs in this specific value chain	The number of processors is the same as the number of exporters (24).
With business support organisations (BSOs) and sector associations	Number of BSOs and sector associations active in this value chain	• Unions: 1 (KUCFAW); • Sector associations: 3 (NutPak, Nutak, KMFA); • Banks and financial institutions: 3 (AFC, WBG and Rabobank).
	Type of export-enabling services provided by BSOs and sector associations	• NGOs: capacity building, certification, GAP, market access, financial management, traceability, youth and gender inclusion, climate resilience, food security; • Others: financial services, input provision, advocacy, marketing.
	Level of cooperation between the private sector, government, NGOs and knowledge institutions	Communication channels among stakeholders are scanty. Not all processors are members of sector associations, despite their obligation to join these. There is little union presence at processing plants. Non-governmental stakeholders agree on the MoA's limited involvement in the sector, but generally show antagonistic attitudes.
With local government	Number of relevant export development strategies and international trade-related policies formulated and implemented	• Kenya National AGOA Strategy and Action Plan (2018 – 2023); • The National Export Development and Promotion Strategy.
	Level of access to finance for SMEs	Low. Finance mostly comes from NGOs partnering with investors (IDH, SNV, DANIDA, Fair MatchSupport) and to a lesser extent from financiers such as WBG.
Contextual factors	Production figures of main products in this value chain (especially those products that CBI would want to focus on), including product pricing	In 2018, AFA estimated a joint installed capacity of 97,650 tonnes/year of NIS and an actual joint processing capacity of 34,645 tonnes/year. This study found a joint installed capacity of 97,360 tonnes/year and an actual joint capacity of 46,406 tonnes/year of NIS in 2018. AFA estimates that, with increased acreage under the crop, production will reach 60,000 tonnes NIS by 2022. That would constitute an increase by around 40 percent from the production achieved in 2018. As of 2018, Kenyan macadamia has caught up with the prices obtained by top macadamia-producing countries.
	Direct export to neighbouring and other non-EU/EFTA countries in volumes and EUR, including growth in %	More than 95 percent of Kenya's macadamia is exported. In 2018, exports to the U.S. and Asia (East Asia and the Middle East) accounted for 70 percent of all exports. Exports of Kenyan macadamia kernel in 2018 reached almost 4,500 tonnes, compared

		to 3,600 tonnes in 2014 (2016: 2,800 tonnes).
	Direct export to the EU/EFTA in volumes and EUR, including growth in %	Destinations in the European Union together accounted for around 27 percent of macadamia exports from Kenya. Average prices for Kenyan macadamia kernel imports to Europe have increased in the last 5 years, reaching €15,200 per tonne in 2018. In total, 1,654 tonnes of macadamia kernel were imported to the EU from Kenya in 2018, compared to 1,268 tonnes in 2014.
	Main export destinations	Key export destinations for Kenyan macadamia are the U.S. (about 60 percent of all exports), Europe (between 20 and 30 percent of all exports) and East Asia and the Middle East (between 10 and 20 percent of all exports).
	Employment figures (if available)	N/a
	Level of foreign investments	Kenya's FDI increased by US$1.6 billion in December 2018, compared with an increase of US$1.3 billion in 2017. The ICT sector has attracted the most FDI, thanks to the arrival of fibre optics in 2009 – 2010. Other sectors targeted by FDI include banking, tourism, infrastructure and extractive industries. The United Kingdom, the Netherlands, Belgium, China and South Africa are the main investors in Kenya.
In this value chain	Main bottlenecks in this value chain for exporting SMEs	• Challenging enabling environment; • Low productivity and incapability to meet demand; • Poor quality; • Poor governance (especially enforcement of regulations regarding NIS exports and harvesting moratorium); • Poor market access.
	Main certification standards in this value chain in this country	Despite a growing market for it, certified organic macadamia is only sold by 3 processors. All processors sell Halal-certified macadamia and all but 1 processor sell Kosher-certified macadamia. Moreover, processors also sell under the following certification schemes: • Fairtrade; • BioSuisse; • Demeter; • EUBio; • USDA-NOP; • Fair for Life; • Quality assurance: ISO, FSSC, BRC, FISMA, IFS Food Higher Level.

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