Potential for Kenya to Export Fresh & Dried Mango to Europe

A European Market Analysis of the Opportunities, Trends, Requirements & Channels to gain access to the European Market

ProFound
ADVISERS IN DEVELOPMENT

Prepared for SNV

November 2018

Table of Contents

Introduction 4

Product-Market Description 5

Product Description 5

Fresh Mango 5

Dried mango 5

Market Description 5

European Demand for Mango 7

Imports of fresh and dried mango in the EU 7

Extra information specific to Dried mango 9

Origin of Mangoes in the EU 9

External Factors Influencing Origin of Mangoes on the EU Market 11

Seasonality 11

Logistics (Shipping) 12

Climate Change 12

Country Bans 13

Trends in the EU market 14

1. Food Safety and Pesticide Residues 14

2. Healthy Living 14

3. Organic Products 15

4. Sustainability 16

5. Tendency towards more varieties 18

6. Convenience fruit 19

A. Freshly Cut Fruit (Fresh) 19

B. Quick Frozen (Fresh) 19

C. Mango Puree 20

D. Ready-to-eat (Fresh) 20

E. Tree ripened (Fresh) 20

Market Access Requirements 21

1. Legislative requirements on Traceability Food Safety 21

A. Traceability 21

B. Food Safety 22

2. Marketing Standards 25

A. General requirements: fresh produce 25

B. Specific requirements for mangoes 26

3. Additional Buyer Requirements 31
A. Colour 31
B. Ripeness & Maturity 31
4. Voluntary social and environmental standards 32
A. GRASP, a GLOBAL G.A.P. add-on 32
B. Organic 32
C. Fair Trade 33
Market Competition 34
Competing regions and main countries in mango supplies to the EU 34
Latin America 34
West Africa 35
Southern Africa 36
Potential positioning of Kenya in the EU 37
Brief description of Kenyan Mango Production and Export 37
Positioning 38
Key criteria for competitive analysis for Fresh and Dried mango, based on comparative analysis of main competitors 39
Competitive analysis (SWOT) Fresh mango from Kenya 40
Competitive analysis for Dried Mango from Kenya 43
Discussion based on competitive analysis 45
Recommendation: A Business Framework for Compliance 47
Market channels for mango from Kenya 49
Fresh mangoes 49
Production and exports 49
Importers and distribution 50
Market segments 50
Dried mango 51
Production and exports 51
Importers and EU processing 51
Market segments 52
Conclusion 53
Annexes 55
Annex 1: Examples of Packaged Mangoes 55

Introduction

The global import volume of mango stood at 1.92 million tonnes in 2017[1]. Whilst the global market increased more than 50% between 2006 and 2010 (ITC, 2015[2]), the previous five years show more of a steady growth as in 2013 the global import of mango stood at 1.6 million tonnes. The European (EU) market is a large and growing market for mangoes. The EU imported 361,587 tonnes in 2017 (EU stat, 2018) with an annual growth of 7% (based on the past 5 years). The United States and the EU are the largest mango import markets accounting for 45% of the world's import volume for mango in 2017. 92% of Europe's import of mango in 2017 came from developing countries.

This study aims to understand the trends, requirements, channels and competition of the EU market, painting a comprehensive picture of the opportunities for Kenyan producers who want to export fresh and dried mango to the EU. The scope of this study is dedicated to fresh and dried mango. However, where applicable it will also share tips on other trends on the market such as frozen, pulps and juice. These sub-sectors are outside the main scope of this study because of the different regulations, market channels and logistics involved and would therefore require further research to offer a comprehensive view.

Fresh mango is key to observe because it is only recently that the volumes of mango production in Kenya are rising. For example, in 2013 only 581,290 tonnes were produced whilst by 2022 it is expected that this will rise to 1,415,000 tonnes (ITC 2015[3]). Dried mango is also interesting, as there is growing demand for dried mango in the EU (CBI 2014[4]), but it has not yet attracted big investors in Kenya like those in pulp processing for example. Mango is one of the main fruits produced in Kenya, ranking 3rd after banana and pineapples respectively[5]. Kenya growers of mango include improved varieties such as Tommy Atkins, Kent, Van Dyke, Kensington, Sensation, Haden, Apple, Ngowe, Boribo, Batawi, Pears, Sabro, Dodo, and Sabine. The main varieties of mango grown in Kenya are Apple and Ngowe accounting for 39% and 17% respectively of total production.

Kenya has a long history of growing horticultural crops for both domestic and export markets. Its horticulture industry (including fruits) is the fastest growing agricultural sub-sector[6]. These developments have seen the industry grow from its base of small business/farmer, to being dominated by sophisticated businesses that are becoming increasingly vertically integrated, making it an interesting source for EU buyers (RVO, 2017[7]). RVO a.k.a The Dutch Enterprise Agency, highlights mango from Kenya as an emerging product of interest.

Even though global demand is growing, and Kenyan supply is rising to meet the challenge, major consumer countries Netherlands (Rank 3) and Germany (rank 10) remain untapped by Kenyan exporters[8]. The Agricultural authority of Kenya highlights that pests such as the fruit fly and mango seed weevil, coupled with diseases like anthracnose and powdery mildew are the major challenges to increased production of quality mangoes. These challenges are a major bottleneck towards gaining access to the EU due to strict food safety border controls. This report will therefore also take specific focus to highlight the legislative, market, and added buyer requirements to gain access to this market.

[1] https://www.trademap.org/Country_SelProduct_TS.aspx?nvpm=1|||||080450|||6|1|1|1|2|1|2|2|1
[2] http://www.intracen.org/uploadedFiles/Formatted%20MANGO%20EXPORT%20GUIDE.pdf
[3] http://www.intracen.org/uploadedFiles/Formatted%20MANGO%20EXPORT%20GUIDE.pdf
[4] https://www.cbi.eu/sites/default/files/market_information/researches/tailored-information-dried-mangoes-west-africa-promising-eu-markets-west-africa-europe-processed-fruit-vegetables-edible-nuts-2014.pdf
[5] http://www.agricultureauthority.go.ke/wp-content/uploads/2016/05/Horticulture-Validated-Report-2014-Final-copy.pdf
[6] http://www.agricultureauthority.go.ke/wp-content/uploads/2016/05/Horticulture-Validated-Report-2014-Final-copy.pdf
[7] https://www.rvo.nl/sites/default/files/2017/05/Tuinbouwrapport_tanzania_kenia_2017.pdf
[8] http://unctad.org/en/PublicationsLibrary/INFOCOMM_cp07_Mango_en.pdf

Product-Market Description

Product Description

Mango (*Mangifera indica*) trees are cultivated in tropical and sub-tropical regions[9]. The mango fruit comes in a multitude of different varieties with varying qualities.

Kenya produces multiple varieties of mango. Higher fibre varieties (generally better for processing) include Ngowe, Dodo and Batawi. Lower fibre varieties (export market) include: Apple, Kent, Tommy Atkins, Keit, Van Dyke and Haden. The fibre content is important, because buyers of fresh mango prefer mangos with low fibre. The less fibre the better because this sell better.

Fresh Mango

The main varieties of mango grown in Kenya are Apple (low fibre) and Ngowe (high fibre) accounting for 39% and 17% respectively. Apple is the variety of choice for export and the fresh fruit domestic market because of its colour and aroma when ripe. The Ngowe variety is mainly used for processing due to its large size and high brix content, resulting in high quality and quantity pulp (ITC 2015[10]).

Dried mango

Dried mango is prepared by drying ripe mango fruits and then cutting it. The most common ways dried mango is presented is in halves, slices, pieces, spears, chunks or cubes.

Market Description

Trade in fruit and vegetable products in the EU has been among the most dynamic areas of international agricultural trade, stimulated by rising incomes and growing consumer interest in product variety, freshness, convenience and year-round availability. It is a highly developed, competitive and rapidly changing market shown by the fact that whilst many emerging markets have managed to enter it, relatively few have achieved significant and sustained success (RVO 2017[11]).

Whilst traditionally Tommy Atkins was the main variety Europe, multiple varieties have been introduced on the market with success. The major mango varieties on this market are:

- Keitt (no fibre)
- Kent (no fibre),
- Osteen (essentially the only variety of mangoes grown in Europe),
- Palmer (minimal fibre) and
- Tommy Atkins (long shelf life, fibrous, but of declining interest).

Of the above, Kent is now regarded as favourite by traders for mangoes sold in the EU. This is because it has no fibre, is suitable for long distance transportation and be artificially ripened (CBI, 2014[12]). Consumers don't seem to pay much attention to variety and retailors market the exotic fruit simply as 'Mango'. This allows buyers to tap into the year-round availability of mango by offer different varieties from different regions of the globe. The mango, regardless of variety should have a sweet taste, nice colour (reddish/yellowish and green mix) and low fibre content.

[9] https://www.cbi.eu/market-information/fresh-fruit-vegetables/mangoes/europe/
[10] http://www.intracen.org/uploadedFiles/Formatted%20MANGO%20EXPORT%20GUIDE.pdf
[11] https://www.rvo.nl/sites/default/files/2017/05/Tuinbouwrapport_tanzania_kenia_2017.pdf
[12] https://www.cbi.eu/sites/default/files/market_information/researches/tailored-study-mangoes-west-africa-europe-product-characteristics-fresh-fruit-vegetables-2014.pdf

Concerning dried mango, there are 2 main types of dried mangoes on the EU-market[13]:

- Sugar-infused (crystallized) dried mangoes with up to 70% added sugar;
- Natural dried mangoes without sugar.

Dried mangoes are eaten in slices as a snack (whole or mixed) or are used in the food processing industry, mainly in breakfast cereals and in energy bars. Generally, the awareness of dried mangoes as a snack is still very low in the EU, which average around 1% of all imported dried fruit in 2012. The dried fruit market is mainly including sultanas, currants, raisins, dates and figs (65%) in 2012. The largest market for dried mangos is the U.K. (CBI 2014[14]) and it is expected that the EU market for dried mango will continue to rise.

Finally, food safety is a very high priority in the EU. Food safety policy underwent deep reform in the early 2000s as a response to a series of human food and animal feed crises (e.g. the BSE outbreak and the dioxin scare). This reform guarantees a high level of all food products marketed within the EU, including those produced from third countries (EU parliament[15]). As a result, food within the EU has a multitude of legislative, market and voluntary standards that are important for long term success in the market.

[13] Exporting dried fruit to the United Kingdom: https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/dried-fruit/uk/
[14] https://www.cbi.eu/sites/default/files/market_information/researches/tailored-information-dried-mangoes-west-africa-promising-eu-markets-west-africa-europe-processed-fruit-vegetables-edible-nuts-2014.pdf
[15] http://www.europarl.europa.eu/RegData/etudes/fiches_techniques/2013/050505/04A_FT%282013%29050505_EN.pdf

European Demand for Mango

Imports of fresh and dried mango in the EU

EU trade data on mango is included in the group fresh and dried Guavas, Mangoes and Mangosteens[16]. Data provided in this chapter is based on this group.

The total market for fresh and dried Guavas, Mangoes and Mangosteens was 615,769 tonnes in 2017, valued at € 1.050.321.592 (just over 1bn euro). Total European imports from 2013-2017, which includes intra EU trade, grew by 10% on average per annum and their value also increased on average at 13% per annum. The EU imported 361,587 tonnes in 2017 with an annual growth of 7% per annum over the same period and 92% of Europe's import of mango in 2017 came from developing countries.

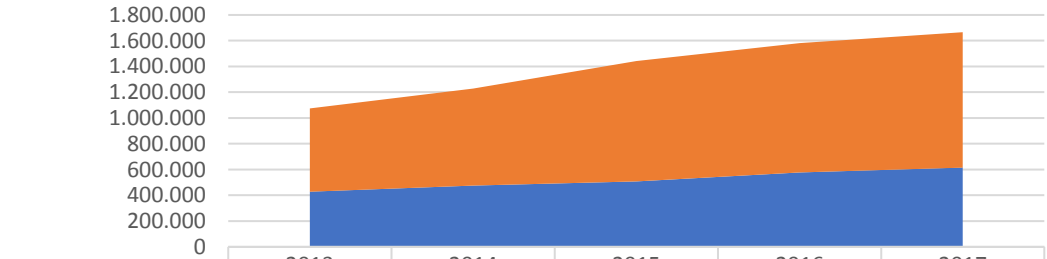
The main destinations of Guavas, Mangoes and Mangosteens, fresh or dried via intra EU trade (of which the majority is from the Netherlands), include:

- Germany (31%),
- France (13%) and
- The Netherlands (7%)

These three countries account for 51% of the inter EU trade. Other, smaller markets include: United Kingdom, Portugal, Belgium & Luxemburg and Switzerland (20%).

Figure 1 shows the total imports of mango both in terms of volume and value. Though the market in terms of volumes has been increasing, the nominal increase is relatively smaller. This shows that the supply, even though growing, is only growing slowly. Much larger growth is seen in the value. Analysis of the trade data reveal that this growth in value is highest within intra EU trade (17%). This is considerably higher than the growth in value from developing countries which is only at 10%. This depicts the importance of value addition and why importers favour the Kent mango (they can add value through artificial ripening).

Figure 1 Total Imports of Fresh and Dried Mangoes in the EU



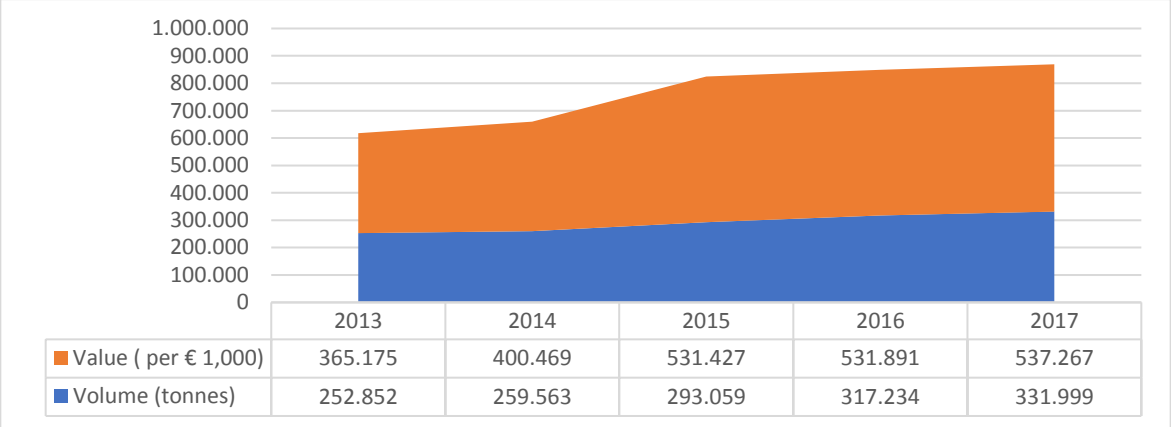
	2013	2014	2015	2016	2017
Value (per € 1,000)	645.846	751.745	934.831	1.005.449	1.050.322
Volume (tonnes)	427.770	476.195	507.213	576.958	615.769

Imports from developing countries follow the same trend. Figure 2 shows the total imports of fresh and dried mangoes from developing countries. In this figure it is observed that the volume and the value are been increasing steadily. However, between 2014 and 2015, whilst the volumes grow in a predictable manner, the value of these products increased significantly. FruitTrop Online attributes that key elements of this rise are most likely due to a better spread of the product and qualitative improvements,

[16] Based on Harmonised Systems code 0804.50: 'Guavas, mangoes and mangosteens, fresh or dried'

with the growth in 'ready-to-eat fruits[17].' This shows once more how improved quality can significantly increase the price, setting a new standard on the market.

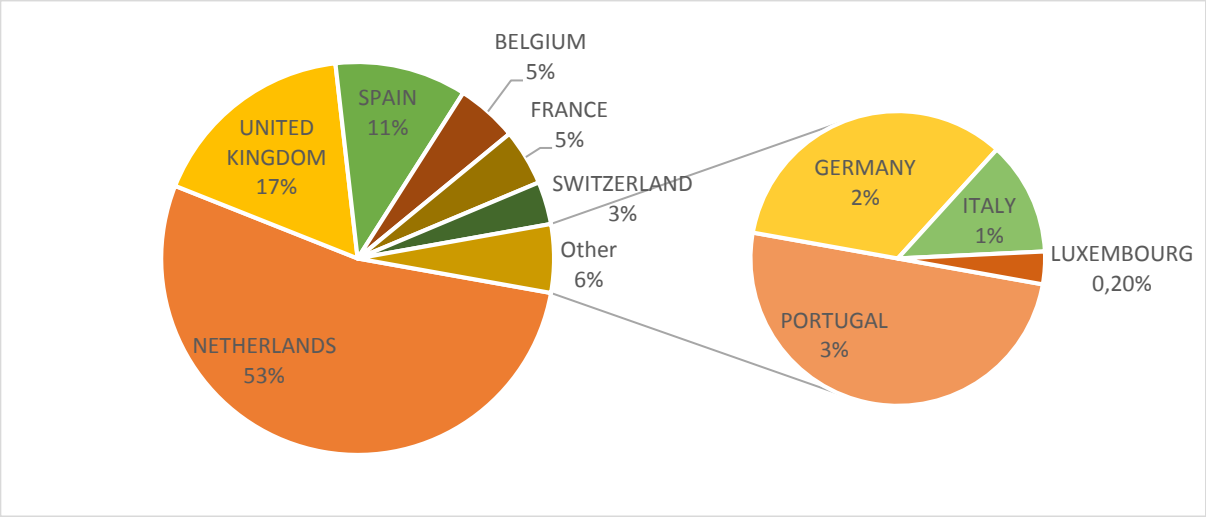
Figure 2: Total Imports of Fresh and Dried Mangoes in the EU from Developing Countries



	2013	2014	2015	2016	2017
Value (per € 1,000)	365.175	400.469	531.427	531.891	537.267
Volume (tonnes)	252.852	259.563	293.059	317.234	331.999

The pie chart below (Figure 3) shows the main importing countries of mangoes directly from developing countries in 2017. Just 6 countries account for 94% of the total direct imports from developing countries in 2017. The Netherlands is by far the largest importing country accounting for 53% of the total EU volume.

Figure 3: Importing EU Countries of Mango from Developing Countries



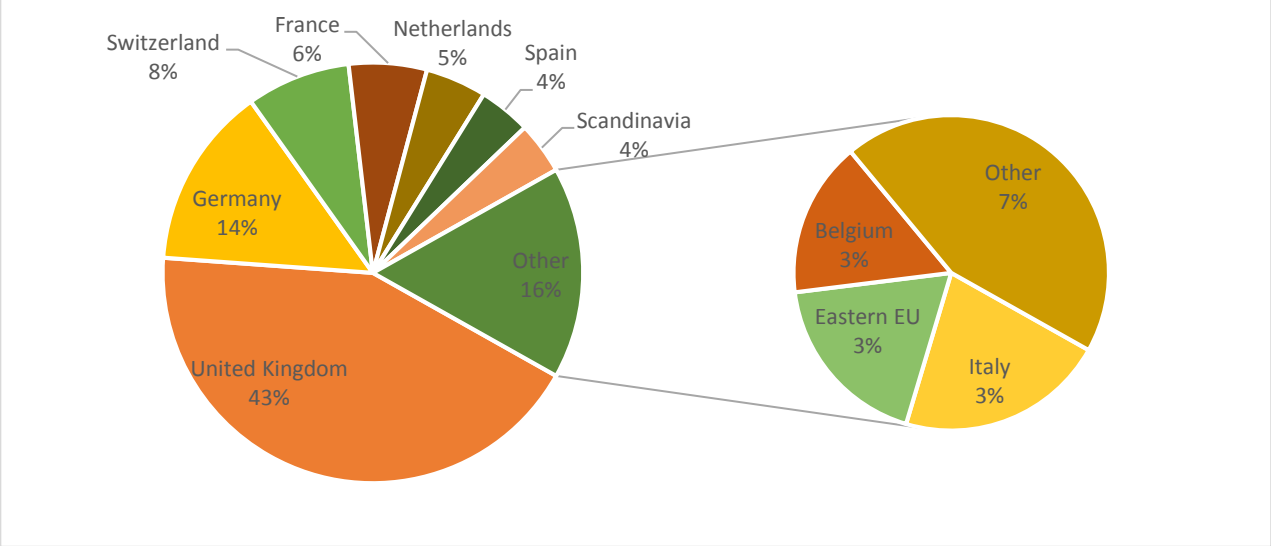
The Netherlands is a hub for fresh and dried mangoes, playing a key role in intra-EU distribution. Close to 90% of Dutch mango imports are re-exported to North-European destinations (Germany being the most notable market) as fresh or processed and mixed into products (ITC, 2015[18]). The total intra EU trade volume of Guavas, Mangoes and Mangosteens, fresh or dried was 286,256 tonnes in 2017 and the Netherlands exported 186,251 tonnes, equal to 65% of all intra EU exports for the product. Other intra EU exporting countries include Spain (14%), Belgium & Luxemburg (6%), France (6%), Portugal (4%), Germany (4%) and United Kingdom and Slovenia both at 1%.

[17] http://www.fruitrop.com/en/Articles-by-subject/Economic-analyses/2016/European-mango-market
[18] http://www.intracen.org/uploadedFiles/Formatted%20MANGO%20EXPORT%20GUIDE.pdf

Extra information specific to Dried mango

In 2014, the Dutch Import Support Office (CBI) conducted a study relating to export markets for dried mangoes[19]. The summary of the EU market based on this study is shown in the pie chart below (figure 4). Based on trade estimates a total of 3,400 tonnes of dried mango was imported in 2012.

Figure 4: EU imports of dried mango as percent of volume, Trade Estimates from CBI Tailored study



The UK is the main market in the EU because of their use in breakfast cereals or energy bars and because the market is familiar with eating dried mangoes as a snack.

Based on interview sources for this research, specific buyers reveal that demand in Switzerland and Germany is growing. An organic trader of dried mangoes supplying the Swiss market noted that dried mango made tremendous growth in the last decade, stating that 10 years ago (2007) Switzerland market for dried mango was only 8 tonnes, and currently it is approximately 150 tonnes per annum. A similar but smaller growth was also observed in Germany, currently purchasing 60 tonnes per annum of organic dried mango. Furthermore, it is expected that the market for dried mango will increase as importers are more capable of suppling more availability throughout the year. More information on the market for dried mangoes can be found here[20].

Origin of Mangoes in the EU

Fresh and Dried Mangoes in the EU have multiple origins from different regions. Focussing on fresh, Spain is the only country in the EU that is also a producer and exporter of the fruit. Excluding Spain, there are a total of 13 countries that supplied at least 1% (rounded up) of the total volume of 2017. These are from different regions, as shown in the table below with their respective share volume depicted in a percentage.

[19] https://www.cbi.eu/sites/default/files/market_information/researches/tailored-information-dried-mangoes-west-africa-promising-eu-markets-west-africa-europe-processed-fruit-vegetables-edible-nuts-2014.pdf
[20] Link is the same as the one provided above (19).

Table 1; Origins of Mango, mainly Fresh, in the EU in 2017

South America	West Africa	Middle East/North Africa	Asia
Brasil (21%) Peru (16%) Dominica Rep. (2%) Mexico (1%) Costa Rica (1%)	Ivory Coast (5%) Senegal (2%) Burkina Faso (1%) Mali (1%) Ghana (1%)	Israel (3%)	India (1%) Pakistan (1%)

The above-mentioned countries are responsible for 56% of the total volume of mangoes supplied on the EU market in 2017. Spain, as the only mango producing EU country, is responsible for 7% of the total volume supplied to the EU. Adjusting for this reveals that the above countries supply 60% of the total demand from outside the EU.

This shows the large diversification of the origin of mangoes on the EU market, especially as at least 21 countries from around the world exported at least 1000 tonnes of Guavas, Mangoes and Mangosteens, fresh or dried to the EU in 2017.

There is little quantitative data available for the origin of dried mango, and so this is best depicted using more descriptive methods. Current supplies of dried mango on the EU market are mainly dominated by:

1. Thailand
2. Philippines and
3. South Africa.

Other countries that are supplying dried mango include Brazil, India, Pakistan, West African countries (Ghana, Burkina Faso and Mali), Tanzania[21] and Zimbabwe[22].

East Africa and Kenya as Origin of Mango in the EU

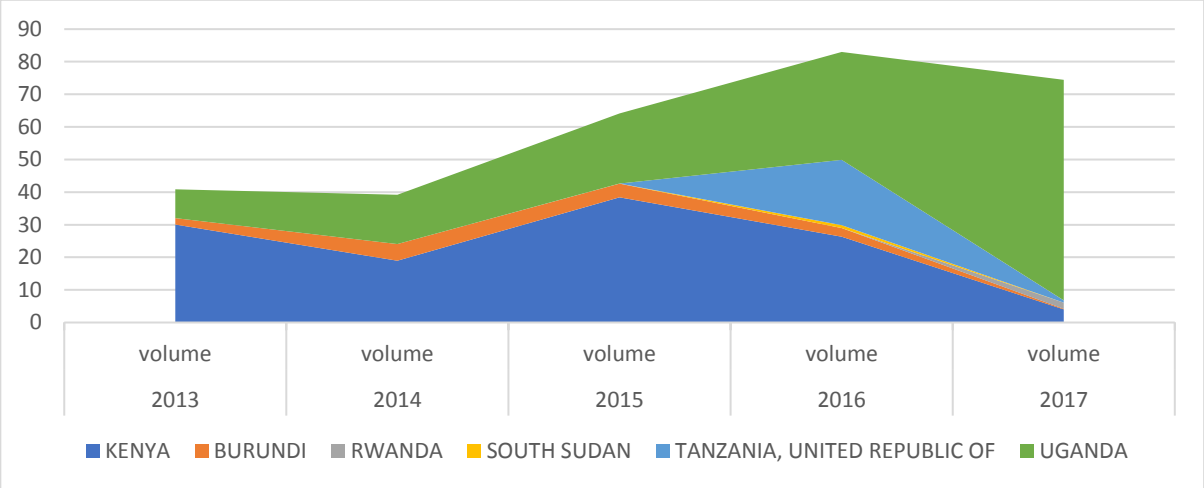
Albeit small in relation to the main suppliers mentioned, mango supply to the EU was observed from East Africa over the last 5 years. Figure 5 below shows that over the last 5 years, supply from mango from East Africa was generally rising. In fact, between 2013 and 2016 the supply of mango from this region doubled from 40 to 80 tonnes. Uganda's growth over the 2016-2017 shows a potential boom. In 2013 this was only 9 tonnes and between 2016 and 2017 this doubled from 33 tonnes to 68 tonnes respectively.

Kenya reached a peak of 38 tonnes in 2015 but has since then decreased to 26 tonnes and 4 tonnes in 2016 and 2017 respectively, a gap that Uganda has filled. The most probable cause of the severe decline from 2016 onwards could be challenges Kenya faced with pests as well as stricter EU maximum residue level (MRL) testing[23]. Additionally, it is expected that over the course of 2018 Kenya will not export any mangoes because of the introduction of the self-imposed ban on export. Challenges with pests, diseases and compliance are the most probable main drivers for this ban.

[21] https://www.cbi.eu/sites/default/files/market_information/researches/tailored-information-dried-mangoes-west-africa-competitiveness-west-africa-europe-processed-fruit-vegetables-edible-nuts-2014.pdf
[22] https://www.cbi.eu/sites/default/files/market_information/researches/tailored-information-dried-mangoes-west-africa-promising-eu-markets-west-africa-europe-processed-fruit-vegetables-edible-nuts-2014.pdf
[23] https://www.standardmedia.co.ke/article/2000200547/mango-farmers-trap-fruit-fly-to-open-eu-market

Besides this, the statistics show that over the last five years, the total supply of Mangoes from East Africa to the EU has doubled. This is testimony to the potential of market access to the EU if quality standards are met. More on this topic will be discussed in the competition chapter.

Figure 5: Supply of Mango to the EU from East Africa



External Factors Influencing Origin of Mangoes on the EU Market

External factors relate to those factors that are to a large extent beyond the control of suppliers. In other words, these are factors that suppliers cannot do too much about, because it is out of their control. In later chapters, attention will be given to internal factors that are within their sphere of influence (for example, quality, and certification). The main external factors that influence the origins of Mangoes on the EU market are: Seasonality, Logistics, Climate Change and Bans.

Seasonality

This is mainly applicable to fresh mango only, because dried mango is not a perishable good and can enjoy a long shelf life of for example 1 year.

European traders organise year-round supply of mango on to the EU market by importing from multiple sources and importing different varieties. The weak points are usually the beginning or ending of seasons, when the fruit quality is not optimal for ripening or is at risk of being overripe. These traders are open to alternative suppliers, creating opportunities for exporters who can supply good-quality mangoes when other countries cannot (CBI 2018[24]). What is observed is that the last quarter of the year has relatively fewer suppliers with Brazil being the only exporting country able to offer a high level of supply at this time.

Seasonality from Kenya

Overall, Kenya's mango industry has a key competitive advantage that makes its value proposition more attractive to the EU market. The country boasts long mango seasons, which ranges from October to March (high season), and another shorter season that ranges from April to June, covering mainly the coastal region (ITC, 2015[25]).

[24] https://www.cbi.eu/market-information/fresh-fruit-vegetables/mangoes/europe/
[25] http://www.intracen.org/uploadedFiles/Formatted%20MANGO%20EXPORT%20GUIDE.pdf

This could make it possible for Kenya to supply to the EU as at the end of year there seems to be an opening for more diverse supply. Sources of this research expressed that challenges are faced in having good quality mangoes, especially around the Christmas period.

	Months											
Countries	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
BRAZIL												
PERU												
COTE D'IVOIRE												
ISRAEL												
DOMINICAN REPUBLIC												
SENEGAL												
PAKISTAN												
BURKINA FASO												
MALI												
MEXICO												
GHANA												
COSTA RICA												
INDIA												
SOUTH AFRICA												
KENYA (Theoretical)												

Level of supply
Low
Average
High

Logistics (Shipping)

Buyers look at shipping time and cost of shipping. The longer the shipment the higher the chance of damage to the fresh produce. For dried mango, it mainly comes down to the cost, in relation to other regions that can offer the same quality.

In most cases, Mango will be transported by ship to the EU. Only highly demanded varieties such as the Ataulfo mango are transported by air. However, on average, mango from Kenya can take up to 21 days and be relatively more expensive than from West Africa (8 days) and South America (also 21 days). Whilst South America duration is just as long, this chain is much more established and due to Brazil's ability to supply all year round, also can benefit from economies of scale.

Climate Change

Frequent and decent rainfall are important to high quality mango. Furthermore, buyers are on the lookout for reliable suppliers. Currently many suppliers to the EU do not use irrigation on their mango farms. Therefore, the ability to do so can give suppliers a competitive and quality advantage.

For example, one buyer described the challenges from one of their Peruvian suppliers. The supplier constantly must plant higher and higher as temperatures continue to rise. A study by Torres Ruiz de Castilla (2010) found that higher temperatures in Peru could reduce mango yields by 3.9%[26]

Kenya may have a comparative advantage here since the country offers multiple climatic conditions ranging from sub-humid to semi-arid zones where mango can be grown. The main mango-growing areas in Kenya include the coastal and eastern regions, contributing an average of 85% of total mango

[26] http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/climatechangeEN.pdf

production in Kenya. The quality of the mangoes from Kenya will be affected mainly by the following four climatic conditions[27]:

- **Altitude.** Mangos typically grow well in altitudes below 1,500 m above sea level, though Apple and Ngowe varieties grow best in areas below 1,000 m. A select few varieties, such as Tommy Atkins, Kent, Keitt, Van Dyke, Sabre, and Peach, do well in areas higher than 1500 m above sea level.
- **Rainfall.** Mature mango trees tolerate drought, since their taproots can reach the water table, but young mango trees require annual rainfall of 850 to 1,000 mm to flourish. A distinct dry season is necessary at flowering, as rain during flowering seriously reduces the fruit set. Hence why irrigated orchids are becoming more attractive for buyers.
- **Soil.** Mangos do best in soils of pH between 5.5 and 7.5 that are loamy in texture, fertile, and well-drained. Soils should be deep (at least 3m). The tree can adapt to various types of soil.
- **Temperature.** Mango quality lowers with decline in temperature; optimal temperatures for growth are between 20° and 26° C.

Country Bans

Country bans can have devastating impact on a sectors' economy because bans can be detrimental to an entire market sector. For example, in 2013 the EU placed a ban on India due to fruit flies having been detected in multiple consignments[28].The EU trade data shows that India's exports of mangoes between 2013 and 2014 to the EU dropped by over 60% from 13,352 tonnes to 4,383 tonnes (2014) and a further drop to 2,534 tonnes in 2015. As of 2017, India had only managed to recover to 5,540 tonnes.

Furthermore, the above-mentioned ban also had serious implications on exports from Pakistan. They received an official warning from the EU, also for risk of fruit flies. The Government of Pakistan acted by placing extra quality checks[29]. This led to the supply dropping from 13,352 tonnes in 2013 to only 4.383 tonnes in 2014, a reduction of almost 67%. Pakistan has been able to recover, but not above levels of 2013 volumes.

Kenya is currently facing a self-imposed ban. During the Mango day held on the 4th of October 2018, FPEAK representative mentioned that over the course of 2018, no mangoes have been exported to the EU. This is in line with the Eurostat data provided in Figure 5 (page 11), that shows that the export to the EU from Kenya was already on the decline. Based on the other examples provided and analysis of the trade data, Kenya's self-imposed ban is very likely to have a negative impact on the export potential if nothing is done quickly to address the core problems.

[27] KCDMS Mango Value Chain Assessment September 2018, RTI International.
[28] https://blog.euromonitor.com/2014/06/indias-mango-crisis-deepens.html
[29] https://tribune.com.pk/story/923472/pakistan-struggling-to-avoid-ban-on-mango-exports/

Trends in the EU market

This section provides details about identified trends for fresh and dried mango on the EU market. Whilst the trends are applicable to both fresh and dried mango, the implications of these trends on fresh and dried can mango vary. This section first highlights the trends and then focusses on the implications for fresh and dried mangoes on the EU market.

1. Food Safety and Pesticide Residues

Food safety, (explained in the requirements section) remains a concern in Europe for all food products. Not complying with legislation on food safety can lead to border rejections of the products. The main issue lies in the contamination of products entering the European market.[30]

The European Union has set maximum residue levels (MRLs) for pesticides in and on food products. Products containing more pesticides than allowed will be withdrawn from the EU market.

Implications for Suppliers

Buyers in several Members States use MRLs that are stricter than the MRLs laid down in EU legislation. This is especially the case in Germany which, alongside the United Kingdom, applies the strictest MRLs at the retail level in Europe! As a rule, German retailers apply an MRL rule which is 3 times stricter than the EU legislation – but some German retail chains can set the MRL limit even higher. In the past few years, this approach spread into all leading European retail chains.

2. Healthy Living

The understanding of what it means to be healthy is changing amongst European consumers. Instead of focusing on treating illness, consumers perceive health increasingly in terms of preventing illness, feeling good and looking radiant (NIHP, 2018[31]). Diet is key in this approach as consumers are more conscious of what they are eating. Fresh plays an important role in this trend as consumers relate fresh produce as being healthy. For example, Hello Fresh SE, a Germany based company established in 2011 with 10 customers prepares combinations of (fresh) ingredients needed for a meal that delivers to consumers doorsteps. In 2017 the company recorded having 1.3 million subscribers[32].

Furthermore, there are also more very health conscious consumers who pay specific attention towards food with less sugar and calories. For example, a popular smartphone app called MyFitnessPal that helps tracks and manage calorie and nutritional intake had 80 million users in 2015 and 150 million users in 2018[33].

Implication for Fresh mango

There is preference to eat more fresh fruits rather than processed foods as these generally are perceived as healthy. National recommendations across the EU are also promoted. Whilst the recommended intake for fruit and vegetable intake vary considerably throughout the European Region, several countries provide a total fruit and vegetable intake recommendation without differentiating between the two, from 3-5 portions/day to 5-9 portions/day[34]. Fresh mangoes are also increasingly used in different recipes which could include breakfast (mostly fresh sliced), or as an ingredient in salads for lunch[35] and in

[30] Eurobarometer Food-Related Risks: http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_354_sum_en.pdf
[31] CBI Market Research Trends for Natural Ingredients for Health Products, 2018
[32] https://en.wikipedia.org/wiki/HelloFresh
[33] https://en.wikipedia.org/wiki/MyFitnessPal
[34] http://www.euro.who.int/__data/assets/pdf_file/0017/150083/E79832.pdf?ua=1
[35] https://www.levarht.com/recipes/mango-avocado-walnut-salad/

preparation of exotic meals and desserts[36]. Finally, mangoes are recommended and even described as 'super fruits' because they contain many vitamins and minerals[37].

Implication for Dried Mango

Dried mango (as well as other dried tropical fruit) is a healthier choice (fewer calories) when compared to regular snacks (e.g.: candy, chocolate, chips, etc.). This healthy snacking trend helps make the U.K the largest market for dried tropical fruits which includes mangoes (representing 11% of total world imports and 50% of EU imports in 2016[38]). Crucial to this trend is to keep the product as natural as possible. For example, in the United Kingdom the low-sugar, natural and additive-free products are identified as the main drivers for dried fruit consumption[39]. To boost or maintain sales, companies in the EU are introducing sugar replacements to their products or lowering the amount of sugar used. The number of new product launches with labels such as "no added sugar", "sugar free" or "low sugar" is increasing[40].

Dried tropical fruit are finding applications in new product development. At the latest ANUGA trade fair in Germany (2017), several new products with dried tropical fruit were launched. Those products included dried fruit mango chutney, dried fruit bars (made of 100% tropical fruit) and different types of snacks. Production of fruit bars as snacks is one of the newest European trends, where dried tropical fruit is finding an application as ingredient. They are more frequently produced without added sucrose as a sweetener, but with fructose, stevia or fruit juice as a natural sweetener. Many ingredient combinations are on the market, such as different types of dried fruit with seeds and nuts[41].

Another area of interest related to this trend is 'Freeze-drying' and is one of the main influences on the dried fruit market. Although products are not the same as naturally dried fruit, they offer a different structure and new possibilities for applications. Freeze-dried tropical fruit is used in muesli's, in the production of snacks or even grinded into powders. However, this requires another type of investment into equipment and the starting material is frozen fruit[42].

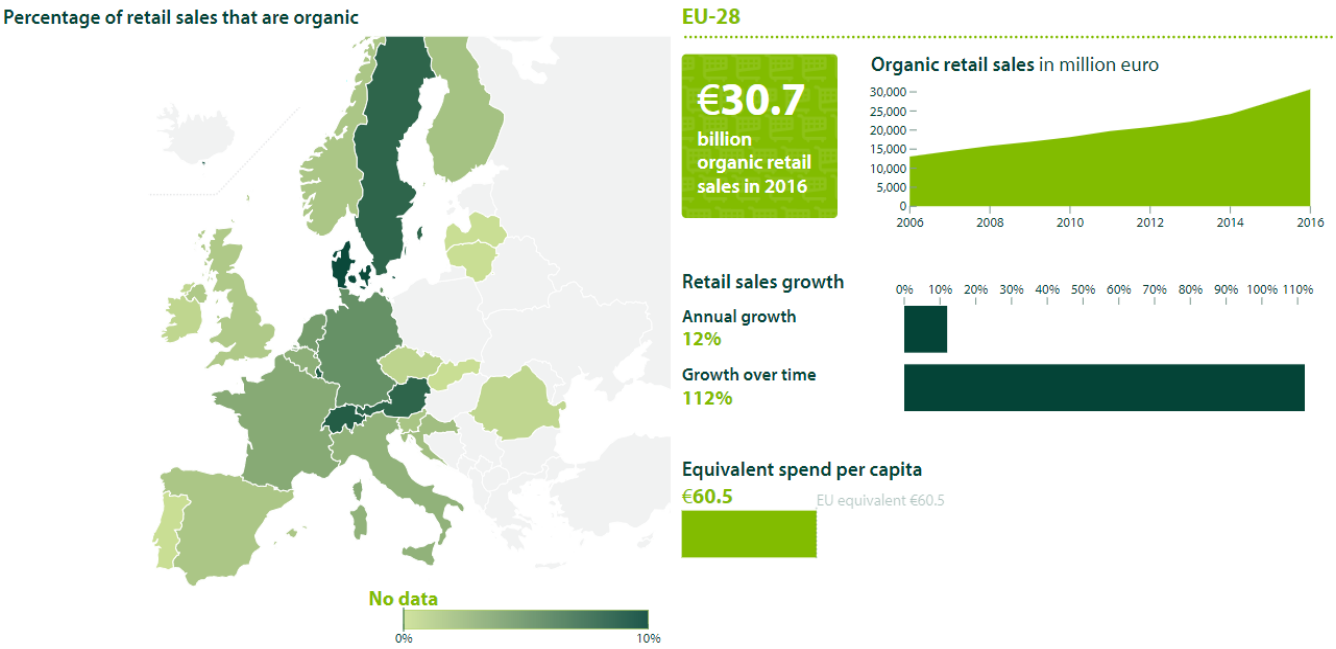
3. Organic Products

The Healthy living trend is positively influencing organic produce because consumers associate organic with better quality and health as well. Consumer food safety concerns, especially over pesticide residues, are also driving the interest in organic fresh foods, to ensure food safety. Although still considered a niche, the organic market is expected to grow over the next years.

According to data from FiBL, the European organic food market grew by 12% in 2016 to a retail turnover of 30.7 billion euro[43]s. Germany is the largest retail market for organic products with close to €9.5 billion euros with an annual growth of 10%, however Denmark has the highest percentage of organic products on the market at 9.7% with an annual growth of 20%. Switzerland spends the most per capita on organic products at €274 euro. The EU average is €60,50 euro[44].

[36] https://www.bbcgoodfood.com/recipes/collection/mango
[37] https://www.mango.org/mango-nutrition/
[38] https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/dried-tropical-fruit/
[39] https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/dried-fruit/uk/
[40] https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/trends/
[41] https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/dried-tropical-fruit/
[42] https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/dried-tropical-fruit/
[43] https://shop.fibl.org/CHen/mwdownloads/download/link/id/785/?ref=1
[44] https://www.ifoam-eu.org/sites/default/files/ifoamvis-package/index.html

Figure 6: Organic Retail in Europe



Source: IFOAM[45]

Implication for Fresh Mango

The growth of organic can be attributed to the rise in the healthy living trend described in the previous section because organic is associated with being healthy. Organic is also a growing trend within the Fresh fruit segment because consumers and businesses are also giving more attention to the environment. A market source shared that in markets where expenditure on organic produce is relatively high such as in Switzerland, non-organic fruit does not even sell in most supermarkets. It is therefore interesting to consider organic certification when looking at the EU market and this expanding trend for fresh.

Implications for Dried Mango

A main supplier of dried mango to the Swiss and Germany market stated that (organic) dried mango sales are on the rise in these countries. According to them, the increased uptake is currently being driven by hikers and climbers. The dried mango is a tasty, healthy and easy to carry snack making it ideal for people on the move. The Swiss market sells almost exclusively organic certified mangoes and this market is also rising in Germany. For dried mango suppliers looking to enter the EU market, tapping to the organic market is an interesting niche.

4. Sustainability

As the organic trend pointed out, consumers and companies are also becoming more and more conscious of their environment. Whilst organic constitutes a part of this, this is not the whole story as environment can also be used to explain social and other external factors. Hence the focus on the term sustainability. Sustainability is increasingly important on the European market, both from a consumer perspective and from a buyer perspective. This trend relates to many aspects like working conditions, water use and waste management, among other factors. Industry sources mention the conservation of water resources as one of the principle concerns in the production of fresh fruit and vegetables.

European consumers increasingly demand sustainable products and want to know where their products are coming from and whether the trade was done responsibly and in a fair manner. Therefore, next to

[45] https://www.ifoam-eu.org/en/organic-europe

organic products, certification that depicts compliance with fair principles is very common. Fairtrade, UTZ and Rainforest Alliance are all examples of labels that are known by consumers.

As much as 75-90% of fresh fruit and vegetables are currently distributed through supermarkets in Europe, while small retail shops, open/ethnic markets and vendors only account for 10-25% of the market. As such, supermarkets become the main decision-makers in the chain; as an implication, service providers such as wholesalers/importers become lean and mean. In this market reality, importers prefer to turn to large and reliable producers to reduce risk and costs.

For European buyers, this means that they are much more involved in the sustainable management of their supply chains focussing on both quality and quantity. To remain competitive, they need to offer year-round supply in the value chain at good quality. This brings with it increasing demands for food safety and sustainability for their suppliers.

For example, multiple buyers that were contacted for this study explained that in terms of volumes, their supply levels are enough to serve the EU market. For example, one organic buyer, Biotropic (Germany), has installed a state-of-the-art ripening and sorting equipment with which they can scrutinize the quality of the mango to offer the highest quality to their customers. The mangoes pass through the following stages of the sorting machine:

- pressure testing to determine firmness
- visual testing with cameras to determine skin defects
- acoustic testing to search for internal defects
- and light testing to determine the sugar content

The result for the consumer is that they have access to best and most delicious organic mangoes, ready to eat. Mangoes that do not pass the test (approximately 33%) are not accepted. However, for suppliers this means ensuring that quality management is carried out stricter or otherwise they risk not receiving payment. This can be quite a challenge, especially when the issues affecting quality are not within the suppliers' direct sphere of control.

For example, climate change in Peru and West Africa is resulting in changing rain patterns, causing some exported mangoes to suffer from wrinkling, a result of having too little water. These mangoes either do not sell or sell for a low price.

Buyers are addressing the challenges relating to the quality of the mangoes through integrating Corporate Social Responsibility (CSR) into their requirements for suppliers. For example, Levahrt, a Dutch fresh fruit and vegetables sourcing company committed to sourcing all its produce sustainably by 2020. This is part of the Sustainability Initiative Fruit and Vegetables (SIFAV 2020), managed by the Sustainable Trade Initiative (IDH)[46]. Other large retail companies such as Lidl, Albert Heijn and Jumbo Supermarkets, as well as producers and traders such as The Greenery are also part of the initiative and have committed towards the 100% sustainability target[47]. This trend is becoming more and more important, so much that CBI launched the CSR roadmap tool in 2017 to help SME suppliers meet these increasing buyer requirements[48].

[46] https://www.idhsustainabletrade.com/initiative/sifav/
[47] http://www.fruitnet.com/eurofruit/article/163222/levahrt-joins-green-sourcing-project
[48] https://www.schuttelaar-partners.com/news/2017/csr-roadmap-for-cbi-structural-work-on-sustainability

Implications for suppliers

More buyers are expected to integrate CSR into their requirements for suppliers. This can be done in a multitude of ways such as surveys, declarations, codes of conduct and increasing supplier documentation. It is more common that buyers now develop and implement sustainability strategies to make their supply chain have (for example) a smaller CO2 footprint, less food loss, use more sustainable packaging, more traceable and transparent and work more directly with suppliers. For example, one market source explained that they are on the lookout for mango suppliers that use irrigation to grow mangoes, as this can ensure better quality mango.

To implement this throughout the supply chain, buyers expect suppliers to make their supply chains more transparent and to take more responsibility for the sustainability and quality of products and operations in terms of quantity and quality. This means that compliance to standards becomes equally as important as the product being exported. It is becoming increasingly important to have evidence, through data and documentation for:

- Legal aspects: compliance with local legislation and use of registered and approved inputs
- Economical aspects: supply levels, costing and logistics
- Environmental aspects: Types of inputs, resource management such as water management and soil testing
- Social aspects: such as fair pay, health and safety, fair contracting with suppliers and training

Compliance and management of documentation of the strict requirements is a challenge for every player (producer, exporter and importer) in the chain. Therefore, the better a supplier can apply sustainability management, the more competitive this supplier will become.

5. Tendency towards more varieties

For quite some time, European countries were mainly supplied with a few well-known varieties of mangoes such as Amélie, Tommy Atkins and Kent[49]. Buyers and retailers generally do not place large significance on the variety unless the variety itself makes it stand out. For example: one variety that stands out is the Ataulfo mango a.k.a. Honey Mango. This mango stands out for its unmatched “sweet like honey” taste[50]. The most likely reason that there is a tendency to more varieties is to ensure year-round supply and because certain varieties are better than others when it comes to processing.

For example, companies focusing on fresh-cut mango would prefer Kent and Keith, while drying exporters can use more varieties. The Palmer variety is not good for fresh cut[51]. For fresh export, Tommy Atkins used to be the most popular for export to the EU (as stated in 2014 CBI study[52]). However, the 2017 RVO[53] study explained that this is not preferred as the flesh gets soft very fast and the fruits tend to be smaller.

Implication for Suppliers

This tendency for more varieties shows potential for Kenya to make its mark on the EU market. The main low fibre variety grown in Kenya is the Apple mango, which accounts for 39% of the supply. There is opportunity for the apple mango’s popularity to spread within the EU, because of its sweetness and because it looks like an apple[54]. This visual look combined with the name could also be very advantageous in the EU market because ‘apples and pears’ are the most common consumed fruit in the

[49] https://www.cbi.eu/market-information/fresh-fruit-vegetables/mangoes/europe/
[50] https://fruitguys.com/almanac/2011/03/06/sweet-as-ataulfo-honey
[51] https://www.rvo.nl/sites/default/files/2017/01/Onderzoek-west-afrikaanse-fruitsector.pdf
[52] https://www.cbi.eu/market-information/fresh-fruit-vegetables/mango-west-africa/characteristics/
[53] https://www.rvo.nl/sites/default/files/2017/01/Onderzoek-west-afrikaanse-fruitsector.pdf
[54] http://www.topfoodhub.com/apple-mango-health-benefits/

EU accounting for 27% of fruit consumed per capita[55]. Good to note that apart from Kenya, this variety is also grown in Malaysia and the Philippines.

Implication for Fresh Mango

Suppliers are open to different varieties and are more likely to be more concerned with their availability and seasonality than variety. For fresh produce the most crucial component is fibre content. The less the fibre content, the better they are on the EU market. Of the two main varieties found in Kenya, this could be an opening for the apple variety.

Implication for Dried Mango

Dried mango exporters can much easily use different varieties that result in the desired marketing and buyer specifications. Domestically in Kenya, this could mean that beyond the apple mango, the Ngowe variety is also a potential match.

6. Convenience fruit

Apart from fresh and dried mangoes, mangoes are increasingly sold through semi-processed options that provide an easy way for consumers to enjoy mangoes. As an exporter, value can be added through (semi-) processing mangoes. However, competitiveness, certified processing and excellent logistics are crucial conditions. The requirements for these can also different than for fresh and dried and are therefore not all covered in this study. However, they are still worth mentioning as they are growing trends on the EU market. The trends identified are: Freshly Cut Fruit, Quick Frozen Fruit, Mango Puree, Ready-To-Eat, and Tree Ripened.

A. Freshly Cut Fruit (Fresh)

Blue Skies Holdings Ltd. was the first company in the world to cut and pack freshly-harvested fruit in the country of origin and fly it directly to the consumer the same day. This company was set up in 1997, based in Ghana[56] but now employs over 5000 people in Ghana, Egypt, South Africa and Brazil. For fresh cut fruits, Blue Skies based in Nsawam has been the leader (95% market share). All their products are air-freighted using commercial passenger airlines such as British Airways and KLM with the bulk of Blue Skies products destined to British supermarkets but also Italy and France (RVO, 2017[57]). The direct value addition in this model is that the mangoes naturally ripened, harvested only when mature and that they can be delivered fresh. Kenya will need to identify its niche as well as attractive ways to add-value to buyers in the EU.

B. Quick Frozen (Fresh)

Frozen tropical fruit includes a range of fruits preserved by a freezing process. Fresh, clean, sound and ripe fruit is used, which is native or grown in tropical regions. Quick frozen tropical fruit can be presented as:

- Individually quick frozen (IQF)
- as a block
- as crushed fruit
- cut in different shapes (chunks, dices, slices, halves, etc.)
- combination of different styles
- tropical purees, juices and concentrates are also sometimes traded in frozen form.

[55] http://www.freshplaza.com/article/174837/Freshfel-report-shows-growth-in-EU-fruit-and-veg-consumption
[56] http://www.blueskies.com/happyfruit.pdf
[57] https://www.rvo.nl/sites/default/files/2017/01/Onderzoek-west-afrikaanse-fruitsector.pdf

Frozen mango is becoming increasingly popular, mainly supplied by India and Peru. Up until 2016, the Netherlands was the leading European supplier, but was then surpassed by India and Peru, showing how emerging market suppliers are increasingly supplying final destinations. The majority of imported frozen fruit goes to industry, such as bakeries and producers of frozen meals, beverages (juices and smoothies), jams and dairy (ice cream and milk-based drinks). Increasing home consumption is additionally driven by the growing consumer desire for convenient and faster-to-prepare foods, especially following the trend of smoothies made at home. Frozen mango is most popular in fruit yogurts.

More information on this can be found in the CBI study on Exporting tropical Frozen Fruit to Europe.

C. Mango Puree

Mango puree is a thick, smooth product which has been processed such that the insoluble fibrous parts of ripe mangoes are broken up to be able to fit through a fine sieve. It is used to make juices. The estimated European Union market for single strength mango puree in 2015 was around 42.000 tonnes. Just like with fresh and dried mangoes, the Netherlands holds most of the mango puree and redistributes it to other EU countries. India (65%) is the main supplier but is losing market share to Philippines, China and Brazil. Important to note is that to enter the pulp market, the mango puree needs to be of high quality[58].

More information on this can be found in the CBI study on Exporting mango puree to Europe.

D. Ready-to-eat (Fresh)

Ready-to-eat mangoes (or ripened mangoes) have become a major part of retail demand in recent years. A few years ago, this trend played a role in the higher prices of mango (see figure 2) and has since then gained momentum within the EU market as mango ripening is performed by several importing companies. The Keitt and Kent varieties of mangoes are most suitable for this, because of the specific transport and ripening conditions required. Ready-to-eat mangoes are more often shipped by sea, which facilitates sourcing and promotion planning. Mango ripening is performed by several importing companies

E. Tree ripened (Fresh)

Tree-ripened mangoes are also a specialty that is often found in specialised shops and high-end retailers. Tree-ripened mangoes are popular because of their superior taste. These mangoes are air-freighted and find their way into markets with a preference for taste and quality. Countries such as France, Spain and Switzerland offer interesting markets for air-freighted, tree-ripened mango[59].

[58] https://www.rvo.nl/sites/default/files/2017/01/Onderzoek-west-afrikaanse-fruitsector.pdf
[59] https://www.cbi.eu/market-information/fresh-fruit-vegetables/mangoes/europe/

Market Access Requirements

Kenya is already an exporter of mangoes. Fresh and dried mangoes from Kenya are mainly destined to the Middle East, with the United Arab Emirates (UAE) taking up about 40% of all Kenyan exports. Besides the UAE, Saudi Arabia, Bahrain, and Qatar are the other top mango export destinations (ITC, 2015[60]).

The European Union and the United States do not appear among the main export destinations for Kenyan mangoes. Even though these are international markets with a growing demand for high quality and high value mango, they are also markets where food safety, quality and traceability requirements are very strict.

To capitalize on the growing demand and exploit new markets, Kenyan exporters must address several bottlenecks along the fresh fruit value chain which prevent them from meeting the standards set by higher-end export destinations.

This section describes the main requirements on the European Union, which are considered some of the strictest worldwide.

Requirements on the European Union

Individual Member States of the European Union (EU) maintain firm control over the fresh and dried fruit market. On top of the legislative requirements which are applicable to all member states, exporters can expect buyers to request extra guarantees, since consumer safety is a top priority on the EU market.

When exporting fresh or dried mango to the European Union, compliance with requirements is necessary. These requirements can be categorised as:

1. Legislative requirements on Food Safety and Traceability
2. Marketing standards
3. Additional Buyer Requirements
4. Voluntary social and environmental standards

1. Legislative requirements on Traceability Food Safety

A. Traceability

Traceability requirements are equally applicable to fresh and dried products[61]. Legal requirements are based on a “one step back, one step forward” principle. Exporters need at least to be able to identify their immediate supplier and immediate buyer[62]. This means that suppliers should also be able to make the same identification. Furthermore, European importers will require their suppliers to provide proof of origin for all fruits and vegetables.

In addition to a Bill of Lading, phytosanitary certificate, packing list and custom documentation, each supplier must also have and use a unique traceability code such as a lot number or GLOBALG.A.P. Number (GGN).

[60] http://www.intracen.org/uploadedFiles/Formatted%20MANGO%20EXPORT%20GUIDE.pdf
[61] https://ec.europa.eu/food/safety/general_food_law/general_requirements_en
[62] https://www.cbi.eu/market-information/natural-ingredients-health-products/buyer-requirements

B. Food Safety

Products entering the European Union are subject to official controls. These controls are carried out to ensure that all foods marketed on the European market comply with all applicable regulatory requirements[63], to safeguard food safety and to avoid environmental damage.

The EU constantly works to ensure that Europe's food supply is the safest in the world and has a comprehensive framework to monitor, control and enforce this. The same standards of food safety apply to all food products, regardless of whether they are imported or produced in Europe. The General Food Law is the legislative framework regulation for food safety in the European Union[64]. The main components (eight in total) of food safety are titled and introduced below.

1. Enforcement and control

The EU introduced the Rapid Alert System for Food (and Feed) Products (RASFF) as a tool to exchange information on the enforcement of EU food safety legislation[65]. This system monitors all cases of non-compliance, as well as alerts and border rejections for specific products in case they do not meet the food safety standards required by the EU. These cases are registered on the RASFF Portal, and can be viewed according to different parameters such as product group, product origin, hazard category, etc[66].

For fresh mangoes, the main reasons for border rejections are spoilage and the presence of the pesticides prothiophos, omethoate and dimethoate[67]. For dried mangoes, some of the reasons for border rejection have been high levels of the preservative sulphite and unauthorized colourings (example: E 110- Sunset Yellow)[68].

In the event of repeated non-compliance of specific products originating from countries, such products can only be imported under stricter conditions such as having to be accompanied with a health certificate and analytical test report. Products from countries that have shown repeated non-compliance are put on a list included in the Annex of Regulation (EC) 669/2009[69].

2. Maximum Residue Levels (MRLs)

The European Union has legislation on maximum residue levels (MRLs) for pesticides in and on food products[70]. Products containing more pesticides than allowed will be withdrawn from the EU market. A general default **MRL of 0.01 mg/kg** applies where a pesticide is not specifically mentioned; such limits apply to fresh produce.

The European Commission has a Pesticides Database where it publishes the specific pesticides and pesticide limits allowed for specific products including mango[71].

As explained in the trends section, important to note that buyers in several EU Member States use MRLs which are stricter than the MRLs laid down in EU legislation. This is especially the case in Germany which, alongside the United Kingdom, applies the strictest MRLs at the retail level in Europe! As a rule, German retailers apply an MRL rule which is 3 times stricter than the EU legislation; other European countries are also adopting these limits especially in retail chains.

[63] https://www.cbi.eu/market-information/fresh-fruit-vegetables/buyer-requirements
[64] http://ec.europa.eu/food/food/foodlaw/index_en.htm
[65] https://ec.europa.eu/food/safety/rasff_en
[66] https://webgate.ec.europa.eu/rasff-window/portal/?event=SearchForm&cleanSearch=1
[67] https://www.cbi.eu/sites/default/files/market_information/researches/product-factsheet-mangoes-germany-fresh-fruit-vegetables-2014.pdf
[68] https://webgate.ec.europa.eu/rasff-window/portal/?event=searchResultList&StartRow=1
[69] http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02009R0669-20140401&qid=1406714343395&from=NL
[70] https://ec.europa.eu/food/plant/pesticides/max_residue_levels/eu_rules_en
[71] http://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=product.resultat&language=EN&selectedID=76

3. Contamination sources and maximum levels

Contaminants are substances that may be present because of the various stages of pre-harvest, harvest, post-harvest, processing (example: drying) and packaging of mangoes. One of the most common problems faced by exporters is contamination derived from external sources. For this reason, it is crucial for exporters to learn and comply with the maximum contamination levels allowed by the European legislation.

The main contamination risks for fresh mangoes are covered under the legislation on MRLs, as explained above. These are complemented by the different sources of contamination in fresh and dried mangoes, and the respective legislation addressing them laid out in section 3 of Annex of Regulation (EC) No 1881/2006[72]:

- ***Aflatoxins*** are genotoxic carcinogens. The total aflatoxin content of food is expressed as the sum of aflatoxins B1, B2, G1 and G2 as well as the aflatoxin B1 content alone, aflatoxin B1 being by far the most toxic compound.
    - Dried fruit, other than dried figs, to be subjected to sorting, or other physical treatment, before human consumption or use as an ingredient in foodstuffs: The maximum levels allowed are 5,0 µg/kg for B1, and 10,0 µg/kg for the sum of B1, B2, G1 and G2.
    - Dried fruit, other than dried figs, and processed products thereof, intended for direct human consumption or use as an ingredient in foodstuffs. The maximum levels allowed are 2,0 µg/kg for B1, and 4,0 µg/kg for the sum of B1, B2, G1 and G2.
- ***Heavy metals:***
    - The maximum limit of **lead** allowed for fruit (excluding berries and small fruit) is 0.10 mg/kg wet weight.
    - The maximum limit of **cadmium** allowed for vegetables and fruit is 0.050 mg/kg wet weight.
- ***Microbiological:*** In the current EU legislation (Commission Regulation (EC) No 2073/2005)[73], microbiological criteria have been set specifically for fresh fruit which is pre-cut:
    - Pre-cut fruit (ready-to-eat): ***Salmonella*** – Absence in 25 g (Analytical reference method: EN/ISO 6579).
    - Pre-cut fruit (ready-to-eat): *E. coli* – Limit value m of 100 cfu/g; limit value M of 1,000 cfu/g (Analytical reference method: ISO 16649-1 or 2).
    - In other cases, where no specific legislation for microbiological contamination is available, food safety authorities can withdraw imported food products from the market or prevent them from entering the European Union when *Salmonella*, *E. coli* or other microbes are found.
- ***Foreign matter***: Contamination by foreign matter like excessive filth, soil or other materials is a threat for the quality of mangoes. This includes insect infestation!

The European Commission has a fact sheet on food contaminants and their management for public circulation[74]. Compulsory components of this framework are that food must be traceable throughout the entire supply chain and that the risks of contamination must be limited.

[72] http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02006R1881-20140602&qid=1406715737277&from=NL
[73] http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02005R2073-20140601&qid=1406716897771&from=NL
[74] http://ec.europa.eu/food/safety/docs/cs_contaminants_factsheet_en.pdf

4. Plant Health

Fruit and vegetables exported to European Union must comply with the legislation on plant health. The EU has laid down phytosanitary requirements to prevent introduction and spread of organisms harmful to plants and plant products in the EU. The requirements mainly imply that:

- Certain listed organisms are not allowed to be imported into the EU, unless specific circumstances apply.
- Plants or plant products specified in Part B, Annex V of Directive 2000/29/EC must be accompanied by a plant health certificate. Fresh and dried mangoes are not listed here and do not require a certificate.

5. Phytosanitary requirements

Fruits and vegetables exported to the European Union must comply with European legislation on plant health. The European Union has laid down phytosanitary requirements to prevent the introduction and spread of organisms harmful to plants and plant products in Europe[75]. This requirement is applicable to mango before shipping; the certificate must be obtained in the country of origin.

6. GLOBALG.A.P.

The most commonly requested food safety certification scheme, essential for exporting fresh mangoes to the European Union is GLOBALG.A.P.[76] Even though GLOBALG.A.P. is not a legislative requirement per se, it is requested by practically all retailers in the European Union.

GLOBALG.A.P. is a pre-farm-gate standard which covers the whole agricultural production process from farm inputs such as seedling, until the product leaves the farm, i.e. only primary in-field processing is covered. To cover further steps in the value chain, GLOBALG.A.P. is often supplemented by quality management systems which relate to post-harvest handling, packaging and other processes out of the farm.

7. Hazard Analysis of Critical Control Points (HACCP)

Implementing a quality management system according to HACCP is a minimum requirement regarding handling and processing steps in the value chain. This system is thus additional to GLOBALG.A.P., which only covers processing steps until products leave the farm. In principle, the implementation of a HACCP system is not mandatory for fresh mangoes and other fresh produce but can be required by some retailers. For processed mangoes (including dried and pre-cut), food business operators need to implement the Hazard Analysis of Critical Control Points (HACCP)[77] system in their daily operations.

HACCP is specified in both the *Codex Alimentarius* standard on General principles of Food Hygiene[78] and mentioned under General Food Law Regulation (EC) 178/2002[79]. Some retailers will most probably ask for additional Quality Management System certificates such as International Featured Standards (IFS): Food[80].

8. Use of food additives

The EU legislation on the use of food additives is most relevant for dried mango and other processed mango products. According to the legislation, products can be rejected by buyers and EU custom authorities in case they have undeclared, unauthorised or a high content level of extraneous materials.

[75] http://trade.ec.europa.eu/tradehelp/sanitary-and-phytosanitary-requirements
[76] http://www.standardsmap.org/review.aspx?standards=194
[77] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2004R0852:20090420:EN:PDF
[78] http://www.codexalimentarius.org/download/standards/23/CXP_001e.pdf
[79] http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32002R0178
[80] http://www.standardsmap.org/review.aspx?standards=167

There is specific requirements for the use of additives and enzymes[81] (examples: colours, preservatives) and flavourings[82]. The substances which are allowed for use in food products are listed as E-numbers. For an overview of E-numbers refer to the Annex of Regulation 1333/s2008 (see under *Consolidated versions*)[83].

2. Marketing Standards

A. General requirements: fresh produce

The quality requirements for fresh produce to be marketed in the European Union are defined under the General Marketing Standards for Fruit & Vegetables[84] according to Commission Implementing Regulation (EU) No. 543/2011[85]. This General Marketing Standard (GMS) applies to all fresh produce, including mangoes (only fresh). It covers the following four subjects:

1. Minimum quality requirements

Subject to the tolerances allowed, the products shall be:

- Intact,
- Sound; products affected by rotting or deterioration such as to make them unfit for consumption are excluded,
- Clean, practically free of any visible foreign matter,
- Practically free from pests,
- Practically free from damage caused by pests affecting the flesh,
- Free of abnormal external moisture,
- Free of any foreign smell and/or taste.

The condition of the products must be such as to enable them:

- To withstand transport and handling,
- To arrive in satisfactory condition at the place of destination.

2. Minimum maturity requirements

The products must be sufficiently developed, but not over-developed, and fruit must display satisfactory ripeness and must not be overripe.

The development and state of maturity of the products must be such as to enable them to continue their ripening process and to reach a satisfactory degree of ripeness.

3. Tolerance

A tolerance of 10% by number or weight of product not satisfying the minimum quality requirements shall be permitted in each lot. Within this tolerance, not more than 2% in total may consist of produce affected by decay.

4. Marking of origin of produce

Full name of the country of origin. For products originating in a Member State [of the European Union], this shall be in the language of the country of origin or any other language understandable by the consumers of the country of destination. For other products, this shall be in any language understandable by the consumers of the country of destination.

[81] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02008R1333-20140414&qid=1406723196662&from=EN
[82] http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02008R1334-20140403&qid=1406737020150&from=NL
[83] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02008R1333-20140414&qid=1406709129158&from=NL
[84] http://ec.europa.eu/agriculture/fruit-and-vegetables/marketing-standards/index_en.htm
[85] http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32011R0543

B. *Specific requirements for mangoes*

In addition to the general quality requirements for fresh produce, specific product-specific marketing requirements for mangoes apply on the European Union market.

Fresh fruits and vegetables without a specific marketing standard should follow the guidelines of the United Nations Economic Commission for Europe (UNECE) Standards for Fresh Fruit and Vegetables[86], which cover fresh mangoes, namely: Standard for mangoes[87] (FFV-45) of the United Nations Economic Commission for Europe (UNECE). Product-specific marketing guidelines are also available for dried mangoes: Standard for dried mangoes[88] (DDP-25).

Imports of products intended for processing are not subject to compliance with the EU marketing standards. However, they must be clearly marked on the packaging with the words "intended for processing" or other equivalent wording. These standards consider the following aspects, each with their own specific components as well, that will be explained below:

1. Quality
2. Size
3. Labelling
4. Packaging

1. Quality

Mangoes (fresh and dried) are divided into three classes: Extra Class, Class I and Class II. These three classes are based on different elements in fresh and dried mangoes. For dried mangoes, the classification is based on defects; these are explained in the section 'tolerances.' For fresh mangoes, the classification is based on the elements described in table 3 below.

Table 2: Classification of Classes for Fresh Mango

Class	Description
Extra	Superior quality. They must be characteristic of the variety. They must be free from defects, with the exception of very slight superficial defects, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package.
I	Good quality. They must be characteristic of the variety. The following slight defects, however, may be allowed, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package: • a slight defect in shape • slight skin defects due to rubbing or sunburn and suberized stains due to resin exudation (elongated trails included) not exceeding 3, 4, 5, 6 cm2 for size groups A, B, C, D respectively • slight bruising • scattered rust-coloured lenticels • a yellowing of green varieties due to exposure to direct sunlight, not exceeding 40 per cent of the surface of the fruit, excluding necrotic stains.
II	This class includes mangoes that do not qualify for inclusion in the higher classes but satisfy the minimum requirements specified above. The following defects may be allowed, provided the mangoes retain their essential characteristics as regards the quality, the keeping quality and presentation: • defects in shape skin defects due to rubbing or sunburn and suberized stains due to resin exudation (elongated trails included) not exceeding 5, 6, 7, 8 cm2 for size groups A, B, C, D respectively • bruising • scattered rust-coloured lenticels • a yellowing of green varieties due to exposure to direct sunlight, not exceeding 40 per cent of the surface of the fruit, excluding necrotic stains.

[86] http://www.unece.org/trade/agr/standard/fresh/FFV-StandardsE.html
[87] https://www.unece.org/fileadmin/DAM/trade/agr/standard/standard/fresh/FFV-Std/English/45_Mangoes.pdf
[88] https://www.unece.org/fileadmin/DAM/trade/agr/standard/dry/dry_e/DDP25_DriedMangoes_2013_e.pdf

a) Fresh mangoes should at least be:

- Intact
- sound; produce affected by rotting or deterioration such as to make it unfit for consumption is excluded
- clean, practically free of any visible foreign matter
- fresh in appearance
- practically free from pests
- free from damage caused by pests affecting the flesh
- free from black stains or trails which extend under the skin
- free from marked bruising
- free from damage caused by low temperature
- free of abnormal external moisture
- free of any foreign smell and/or taste.

The development and condition of the mangoes must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination

b) Dried mangoes should at least be:

- intact (only for halves); however, edges that are slightly torn, slight superficial damage and slight scratches are not considered as a defect
- sound; produce affected by rotting or deterioration such as to make it unfit for human consumption is excluded
- clean, practically free of any visible foreign matter
- sufficiently developed
- free from living pests whatever their stage of development
- free from damage caused by pests, including the presence of dead insects and/or mites, their debris or excreta
- free from blemishes, areas of discolouration or spread stains in pronounced contrast with the rest of the produce affecting in aggregate more than 20 per cent of the surface of the produce
- free from mould filaments visible to the naked eye
- free of fermentation
- free of abnormal external moisture
- free of foreign smell and/or taste except for a slight salty taste of sodium chloride and/or calcium chloride or a slight sour taste of citric acid and a slight smell of preservatives/additives, including sulphur dioxide.

The condition of the dried mangoes must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination.

Moisture content:

- not exceeding 15.0%for untreated dried mangoes
- above 15.0% and not exceeding 35.0%for dried mangoes treated with preservatives or preserved by other means (e.g. pasteurization). Products between 30.0% and 35.0% should be labelled as soft fruit/high moisture.

c) Provisions concerning tolerances

Table 3: Tolerances for Fresh Mangoes

Class	Tolerances allowed
Extra	A total tolerance of 5%, by number or weight, of mangoes not satisfying the requirements of the class but meeting those of Class I is allowed. Within this tolerance not more than 0.5% in total may consist of produce satisfying the requirements of Class II quality.
I	A total tolerance of 10%, by number or weight, of mangoes not satisfying the requirements of the class but meeting those of Class II is allowed. Within this tolerance not more than 1% in total may consist of produce satisfying neither the requirements of Class II quality nor the minimum requirements, or of produce affected by decay.
II	A total tolerance of 10%, by number or weight, of mangoes satisfying neither the requirements of the class nor the minimum requirements are allowed. Within this tolerance not more than 2% in total may consist of produce affected by decay.
Size	For all classes: a total tolerance of 10%, by number or weight, of mangoes not satisfying the requirements as regards sizing is allowed.

Table 4: Tolerances for Dried Mangoes

Defects Allowed	**Tolerances allowed percentage of defective produce, by number or weight**		
	Extra	I	II
(a) Tolerances for produce not satisfying the minimum requirements of which no more than	10	15	20
Injuries calluses and damage caused by heat during drying	5	8	10
Mouldy and mildew spots of which no more than mouldy	0.5 0	4.5 0.5	9 1.0
Fermentation	0.5	1	2
Rotting	0	0.5	1
Pest damage	2	2	6
Living Pests	0	0	0
(b) Size tolerances (if sized)			
For produce not conforming to the size indicated, in total	10	10	10
(c) Tolerances for other defects			
Dried mangoes belonging to varieties other than that indicated	10	10	10
Presence of pieces among halved mangoes (by weight)	2	7	13
Foreign matter, loose stems, pit fragments, skin fragments (pieces per kilo)	3	7	10
Foreign matter of mineral origin (by weight)	0.25	0.25	0.25

2. Size

a) Fresh Mango

EU importers and consumers prefer mangoes of medium sizes (between 450 and 650 g). This is most likely because larger-sized mangoes have a slower turnaround and a higher risk of being overripe, meaning they must be sold at lower prices. On the other hand, consumers in the main EU countries (UK, France, Germany etc.) show a growing interest in larger sizes. In smaller EU markets – especially in Eastern EU countries, mangoes of smaller sizes are preferred.

Table 5: Code of Sizes and Descriptions

Size code	Weight in grams	Maximum difference between the fruit, in grams
A	100-350	75
B	351-550	100
C	551-800	125
D	>800	150

Source: UNECE[89]

b) Dried Mango

Due to the wide usage of dried mangos (snack, mixed with nuts and as an ingredient in other products) the sizing of dried mangoes is dependent on the end usage and market. Suppliers are advised to speak directly with their buyer to be able to see how best they can meet their requirements. However, when sized, size is usually determined by diameter of the widest part.

3. Labelling

a) Fresh Mango

Labelling of consumer packages must be in accordance with the rules and regulations applicable in the European market. Note that labels may not contain any toxic ink or glue.

If the nature of the produce is not visible from the outside, the package must be labelled with the name of the product, and the name or any optional name of the variety and/or its commercial name.
Labels or marking for fresh fruit and pre-packed fresh fruit should provide the following information:

- packer and/or dispatcher/shipper
- name and physical address (street/city/region/postal code/country) or a code mark officially recognised by the national authority
- product name 'Mangoes' if the contents are not visible from the outside and name of the variety
- country of origin and, optionally, district/region/place
- commercial specifications, i.e. class, size (code), number of units and net weight
- official control mark (optional).

If applicable, the label should include any certification logo (such as in the case of organic-certified mangoes) and/or retailer logo (in the case of private-label products). A list of ingredients is not mandatory for fresh fruit, unless the container is filled with several different products, in which case the label should include a list of the products and the quantity of each product.

[89] https://www.unece.org/fileadmin/DAM/trade/agr/standard/standard/fresh/FFV-Std/English/45_Mangoes.pdf

b) Dried Mango

The name of dried tropical fruit on the label should include “Mango” and the word “dried”. However, in some cases instead of word “dried”, to better describe a product, some other description can be used, such as “dehydrated”, “sun dried”, “freeze dried”, “soft”, etc. It is common that specifications on the label include the crop year, style of cut, variety and origin of product.

“Best before” followed by the date is usually optional for natural dried products, but mandatory for soft fruit (high-moisture dried tropical fruit).

Labelling of retail packages must comply with the European Union Regulation on the provision of food information to consumers (Regulation (EU) No 1169/2011)[90]. This regulation defines nutrition labelling, origin labelling, allergen labelling and legibility (minimum font size for mandatory information) more clearly. However, dried tropical fruit is not included in the allergen list of the regulation.

Information for non-retail packages (example: dried mango in bulk) must be given either on the container or in accompanying documents. However, the name of the product, lot identification, and the name and address of the manufacturer, packer, distributor or importer, as well as storage instructions, must appear on the container. Note that lot identification, and the name and address of the manufacturer, packer, distributor or importer may be replaced by an identification mark, provided that such mark is clearly identifiable with the accompanying documents.

4. Packaging

a) Fresh Mango

In recent years, the packaging of mangoes has become more standardized. There are two main types of packing according to the method of transportation used.

Sea freighted mangoes are packed in stackable trays that can be ‘blocked’. The size of a tray is 30 x 40 x 10/12 cm with the fruits lying or posed vertically with the peduncle side up or down depending on mango size and the cardboard dimensions. It is important to always show the coloured side of the fruit. To add more value to the mangoes, wrap each mango in soft paper as is usually done in air freighted mangoes.

Usually, a tray contains 4 kg (net) of mangoes with 6 - 10 fruits per tray depending on the variety. The trays are stacked on pallets of 80 x 120 or 100 x 120 cm that are common in transportation.

Air freighted mangoes packing is more variable, and some differences may occur from one country to another. Most of the fruits are shipped in boxes with a cardboard flap or cover, or in telescopic boxes with refold. Each box contains 6 kg net of mangoes. Recently telescopic boxes containing 7 – 8 kg (net) of fruit are used as well – see Annex 1.

The fruits always come with a small sticker and are wrapped well with paper or polystyrene for maximum protection against damaging. The boxes look more sophisticated, and sometimes the bottom is covered with a soft layer/foam carpet. If necessary, the fruits are wedged in the box with paper pads.

The size of a box is the same as sea freight (30 x 40 x 10/12 cm). Also, the cardboard boxes are provided with blocking system to stack them firmly in the pallets.

The term ‘by air’ could be mentioned on the boxes, or a proper illustration to indicate this (example: the illustration of an airplane). Other information/slogans can be printed on the box that are related to the

[90] https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:304:0018:0063:EN:PDF

ripeness of the mangoes or their excellent quality, as well as any other characteristics which make the product unique.

Storage-life of all varieties

At ambient air temperature, mangoes harvested at correct stage of maturity can be stored for about 8-12 days. Under cold conditions at 8 -12^{o}C, storage life can be further extended up to 25 days without losing fruit quality. Mangoes are not appropriate for freezing or to conserve in temperatures below 8o C.

b) Dried Mango

Packaging used for dried mangoes and other tropical fruit must protect the organoleptic and quality characteristics of the product, protect the product from micro-biological and other contamination (including contamination from the packaging material itself) and not pass on any odour, taste, colour or other foreign characteristics to the product.

Dried mangoes are usually packaged in plastic bags or plastic liners placed in carton boxes of different sizes. Packed products should be transported on EURO pallets (80 x 120 cm) and further transported in containers. Twenty-foot containers may contain 1600 12.5 kg cartons or 2,000 10 kg cartons.

As other tropical fruit, dried mango does not require special temperature of transport or storage. However, extremely low or high temperatures should be avoided. At high storage temperatures, fruit sugar particles may form on the surface of the product, hardening and discolouring them. Such crystallised fruits may, however, be reconditioned using steam.

For more information on labelling, packaging and quality, see also the marketing standards above or read about food labelling at the EU Trade Helpdesk[91].

3. Additional Buyer Requirements

A. Colour

The colour of the mango plays a crucial role in the consumers' buying decision. People like red, orange and yellow reflecting warmth and ripeness. Warm and bright colours are preferred to green, which is often associated with 'unripeness' - especially by mainstream consumers who are less familiar with mangoes. This can be illustrated by the low popularity of the Amélie variety in the beginning of its season, which has a green colour.

For dried mango, the main factors determining quality and quality perception are colour uniformity and an orange tonality (characteristic of dried mango). The percentage of mango slices corresponding to these characteristics (example: 95%) determine the quality level of the product.

B. Ripeness & Maturity

The development of ripeness for each mango is different and rather unpredictable. Checks in ripeness are done at random. It is wise to put aside those mangoes that have not reached their physiological maturity. There are different ways to assess the physiologic development:

- The number of days between the first step of fruit ripening and the harvest.
- The shape of the fruit such as the inflated cheek, widening of the peduncle area etc.

[91] http://trade.ec.europa.eu/tradehelp/labelling-and-packaging

- The destruction technique by checking the colour zone level around the kernel), grade of °Brix. These aspects are seriously checked throughout the value chain (farmers, harvesters and exporters) according to their experience and know-how.
- Traditional parameters to assess ripeness are sometimes used; example: the level of sweetness of the mango should be equivalent to six sugar cubes.

In addition, exports of unripe mangoes that are picked too early must be avoided. Even if the selling conditions are met with EU buyers, and immature mangoes or mangoes of different maturities are delivered, suppliers run the risk to damage of company and country image.

4. Voluntary social and environmental standards

A. GRASP, a GLOBAL G.A.P. add-on

'GRASP' stands for GLOBALG.A.P. Risk Assessment on Social Practice and is a voluntary ready-to-use module developed to assess social practices on the farm, addressing specific aspects of workers' health, safety and welfare[92]. Operators certified against GLOBALG.A.P. can get certified according to this additional module to substantiate their social practices at the farm level.

B. Organic

Organic certification is a non-legislative requirement for mangoes, in order for a company to market their product as 'organic' on the European Union market, it must comply with the EU Regulation (Council Regulation (EC) No 834/2007 and Commission Regulation (EC) No 889/2008 (OJ L-250 18/09/2008) for organic production and labelling – which is in itself a legal requirement. Organic products must be grown using organic production methods which are laid down in legislation. Growing and processing facilities must be audited by an accredited certifier before a supplier may put the EU organic logo on their products.

One of the factors which exporters must pay special attention to is whether their organic certification is *de facto* recognised by the EU legislation. Therefore, producers/exporters should search for a certifier whose standards are recognised by the EU. The European Commission's Agriculture and Rural Development website provides a thorough explanation of import regulations and other related issues[93].

Commission Regulation (EC) No 1235/2008 of 8 December 2008 laying down detailed rules for implementation of Council Regulation (EC) No 834/2007 and its latest amendments, as regards the arrangements for imports of organic products from third countries, can be found on the EUR-Lex website[94].

Organic certification can be obtained for both fresh and dried mangoes, as well as for other mango products.

[92] http://www.globalgap.org/uk_en/what-we-do/globalg.a.p.-certification/globalg.a.p.-00001/GRASP/
[93] http://ec.europa.eu/agriculture/organic/organic-farming/what-is-organic-farming/international-trade-in-organics/index_en.htm
[94] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008R1235

C. Fair Trade

'Fairtrade International' is the leading standard-setting and certification organisation for Fairtrade. In general, fresh and dried fruit make up a small part of Fairtrade-certified products[95].

Products which carry the Fairtrade label indicate that producers are paid a Fairtrade Minimum Price[96]. Regarding mangoes, Fairtrade International has a minimum price structure for **mangoes from several origins (including Eastern Africa and Zambia), categories (fresh, for drying, for processing), and conventional or organic.**

Other fair trade standards available in the European market are Fair Trade Ecocert[97] and IMO's Fair for Life[98]. Fair Trade Ecocert provides for guaranteed minimum prices, producer support and good agricultural practices; this standard requires an organic certification. IMO's Fair for Life has a similar proposition and is a standard for companies which demonstrate decent working conditions and commit to fair sourcing and responsibilities towards their primary producers. Organic certification is not compulsory for Fair for Life holders.

[95] http://www.standardsmap.org/review.aspx?standards=71
[96] http://www.fairtrade.net/price-and-premium-info.html
[97] http://www.ecocert.com/en/fair-trade-certification-program
[98] http://www.standardsmap.org/review.aspx?standards=141

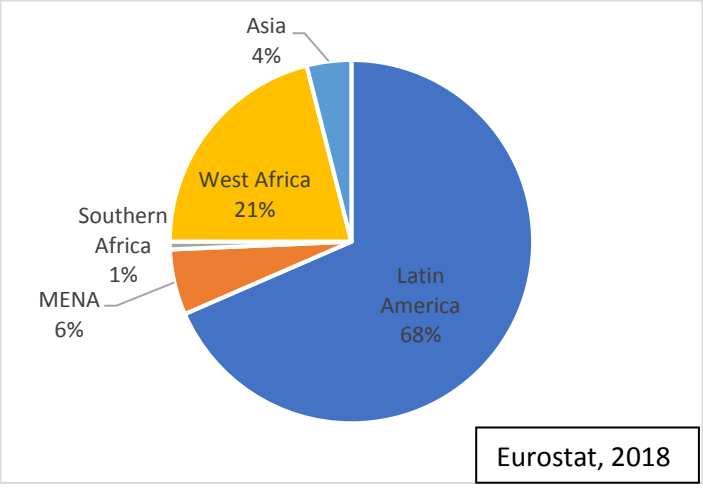
Market Competition

This chapter focusses on the market competition of mangoes on the EU market and seeks to understand and explain the main drivers for competitiveness in this market. As Kenyan mango is yet to enter the EU market at scale, this chapter aims to establish a benchmark of criteria that are most important for Kenyan exporters to consider as they plan to enter the EU market. To do this, this chapter reviews the following:

1. Competing regions and main countries in mango supplies to the EU
2. Kenyan Positioning in the market towards the EU
3. Key criteria for consideration based on comparative analysis of key competitor (West Africa)

Competing regions and main countries in mango supplies to the EU

Figure 7: Competing regions in Mango supplies to the EU in 2017 % of volumes



The world market for mango is highly dynamic; according to data presented on Flesh Plaza[99] and ITC Trademap, approximately 1.8 to 1.9 million tonnes of mangoes were traded globally in 2017. Europe itself imported around 589 thousand tonnes, which corresponds to around 30% of the total volume worldwide. Mangoes from outside of Europe are available all year round, as production is spread around different tropical regions. The key regions are introduced and described below.

Latin America

Latin American countries are main fresh mango producers for the EU and are taking up 68% of the total EU mango imports in 2017 (figure 7). This region exported a total of 239,535 tonnes in 2017. Led by Brazil and Peru, these two countries combined make up 95% of the total Latin American supply to the EU, these countries have a well-established position. A popular variety from these origins, which is present on European supermarket shelves, is the Kent mango. Peru and Brazil are present on both the large-volume markets and niche markets, such as organic. They have invested largely in technology, logistics, (market) research, and have the possibility to organise intensive promotion campaigns for mangoes and other tropical fruit on destination markets.

Brazilian exporters, are well organised, have large farms and benefit from economies of scale, able to offer year-round supply. For export markets, they concentrate on a few varieties and ship the majority by sea-freight to keep cost as low as possible. Furthermore, they can comply with the increasing buying power of EU supermarkets with some of them being able to deal directly with supermarkets[100]. They achieve economies of scale by also supplying their domestic economies, Middle East, Russia, China and other emerging markets. This regions position is high volumes-low margin approach.

[99] http://www.freshplaza.com/article/187370/OVERVIEW-GLOBAL-MANGO-MARKET
[100] https://www.cbi.eu/sites/default/files/market_information/researches/tailored-study-mangoes-west-africa-europe-competitiveness-fresh-fruit-vegetables-2014.pdf

Peru is the main supplier for the Kent variety to the EU market. Peruvian mangoes are a reference for constant quality, ripeness control, organic mango exports and the country is advancing well in the ready-to-eat mango segment thanks to organised value chains, even by smaller exporters. For example, for the 2017/2018 season Peru expects to end the season with 200,000 tons of exports, 66% of which are destined to the EU market. This would be more than 2016/17 season of which 60% were set for the EU market[101].

West Africa

West African countries are taking up 21% of the total EU mango imports in 2017 as depicted in the pie chart above. Their total supply in 2017 to the EU was 73,542 tonnes. The largest supplying country in this region is Ivory Coast that comprised almost 43% of West African supply to Europe in 2017 with 31,442 tons.

The West African model is different from the main supplying Latin America model. Whilst the latter focuses on large volumes and economies of scale, the West African producers operate with more diversification and value addition. They deliver moderate volumes and aim also for higher margins through finding niches in organic, dried, freshly cut and sun ripped mango[102]. For example, even though Ivory Coast's annual mango export volumes to the EU in 2017 are only 31% of those of Peru and 25% of those of Brazil, Ivory Coast is the 3rd largest supplier of mango to the EU. Burkina Faso has been specifically mentioned by industry sources as especially competitive on the organic market as well. West Africa can make itself more competitive and diverse because of their good relations with Europe and their proximity to the EU market. Furthermore, these countries are not directly competing with Latin American suppliers such as Peru whose season ends in April, which is the period that production in West Africa picks up[103].

History: West African countries are behind the development of the mango market in the EU since the 1970s. To this end, West Africa has benefitted from support, in the forms of research and investments that enables it to grow and adapt itself to the demand of the EU markets.

Proximity: There are frequent air and sea links allowing mangoes to be delivered as quickly as within 24 hours by air and 10-15 days by sea. This is shorter than the 19-23 days from Peru for example.

Dried Mangoes from West Africa

Dried mangoes are done on a larger scale in Ghana and are sometimes sources from Burkina Faso and Mali as well[104]. Large producers in Ghana include Ebenut, Tamale food processing company and HPW (Swiss owned) producing organic dried mango. Main seasons are from Jan/Feb and from May to August if rainfall is enough. They are mostly air-dried using a low temperature drying process with clean air. Main EU markets are mainly to the U.K.

Burkina-Faso received foreign development assistance to aid the dried mango market. Here the dried mango sector is organised in cooperatives, of which the largest coordinating body is the Cercle des Sécheurs of which 80% are women, with an export licence. Sun-dried and gas drying ovens are used

[101] http://www.freshplaza.com/article/192443/Peru-expects-to-end-the-mango-season-with-200,000-tons-of-exports
[102] https://www.rvo.nl/sites/default/files/2017/01/Onderzoek-west-afrikaanse-fruitsector.pdf
[103] https://www.cbi.eu/sites/default/files/market_information/researches/tailored-study-mangoes-west-africa-europe-competitiveness-fresh-fruit-vegetables-2014.pdf
[104] http://www.intracen.org/uploadedFiles/intracenorg/Content/About_ITC/Where_are_we_working/Multi-country_programmes/Pact_II/National%20mango%20study%20-%20Ghana.pdf

here. Organic dried mangoes from Burkina Faso are now well-represented in organic shops and Fair trade within the EU[105].

In Mali, around 50% of dried mangos come from small processers in the Sikasso area. A large part of dried mango from Mali are re-exported to the EU by Burkina Faso.

Middle East & North Africa & ASIA

Focussing once more on the total mango exports, the MENA and Asian markets comprise 10% of the total supply to the EU in 2017. Within these regions it is Israel (MENA), Pakistan and India (Asia) that make up the main supply. Israel represents almost 89% of the supply and Pakistan and India represent almost 86% of mango supply from Asia.

Israel mainly produces the Maya and Aya varieties within the summer season. They are ready-to-eat mangoes, picked at an almost completely ripened stage, and require careful picking, packing and handling. They export direct to France, UK, Germany – also including the Kent variety in August and September, followed by Keitt in September/October. This can have competition implications for Senegal that supply's Kent mangoes in the same period. In 2017 the supply was 18,116 tonnes.

Pakistani supplies the yellow mangoes (Chaunsa, Sindhri) between May to September, which is mainly for the Asian population in the UK. In 2017 Pakistan supplied only 6,367 tonnes which is much lower than for example in 2013 when they supplied 12.2 thousand tonnes. This is most likely due to the stricter checks in Pakistan considering the 2015 ban on Mango from India[106].

India is the world's largest mango producer[107]. However, its export volumes represent less than 1% of domestic production levels and have been subject to different food bans from the EU. However, it too supplies the German and Swiss market with dried mango.

Dried Mangoes from Asia

Thailand and the Philippines are quite dominant and innovative in dried mango supply and technique. Their supply is present all year round. Thai producers cut mangoes (Nam Dok Mai) in thick slices and use advanced drying techniques and combine the process with osmo-active substances (glycerol, sucrose and sodium chloride), preservative (potassium sorbate), anti-browning agent and microbial inhibitor (sulphur dioxide), as well as a texture improving agent (calcium chloride). Their marketing is very consumer oriented and dried mangoes from Thailand are attractively packed. They are exported to Asia, USA, Middle East and EU countries and production volumes are backed up by a continued growth in demand in the local market.

The Philippines is also a main producing country in the world supplying multiple markets. Germany and Italy are the most important EU markets. Philippines is also more innovative, processing mango into balls and candies such as 'mangorind.' There are some large international producers such as Profoods International, 7D Food International, Dole products, Guimara Best, Costa Buena foods all using modern drying equipment and processing methods.

Southern Africa

Whilst a very small proportion of the total EU supply of fresh mango in 2017, dried mangoes from South Africa are regarded in the EU to be higher quality because they are sweet, and their taste is very close to

[105] https://www.cbi.eu/sites/default/files/market_information/researches/tailored-information-dried-mangoes-west-africa-competitiveness-west-africa-europe-processed-fruit-vegetables-edible-nuts-2014.pdf
[106] https://www.bbc.com/news/business-27238239
[107] http://unctad.org/en/PublicationsLibrary/INFOCOMM_cp07_Mango_en.pdf

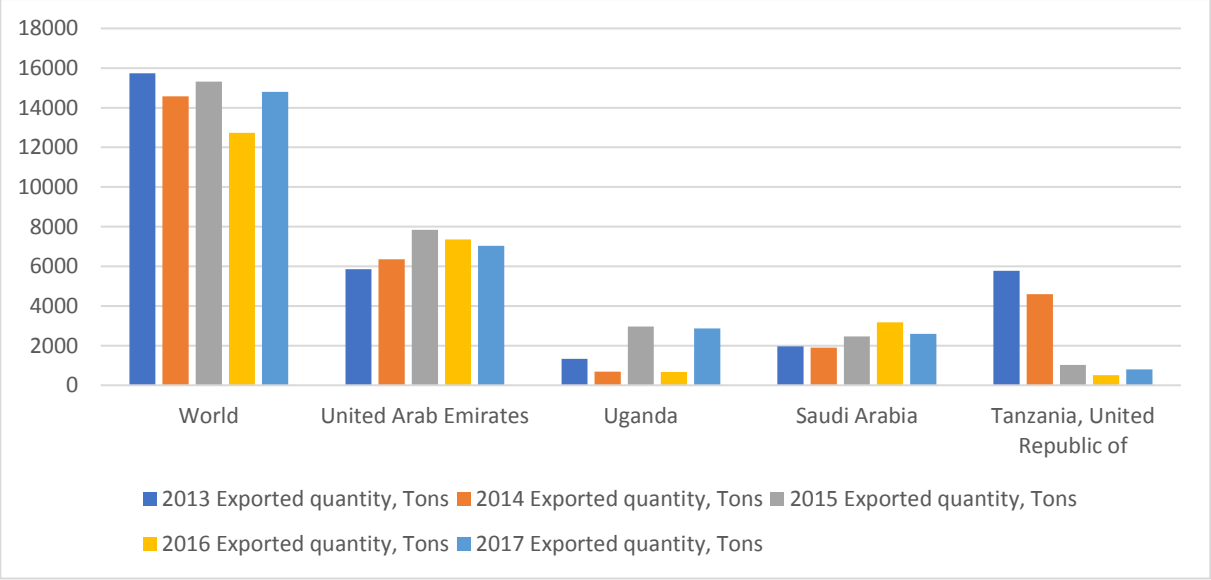
fresh mangoes. This allows them to receive a better price than dried mangos from Asia[108]. A volume of 13, 599 tons of mangos was processed into dried during the 2013/14 marketing season, which was up from 9331 tons processed in 2012/13[109]. South African exporters are mainly focussed on expanding towards the East African and domestic market for both fresh and dried mangos and hence potential competition for Kenyan suppliers of dried mango.

There stands a lot to be learned from South Africa when it comes to dried mango. In the EU, a comparison is often made between the products from West Africa and South Africa. South African dried mangoes are better suited to the expectations of EU importers and consumers, even if conventional methods are used here. The production units in South Africa have a significantly greater treatment capacity than West African countries and are more efficient by maintaining the drying temperatures with forced ventilation[110]. Furthermore, their cuts are thicker, larger slices and are cut mechanically.

Potential positioning of Kenya in the EU

Brief description of Kenyan Mango Production and Export

Figure 8: List of importing markets for Fresh or Dried guavas, mangoes and mangosteens from Kenya 2013-2017, tonnes



Source: ITC Trade Data

On average Kenya has exported 14636,6 tonnes of mangoes between 2013-2017. Its main markets are the UAE and Saudi Arabia as well as regional export to Uganda and Tanzania. Mango is the third most important fruit, accounting for 17% of total fruit exports, after banana (35.6%), pineapples (20%). Mango production in Kenya has been on the rise as statistics from the Kenyan Horticultural Directorate (HCD) show[111]. Kenya grows a multitude of varieties such as Tommy Atkins, Kent, Van Dyke, Kensington, Sensation, Haden, Apple, Ngowe, Boribo, Batawi, Pears, Sabro, Dodo, and Sabine.

[108] https://www.cbi.eu/sites/default/files/market_information/researches/tailored-information-dried-mangoes-west-africa-competitiveness-west-africa-europe-processed-fruit-vegetables-edible-nuts-2014.pdf
[109]https://www.nda.agric.za/doaDev/sideMenu/Marketing/Annual%20Publications/Commodity%20Profiles/FRUITS%20AND%20VEGETABLES/Mango%20market%20value%20chain%20profile%202015.pdf
[110] https://www.cbi.eu/sites/default/files/market_information/researches/tailored-information-dried-mangoes-west-africa-competitiveness-west-africa-europe-processed-fruit-vegetables-edible-nuts-2014.pdf
[111] http://www.agricultureauthority.go.ke/wp-content/uploads/2016/05/Horticulture-Validated-Report-2014-Final-copy.pdf

Table 6: Mango Area, Volume and Value in Kenya

Crop	2012			2013			2014		
	Area (Ha)	Volume (MT)	Value (million KES)	Area (Ha)	Volume (MT)	Value (million KES)	Area (Ha)	Volume (MT)	Value (million KES)
Mango	41,411	573,720	6,216.00	44,018	644,829	7,669.00	47,620	744,639	8,902.00

Source: HCD Validated Report 2014[112]

The country has a relatively long mango season that ranges from October to March (high season) and another shorter season that ranges from April to June covering mainly the Coastal region. It has an existing processing industry that makes use of the high availability of the Ngowe variety grown mainly at the Coast, has proven to produce pulp that is used for juice processing, mango-based drinks, jams, mango ice-cream, dessert, puddings, bakery fillings, baby foods, flavours as well as yoghurt and confectionery.

There is also a growing international demand for dried mangoes from Kenya, but this area has not (yet) attracted big investors like the ones found in mango pulp processing. The players in this subsector are relatively small[113]. For example, one dried mango producer Burton & Bamber is making steps towards expanding their facilities to produce up to 90MT per annum.

Positioning

This analysis reveals that there are two main competitive approaches for supplying mango into the EU:

- High Volume-low margin approach, focussed on economies of scale, efficiency in the value chain, focus on relatively few varieties, sustained quality and marketing. This market is dominated by Latin America (Peru + Brazil) whose suppliers are highly professional, have large scale production, and can meet compliance requirements of the EU. These economies of scale are reached especially in Brazil, due to its ability to supply mango throughout the year. Peru however dominates from January until April.
- Value Addition-higher margin approach, focussing on value addition at origin such as drying, pre-cutting, sun-ripening, as well as taking advantage of the reduced supply from Latin America as the Peruvian season drops. This is typical for West African region as well as in other main exporting regions such as Israel and Pakistan. West Africa supplies the EU mainly from April- July and Israel follows with its main season being July-September.

Regardless of the approach, the competition is fierce amongst global suppliers. Competition is centred on a supplier's ability to offer high quality at the right time. Supplying irregularly-shaped or low-quality mangoes will always open opportunities for competing countries because ultimately the importer is more interested in selling high-quality fruits and making a profit than having to deal with low-quality lots.

Implication for Kenya as a supplier

Whilst Kenya's mango production is on the rise, its total world exports have averaged 14636,6 tonnes between 2013-2017. This is a small fraction when compared to the major volume suppliers such as Brazil (179,744 tonnes, 2017), Peru (162,938 tonnes, 2017) and Ivory Coast (78,202 tonnes in 2017) to the world market[114]. Compound with the challenges of meeting compliance requirements of the EU as well

[112] http://www.agricultureauthority.go.ke/wp-content/uploads/2016/05/Horticulture-Validated-Report-2014-Final-copy.pdf
[113] http://www.intracen.org/uploadedFiles/MANGO%20EXPORT%20GUIDE%20Final.pdf
[114] https://www.trademap.org/Country_SelProductCountry_TS.aspx?nvpm=1|384||||0804|||4|1|1|2|2|1|2|2|1

as the highly efficient value chain and logistics, this approach would be very challenging for Kenya to enter.

This means that it is most likely competitive edge lies in a mix between fresh mango supply, value addition and the extension of shelf life through processing whilst raising the standards of food safety, certification and traceability. For example, Kenyan mango processors have indicated they have had numerous inquiries for mango pulp from Europe (ITC, 2013). Furthermore, buyer sources for this study shared their interest in finding new sources for both fresh (low fibre) and dried mango.

The purpose of this chapter is to establish a benchmark of criteria that are most important for Kenyan exporters to consider as they plan to enter the EU market. The analysis thus far shows that a model that resembles the West African model may be suitable for Kenya to adopt to get more competitive on export to the EU. The following section looks at the key criteria for Kenyan mango suppliers to consider.

Key criteria for competitive analysis for Fresh and Dried mango, based on comparative analysis of main competitors

The Kenyan mango chain has been receiving increased attention from development partners in Kenya. IGD, Technoserve and the Research Triangle Institute (RTI) have been working on the mango value chain. The latest report was distributed in September 2018 and was written as part of the Kenya Crops and Dairy Market Systems Activity (KKCDMS) as part of a USIAD programme, implemented by RTI. This report provides an up-to-date assessment of the mango value chain as part of a programme that will run until 2022 on mango and other products[115]. This report has been used to fill out the SWOT analysis in the following pages.

This analysis focusses firstly on Fresh and then on Dried mango. These criteria will be useful in highlighting the barriers to accessing market opportunities and will also be critical to developing sustainable routes to market.

The comparative analysis of key competitors done by CBI for West African countries provides a solid baseline for the fresh mango competition from main global players. This framework has been modified where applicable to suit this study. In doing so, this comparative analysis helps highlight the Opportunities and Threats for Kenyan suppliers to enter the EU.

[115] KCDMS Mango Value Chain Assessment September 2018, RTI International.

Competitive analysis (SWOT) Fresh mango from Kenya

	Baseline				Kenya			
Topic	**Strength & Weakness**	**Latin America**	**West Africa**	**Israel**	**Strengths**	**Weaknesses**	**Opportunities**	**Threats**
Production	S W	Farms able to produce large quantities – incl. organic Micro-climate limits the differentiation in varieties	Climate & low production costs, irrigated production Small quantities due to fragmentation. Fruit flies	Farms able to produce large quantities – incl. organic	Domestic production on the rise	Largely informal and unstructured (RTI) Insect pests and disease (HCD) Diseases Small-scale production systems (ITC) & premature harvesting of fruit (HCD) high postharvest losses (HCD) Lacking model for sustainability and quality of extension service providers (RTI) Farmers currently receive only 10% of the total selling price (RTI) Limited access to good quality planting materials combined with limited awareness by farmers of the benefits of these inputs and management. Sometimes inputs are already contaminated before use (RTI)	Building quality food systems by the value chain first making compliance a high priority Streamlining agriculture regulation through simplification of compliance documentation Continued expansion of the domestic and export markets (ITC) Quality is low because of poor management, inputs and infrastructure (RTI). New models can be developed. Strengthen and form farmer groups Sustainable models for extension service providers. Quality can me improved through aggregation through self-help groups, cooperatives, traders and processors	Many global players, Kenya must innovate to compete. Dominated by smallholder farming, making it hard to scale-up and meet quality requirements of buyers (RTI) Advice is being given by input providers. High risk of sponsored advice to support sales of input provider, not the farmer (RTI). Extension service focused on mending symptoms but not the core problem, which is to understand compliance and then find tools that assist in making compliance easy. ICT solutions being implemented without understanding the core of Good Agricultural Practices.

Baseline					Kenya			
Topic	**Strength & Weakness**	**Latin America**	**West Africa**	**Israel**	**Strengths**	**Weaknesses**	**Opportunities**	**Threats**
Season	S W	Brazil supplies whole year Peru supplies January-April Chaos in delivery during transition periods	April – July with Senegal until September Difficulty in occupying this whole timeslot	July-September and Keitt in September/October Kent and Keitt too green at end of the season	Peak (main) season in October to March	April-June season direct in line with Senegal. Market information asymmetry (RTI)	October-January season to export to EU before Peru picks up	Small window of opportunity requiring good logistics and organisation
Ripening	S W	Good working cold chain suitable for ready-to-eat Incidental delivery delays cause prolonged storage	Naturally ripe mangoes by air (ready-to-eat) Picking too early-or fungal attacks at end of season	Good working cold chain suitable for ready-to-eat		Needed investment in infrastructure Improper harvesting techniques (ITC)	Cold chain potential, but mainly for avocado	Competitors are well organised
(Export) markets	S W	USA and in EU direct to UK, Spain, France and Germany (Peru ↗) Peru ↘ in US market Direct exports to EU still low	Proximity to the EU, the history and persistence Exports ↘ less direct to France and political problems	Middle East and in EU direct to UK, France, Belgium and Germany (exports all countries ↗)	Growing demand remains untapped.	GLOBAL G.A..P certification is a must. Other standards and requirements are not clearly explained at regulatory level (RTI) Lack of consistent mango market (RTI)	Streamlining of national regulations Middle East countries however increasing competition from Israel EU exports in East African region growing	Phytosanitary inspections, food safety, traceability requirements. Public and private standards Self-imposed ban, means that first companies and organisations need to work together to deliver a quality product
Price level	S W	Reasonable fixed prices (economies of scale) Bad weather conditions can drive up prices	Competitive prices for air freight mangoes Due to post harvest losses prices can largely fluctuate	High prices due to intensive labour and careful handling		Due to post harvest losses prices can largely fluctuate Poor coordination among and insufficient financing of public institutions	Niche market through specialisation branding Cooperation with East Africa (Uganda) for better price and quality. Better organisation and coordination with exporters to reach scale on price and quantity.	Highly Competitive market from multiple global regions. Currently Kenyan exporters do not cooperate to reach price, quality and quantity scale.

Baseline					Kenya			
Topic	**Strength & Weakness**	**Latin America**	**West Africa**	**Israel**	**Strengths**	**Weaknesses**	**Opportunities**	**Threats**
Sales network	S W	Collaboration with importers Able to sell to supermarket Except the UK most exports still go via NL	Ability to sell via smaller importers and wholesalers Exports via NL and Belgium. Limited diversification	Collaboration importers Able to sell supermarkets	Kenya recognised internationally as a source of quality fresh fruit and vegetable due to good soil fertility.	Market information asymmetry (RTI)	Importers also willing to invest more in supply chain (vertical integration)	Most support from EU importers may be focussed on West Africa
Organisation	S W	Work with tight schedules Cooperation in value chain Tempo of exports is not always fast.	More flexibility in doing business Complex with middlemen and not transparent	Work with tight schedules Cooperation in value chain Less flexibility in doing business		Farmer groups are not or poorly organised	Increased focus on sustainability in the chain can make cooperation with suppliers better through improved compliance	Importers prefer to work with established suppliers
Client services	S W	Close communication with customers.	Be closer with French speaking countries Lack the necessary staff for customer service	Good communication. All staff speak English well	Good communication. All staff speak English well	Limited investment in mango, compliance, regulation	Cooperation within supported development programmes	These programmes require substantial investment from Private players

Competitive analysis for Dried Mango from Kenya

	Baseline				Kenya			
Topic	**Strength & Weakness**	**Thailand (T) & Philippines (P)**	**West (W) & South (S) Africa**	**India (I) & Pakistan (P)**	**Strengths**	**Weaknesses**	**Opportunities**	**Threats**
Production	S W	(T)Well established, advanced technique and main producing country. (P)Main producer, advanced techniques, drying within 8hrs. (P) Limited drying capacity, shortage of supplies	(S) efficient drying temperatures, uniform colour. (W) In Ghana done at larger scale with reliable supply. Different technique means no additives are necessary. (W) Cooperative model to coordinate supply (S) not ideal climatic conditions, high fluctuation of supply of mango and energy. (W) storage limited due to high temperatures. (W) high energy costs of air-dried ovens	(I) Mango cultivated in all states in India (P) houses an important mango processing industry.	Large producer of mangoes with supply expected to continue increasing. Long shelf life.	Dried mango production still small, with pockets of production. Manual processing of fruits (handling, peeling or cutting) is a handicap not only for the productivity but also in terms of hygiene, i.e. the dried mango usually goes multiple hands during processing.	Better drying facilities to increase supply and quality. The use of organic waste from fruit (skin, core) could also be valued to produce dried fruit (decomposition gases) and lessen the energy requirements of the transformation (associated with energy sources already used: gas, electricity, solar energy)	Ability to reach scale. More competition may arise as well from Brazil and Peru that are already the main fresh mango exporters to the EU
Product	S W	(P) Carabo variety is very sweet. Producer of mango candy + slices (T) Slices + candy (T) High sugar content, low nutritional value and poor flavour. Texture and shrinkage.	(S) High quality, taste resembles fresh. (W) Uses same varieties as S. Africa + opportunities for organic	(I) well known (P) Sindh variety very sweet and well known. Slices and candy. Also makes mango leather from pulp.	Processing technique does not require added sugar (or preservatives)	High brix content of apple mango for example can lead to dark dried mango.	Ingredient in muesli. Dried mango can enter the composition of specific preparations such as muesli. Its production and trade could be expanded.	Main criticism from EU market can include: Slices or chunks often too different, diverse colouring, dried mangos are hard/tough, and packaging is unattractive.

	Baseline				Kenya			
Topic	**Strength & Weakness**	**Thailand (T) & Philippines (P)**	**West & South Africa**	**Pakistan & India**	**Strengths**	**Weaknesses**	**Opportunities**	**Threats**
Price level	S W	(P) Higher price due to high production costs. Faces steep competition through ASEAN neighbours.	(S) Higher price due to higher quality) (W) Wholesale and retail price of dried mango from West Africa are lower than Asia or South Africa.	(I) Ban on Indian mango imports		The wholesale and retail prices of dried mangoes from West Africa are lower than those from Asia or South Africa	Whilst Asian region is a major competitor, their products remain sweet because of that preference in local market, Russia and MENA countries.	The Philippines with tasty mangoes but higher in price. However, if the new processing technique (FIRCH) is more widely adopted by producers, price levels of dried mangoes are likely to reduce.
Sales network	S W	(T) Actively packed-consumer oriented (P) Links to multinationals and small packaging	(S) Mangos in high regard in EU (W) Established in organic + FT shops in EU.	(P) Support from NGO's to develop sector.		Dried mango in Kenya is yet to attract large investment.	South Africa has the recognition, but not the supply. Mangoes could be sourced from East Africa (proximity greater than West Africa) in exchange for transfer of drying technology (Partnerships)	
Organisation	S W	(T) Year-round supply (P) Infrastructure challenges inter-island shipping	(S) seasonal supply		Availability of mangoes almost throughout the whole year.	GLOBAL G.A..P certification is a must.	Organizing dried fruit supplier into cooperatives could increase processing potential.	West Africa expanding to offer organic dried mango at competitive price to the EU.

Discussion based on competitive analysis

This report focuses on the potential that Kenya has to Export Fresh & Dried Mango to Europe. What is clear from the above analysis is that the market potential is evident. The main potential is:

- Investments into domestic production show that production is on the rise (quantities)
- Kenya enjoys an advantage if it supplies fresh mango to the EU between October-December
- Dried mango processing can deliver 'natural' products as no sugar or preservatives need to be added (which is popular with the health-conscious segments)
- Due to domestic availability being present for most of the year (9 months), dried mango production can reach scale and supply EU all year round.
- The EU market is growing, and more varieties are gaining acceptance, opening opportunities for mangoes such as the Apple variety. This is valid for both fresh and dried mango.
- Kenyan companies speak good English

However, this potential is being hindered by a major bottleneck: that Kenya struggles with managing the Market Access Requirements to enter and sustainably supply the EU market. Cross analysis with the latest reports on the domestic market reveal that compliance to Market Access Requirements is also limiting the ability for the domestic market to grow. At the center of this is that compliance to standards is not well understood and is unclear to the private sector as well as other market system players. There is also miscommunication about which standards are voluntary and which ones are compulsory. An example of this is GLOBAL G.A.P. Whilst technically this is a voluntary standard, it is so ingrained in trade with the EU, its characteristics resemble that of legislative/compulsory standards.

This analysis identified 3 key myths/misconceptions of compliance which need to be addressed for increased domestic and international market access. These three myths/misconceptions are introduced and described below.

Myths relating to compliance and improved market access

a) Compliance ≠ Certification

Description of Myth	Claims made by companies	Change required
Companies define compliance as having the right certificates. Certification is seen as an administrative process to look good on paper. Hence, companies see it as something that can be quickly obtained, for a price.	Companies find certification expensive and rarely see the added value of certification. Companies want service providers that 'offer' certification. Value chain players view certification as not delivering (enough) on its promise for structural improvement of livelihoods. Organizations want to move 'beyond certification', but do not know what the alternatives are.	Compliance = improvement and documentation of internal processes to offer quality products and to build trust in a chain. Certification is the process to prove that procedures and actions are in place to keep quality high. Certification is not 'offered,' instead, certification is something that is 'earned.'

b) ICT tools and extension solutions ≠ Compliance

Description of Myth	Claims made by companies	Change required
ICT tools and extension solutions offer more information and data. Introduction of ICT tools will make compliance easier and simpler. This information can be used to show adherence to standards and companies are encouraged to make use of such services. ICT solutions offer a quick fix to the bottlenecks of compliance	These solutions cost money, and hence make compliance expensive. These tools are useful but are also seen as a large investment. Companies look for support to either deliver or purchase such solutions.	Market players need to better understand the business case for compliance before implementing solutions and extension services. Compliance business case has three steps: 1. Understand the needs of the value chain 2. Design a process for improvement and management. This may include ICT and extension solutions. 3. Marketing and communication. Hence compliance is not only a cost, but a marketing investment (CSR, market access, acquisition, competitive edge)

c) Increased awareness of standards ≠ Better Compliance

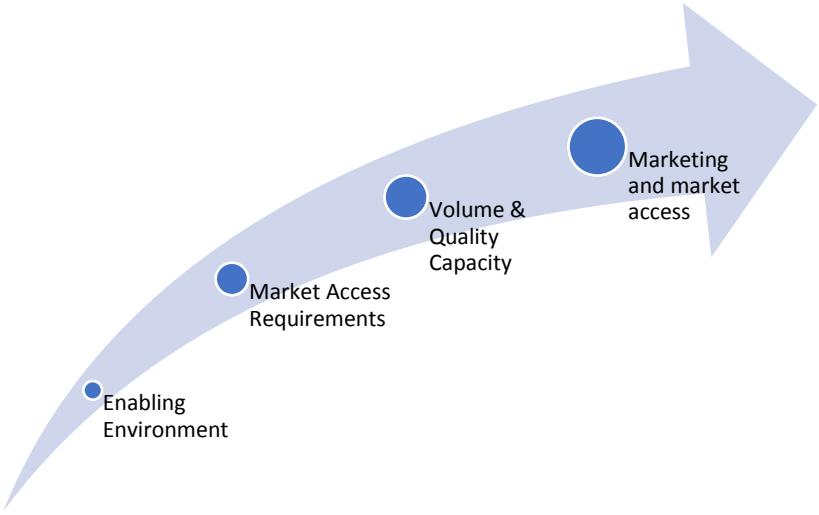
Description of Myth	Claims made by companies	Change required
Standards are not well known, and hence improved awareness will lead to better compliance in the value chain	Compliance is expensive, and if a market is not demanding it there is no need to go the extra mile to comply.	Next to market players having to understand the business case for compliance as described in point 2, the awareness needs to focus on the dilemma of the tragedy of the commons: Ignorance of a few players can have impact on the entire sector (for example, country bans on export of mango). Companies cannot afford not to comply, because avoiding doing this is ultimately limiting their own sustainability and growth.

Recommendation: A Business Framework for Compliance

This analysis shows that the global market for fresh and dried mango is highly competitive. Kenya has potential to enter this market as well, but it would rapidly need to become more competitive. To do so, it is recommended that the Kenyan mango sector, which includes development partners, follow the following steps:

1. Enabling Environment for compliance
2. Understanding of Market access requirements
3. Volume and Quality Capacity
4. Marketing and market access

Figure 9: Roadmap to improved Competitiveness for the Kenyan Mango Sector



At each step of this roadmap, specific compliance components play a crucial and role. For a company to become more competitive, it needs to improve its compliance. Compliance becomes the foundation for improved competitiveness. The specific compliance steps that correspond to the 4 steps are depicted in Figure 10 below.

Figure 10: Kenya Mango Sector Compliance Pyramid

Figure 10 highlights the order of the compliance requirements to build a more competitive mango sector in Kenya. Firstly, is the need to address legislative requirements on Food Safety and Traceability. This is necessary to build an enabling environment for quality.

This 1st step requires cooperation from all players involved. For example, for food safety and traceability, it is important that the sector agrees to universal documentation sets for evidence of compliance. Standards and principles of relevance at this stage should include national legislation and standards KS1758, Good Agricultural Practices, ISO22000 and HACCP, depending on levels of processing. For the EU-market GLOBAL G.A.P will also fall under this first pillar.

With this in place, the private sector should be brought together to establish minimum marketing and trading standards (Step 2). These include the minimum quality standards such as size, colour and appearance of the mangoes. The public and development sector can support this process through bringing people together and coordinating relevant training and knowledge sharing. The sector could therefore introduce requirements for quality trade of mangoes. This sets the scene for private business to grow and invest into better volume and quality capacity. Furthermore, also Good Manufacturing Practices can be applied, and companies can focus on their labelling and packaging as well.

At the third level (Step 3), companies can focus on improving competitiveness by their investments into quality and quantity. It is from this stage only that certification may become relevant for companies. Companies would also look at specific product quality specifications and supply quantities and look for more buyers. For competitive reasons, it is recommended that this information remain in the ownership of the companies involved.

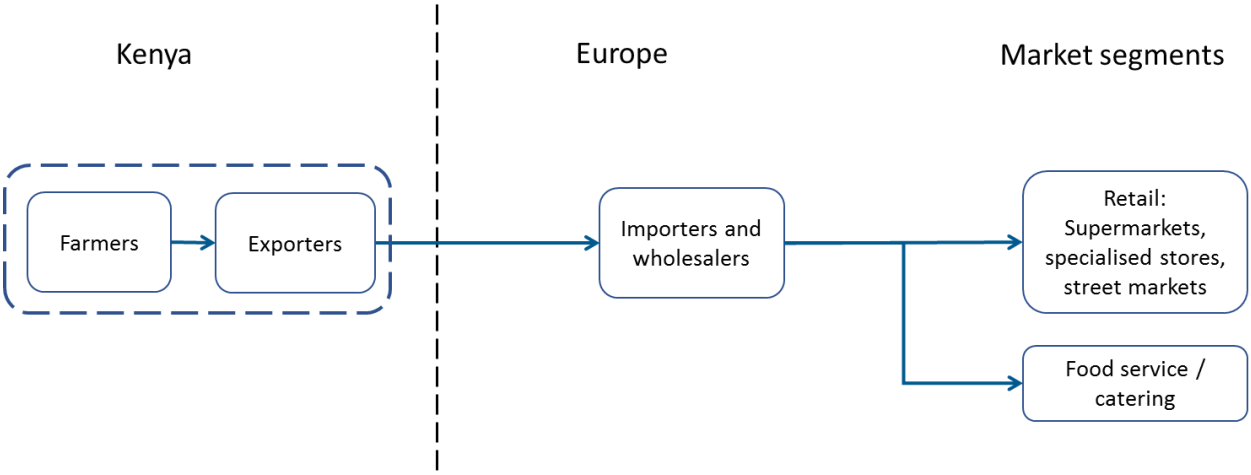
The final step (Step 4) is marketing and market access and this coincides with the 'voluntary social and environmental standards' level in the compliance pyramid. This is where certification such as EU-organic, Fairtrade, UTZ and more become relevant as these are Business-to-Consumer certifications. These standards are only available through 3rd party inspection because suppliers must 'prove' that their claims are true.

Market channels for mango from Kenya

As the market channels for fresh and dried mangoes from Kenya are different, this section separates identification and analysis of the market channels for these products.

Fresh mangoes[116]

Figure 11: Fresh Mango Market Channel



Production and exports[117]

Producers can grow mangoes for the fresh market, as well as to process them into dried mango (see below) or mango puree/juice. These applications (fresh and processed) require different investments in terms of equipment and skills.

There are many "touch-points" for fresh mangoes in the beginning of the supply chain, such as harvesting by hand, quality sorting, cleaning, and packing mangoes, which are all potential sources of contamination. Producers and processors need to take measures to prevent contamination during these steps. These have been addressed in the Market Access Requirement chapter.

Growers of fresh mangoes deliver their produce to exporters, which usually carry out post-harvest treatments such as sorting, cleaning or washing, packaging and labelling. Production and exporting can also be combined in one company, especially in the case of large-scale farmers.

Fresh mangoes can be transported by air or sea freight, depending on the distance the produce needs to travel. In general, sea freight is most common for mangoes except in the case of speciality mangoes, like ready-to-eat. As sea transport is less expensive and more environmentally friendly, technological developments in sea transport (storage, conditioned containers and ripening) are being explored continuously to reduce the dependence on airfreight.

Throughout the supply chain, cleaning and decontamination of equipment, containers, pallets, crates and vehicles is of the utmost importance. Exporters must meet the demands of logistics and pay

[116] CBI Market Channels for Fresh Fruits & Vegetables, https://www.cbi.eu/market-information/fresh-fruit-vegetables/channels-segments/
[117] CBI Product Factsheet Exporting Mangoes to Europe, https://www.cbi.eu/market-information/fresh-fruit-vegetables/mangoes/europe/

special attention to a timely delivery, quality equipment and packing, cooling, hygiene and correct documentation.

Importers and distribution

European importers are the most important trade channels for exporters of fresh mangoes. Fresh fruits are often sourced through the Netherlands. This is where the main players, facilities and logistic networks for fresh produce in Europe are located.

Importers purchase fresh mangoes from various producing countries and resell them to domestic retailers, or re-export them to other countries. The wholesale / distribution activities might be integrated into the importer's service portfolio or outsourced to a separate company.

Fresh mango importers usually specialise in fresh produce such as fruits and vegetables at large. They take care of necessary administrative formalities and often provide services such as (re-)packaging (e.g. in retail-sized packaging), transportation and logistics to then sell the produce to the retail market.

Ready-to-eat mangoes, which are increasingly demanded by supermarkets, are traded through specialised importers who have experience with logistics and ripening of delicate tropical produce. Ready-to-eat mangoes require excellent quality control, in time delivery and logistics. Importers subsequently demand containers of mangoes that are of uniform quality and ripeness, considering the time needed for transport and ripening.

To reduce the risk of diminished product quality, exporters should work with trusted partners or intermediary shipping companies.

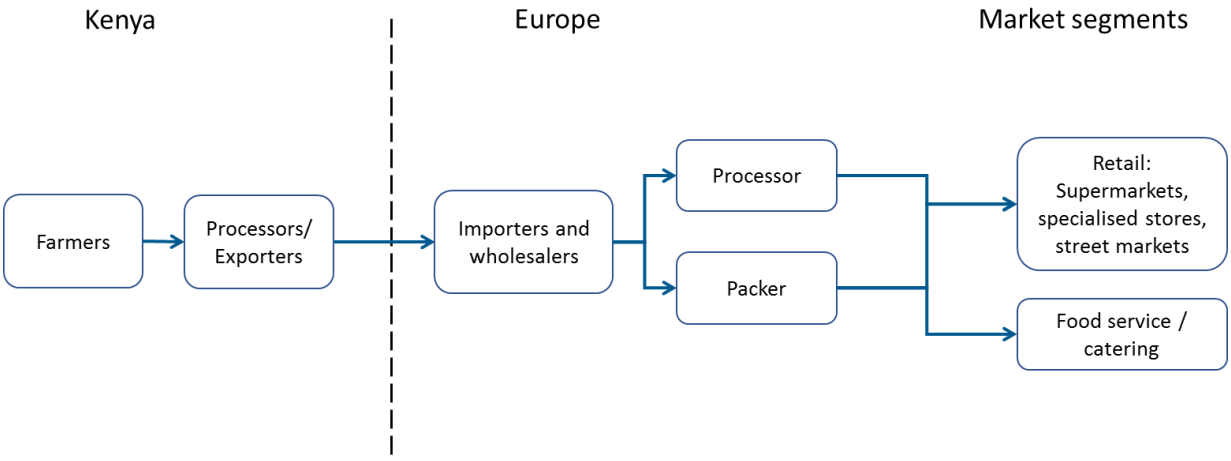
It is key for Kenyan exporters to find importers with proper ripening facilities, a good customer network and extensive market knowledge. This will help ease market entry.

Market segments

Most fresh mangoes are sold in retail chains, with a small share used in food services. It is important to distinguish between the supermarket channel and the specialist retail channel, which includes physical shops and street markets. Supermarkets are dominant in north-western Europe, while specialised retail is more important in southern Europe.

Dried mango[118]

Figure 12: Dried Mango market Channels



Production and exports[119]

A major trend in the processing industry of dried fruits in general, including mangoes, is the investment in new drying and processing technologies. This trend continues as a move away from sun-drying processes, to improve food safety and quality control over the production process.

Freeze-drying (lyophilisation) becomes a more frequent demand from the breakfast cereal and confectionary industry, although it is more expensive than traditional drying with hot air. This is most common for berries, not yet for mangoes.

Importers and EU processing

As for fresh mangoes, European importers are the most important entry point for exporters of dried mangoes. In Europe, dried mangoes are mostly used as a snack. For this purpose, they are repacked in consumer packaging, as commercial or private label brand.

This is taken up by specialised packers; more than 50% of dried fruits and nuts is re-packed in Europe into smaller packs for the retail and food service sector. Packers increasingly pack under private label brands for retailers.

Many packers import directly as well, however, as the market is unfamiliar yet with Kenyan dried mango suppliers, importers remain the most important market entry point.

Transparency in the supply chain is crucial. To achieve this, many importers develop their own codes of conducts and build long-lasting relationships with preferred suppliers.

Importers also trade to processors, which use dried mangoes as a food ingredient, for example in bakery or cereal products. Although big food processing companies more often import directly from developing countries, this only applies to the most commonly used products (such as peanuts or raisins). For exotic products like mangoes, most trade will go through importers, as these are imported in smaller quantities. Examples of such final products include:

[118] CBI Market Channels for Processed Fruits & Vegetables, https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/channels-segments/edible-nuts-dried-fruits/
[119] CBI Product Factsheet Exporting Mangoes to Europe, https://www.cbi.eu/market-information/fresh-fruit-vegetables/mangoes/europe/

- Dried fruit or cereal mix, such as Organic Trail Mix from Forest Whole Foods[120] or cereal additive mix with mango, pineapple and coconut from Albert Heijn[121]
- Fruit or protein bars, such as Torq Bar Organic Mango[122], or Protein Bar Mango Ananas from RXBAR[123]
- Chocolate bar with mango pieces, such as Kacau Chocolate Mango and Marassalt[124]

More and more, importers are taking up packing or processing activities themselves. In addition to packing, they also blend, mix, coat, and brand the products. There is also further specialisation of the importers (wholesalers). Some of them deal exclusively with dried fruit and vegetables and edible nuts as food ingredients.

Market segments

Dried mangoes and food products containing dried mangoes are sold by retailers and food service industries. Compared to fresh mangoes, food service industries play a stronger role.

According to Innova Market Insights, snack nuts and seeds like trail mixes accounted for over 30% of snack launches in 2016, up from 27% five years earlier[125]. Factors driving that growth include new research on nuts' health attributes, greater availability of various nut types, and technological advances allowing for new coatings, flavours, and packaging formats[126].

[120] https://www.forestwholefoods.co.uk/product/organic-trail-mix/
[121] https://www.ah.nl/producten/product/wi437112/ah-verrijker-ananas-mango-en-kokos
[122] https://www.mudsweattrailsstore.com/product/52043/torq-bar-organic-mango-doos-15-stuks?channable=e24277.NTA2MDEyMzQxMjY1OQ&gclid=EAIaIQobChMIxZS5p6PJ3QIVyw8YCh1irwQUEAkYBSABEgIKAPD_BwE
[123] https://da.luckyvitamin.com/p-2928428-rxbar-protein-bar-mango-pineapple-12-bars?locale=da-dk&scid=scplp182534&sc_intid=182534&gclid=EAIaIQobChMI7PWQnKPJ3QIVDeWaCh1TiAiaEAkYASABEgJrBPD_BwE&LanguageCode=DA
[124] https://www.dekoffiethuiswinkel.nl/kacau-chocolate-mango-en-marassalt.html?gclid=EAIaIQobChMIqLWoiaPJ3QIVyuR3Ch22NAR0EAkYEiABEgKWPfD_BwE
[125] http://www.foodingredientsfirst.com/Supplier-Profiles/Innova-Market-Insights.html
[126] https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/channels-segments/edible-nuts-dried-fruits/

Conclusion

This study highlights the trends, requirements, channels and competition of the EU market, painting a comprehensive picture of the opportunities for Kenyan producers who want to export fresh and dried mango to the EU. This is done considering the growing EU- and global demand, and the increasing Kenyan supply of the exotic fruit. What is clear from the analysis is that there is a high potential and opportunity for fresh and dried mango from Kenya in the EU. For example, East Africa's supply of mango to the EU has already doubled over the last five years, mainly from Uganda. Kenya should act quickly to also take advantage of this growth by capitalising on the following advantages:

- Kenya can benefit from supplying fresh mango to the EU in the October-December season, a time when supply of quality mango is lower than the rest of the year.
- Natural dried mango processing can deliver a quality product.
- Kenya has a high domestic annual availability of mango (9 months per year).
- The EU market is growing, and more varieties are being accepted. This opens opportunities for 'new' mango varieties such as the Apple variety, which accounts for 39% of the mango production in Kenya, meaning it could supply it at scale.
- Kenya is already a well-known sourcing origin by international importers for other exotic fruits (such as avocados) and vegetables. It also already produces internationally recognised varieties of mango.
- Kenya has a diverse climate and can grow mangoes over a large area.
- Kenyans speak good English.

Kenya's potential lies in applying a 'Value Addition-Higher Margin' strategy. This strategy focusses on value addition at origin, as well as taking advantage of the reduced supply of fresh mango from Latin America at the end of the year. This means Kenya should seek a combination between fresh and dried mango supply within the context of major EU trends. These main trends are Food Safety and reduction of Pesticide Residues, Healthy living, Organic production & certification, and supply chain sustainability.

Kenyan suppliers of mango should also tap into consumption patterns on the EU market. For fresh, this includes looking into opportunities for fresh-cut, quick frozen, ready-to-eat, pre-cut, sun and tree ripening mangoes and mango puree. For example, Kenyan mango processors have indicated that they have had numerous inquiries for mango pulp from Europe (ITC, 2013).

Dried mango also offers a magnitude of pathways to the market. For example, Kenyan suppliers can opt to export final pre-packed and branded consumer products. Alternatively, they could also aim to export in bulk to specialised packers who can handle the final branding. Additionally, Kenyan suppliers are also encouraged to also see their dried mango as an ingredient. This would expand their market access as their mango could be used as a food ingredient in bakery, cereal products or even dairy.

However, even with these diverse channels and opportunities into the EU market, this market remains untapped by Kenyan mango exporters. This potential is being hindered by a major bottleneck: Kenya struggles with managing the Market Access Requirements to enter and sustainably supply the EU market.

To take advantage of these trends and opportunities, the Kenya mango sector needs to become more competitive by better understanding the relationship between competitiveness and compliance. Compliance plays a critical role in developing the Kenyan mango sector further. Within

this, specific attention will need to be given to the legislative, market, and added buyer requirements to gain access to the EU market.

This calls for a 'business framework for compliance,' aiming to change the mindset of compliance. In this model, compliance is no longer viewed as a hindrance, a hurdle, or something complicated and costly to doing business, but instead, is seen to improving competitiveness and adding value. This approach offers a roadmap to develop Kenya's mango sector by making it more robust against current challenges such as the self-imposed ban on exports of mango to the EU.

This report recommends that this framework be developed in four steps, each with its own specific compliance focus and a collaborative approach is used. The main partners in this approach should be the private sector, government and development partners as this would lead to largest impact in opening sustainable market access for the Kenyan mango suppliers to the EU market.

Annexes

Annex 1: Examples of Packaged Mangoes[127]

Sea freighted mangoes

SENEGAL: Packaging of **Kent** – 9 pcs with sticker (left) and 6 pcs box with cardboard flap

MALI: Packaging of **Kent** – 9 pcs box with cardboard flap (left) and **Kent** 8 pcs from **COTE D'IVOIRE** and sticker

PERU: Packaging of **Kent** – 8 pcs basic (left) and **Kent** 10 pcs from **BRAZIL** with sticker and polystyrene

[127]Adapted from CBI study: Product Characteristics for Fresh Mangoes: https://www.cbi.eu/sites/default/files/market_information/researches/tailored-study-mangoes-west-africa-europe-product-characteristics-fresh-fruit-vegetables-2014.pdf

SENEGAL: Packaging of **Kent** – 9 pcs basic (left) and 10 pcs correct (right) with polystyrene and sticker

MALI: Packaging of **Amélie** – 12 pcs basic/not attractive (left) and **Kent** 10 pcs (right) with paper and sticker

BURKINA FASO: Packaging of **Kent** – 7 pcs basic/not attractive (left) and **Amélie** 12 pcs with polystyrene

Air freighted mangoes from other countries

MEXICO: Packaging of **Kent**–12 pcs in telescopic box (left) and 12 pcs with compartments (right) which are both correct with polystyrene/paper and sticker (both 6 – 7 kg)

MEXICO: Packaging of **Kent**–14 pcs in telescopic box (left) and 7 pcs Nam Dok Mai from **THAILAND** well-packed in polystyrene

ISRAEL: Packaging of **Maya** – 24 pcs in 40x60 tray (6 kg)

PAKISTAN: Packaging of **Sindhri** – 10 pcs