Introduction and methodology

In the report, a business and implementation plan is written for container transport of avocados. To be able to answer the main question: ***" How can the FORQLAB project effectively establish and implement a sea freight container transportation service to export avocados from Kenya to the Netherlands? "***.

FORQLAB (Food Waste Reduction and Food Quality Living Lab) is a project started in 2022 and ending in 2024, which is a multi-year research project to structurally reduce food losses and improve food quality in Kenyan avocado and dairy chains. The project links producers in Kenya with Dutch importers (avocados) or local businesses (dairy). The research takes place in two areas in Kenya for both avocado and dairy; a relatively well-developed chain in the central highlands and a less-developed chain in western Kenya. The applied research will be carried out by several universities involved, two in Kenya and four in the Netherlands.

To carry out this research, the following research methods have been used: literature study, internal source research, in-depth interviews, group discussion & observations. The information that comes out of this is mainly qualitative data. After concluding the project, the acquired results are given back to the FORQLAB project. Also, the opinions of all stakeholders are important and have been taken into account. Using the above research methods, the main question is answered.

Market

Over the past ten years, the production and commerce of avocados have grown rapidly worldwide, also in Kenya. The avocado trade will expand over the coming years, but as the market becomes more competitive, producers will need to become more efficient and sustainable. For Kenyan avocados, there is global competition with mainly Mexico, Peru, and Colombia to supply the European market. Therefore, it is important that Kenyan avocados are of high quality.

The market for avocado exports from Kenya is expected to continue growing in the coming years, driven by increasing global demand for fruit, particularly in Europe and Asia. Kenya is one of the

leading producers of avocados in Africa, and the country has been investing in improving the quality and quantity of its avocado production to meet international standards. As production rises, exports of avocados from Kenya to countries such as the United Arab Emirates, Saudi Arabia, China, and the European Union have also risen. (Figure 1)

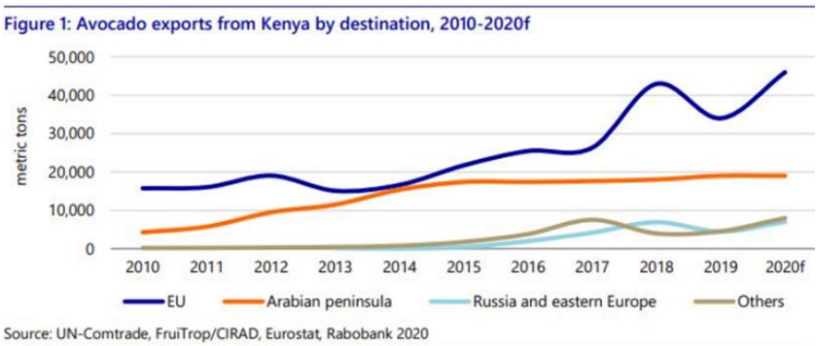

Figure 1, Kenyan avocado export and destination, retrieved from, https://research.rabobank.com/far/en/sectors/fresh-produce/kenya-avocado-sector-growing-fast-but-still-growing-up.html

Challenges:

There are a few challenges for the export market of avocados. The first one is infrastructure. The poor quality of the roads from the farmers to the port can cause the quality of avocados to deteriorate. This is due to potholes and bumpy roads, which also prevent refrigerated trucks from entering some roads, which affects the quality of avocados.

The second one is shipping conditions. Avocados are fruits and are sensitive to ethylene. Therefore, it is difficult to combine them with other ethylene-emitting perishables (fruits, vegetables, cut flowers) in the containers. Only later in the season when the avocados are more mature, they can be combined in containers with ethylene blockers.

Another challenge is political issues and working together with the Kenyan government. They do not have any knowledge about avocados, such as the different types of varieties. Also, the government makes it obligatory to scan every outgoing container. This can be quite frustrating as most scanners are not functioning and it takes a lot of unnecessary time. Added to this are the forms and documents required to transport avocados.

The last challenge is international, fast-rising demand & supply. The demand in Europe for avocados keeps growing. So many countries just like Kenya are planting immense amounts of avocado trees. Therefore, there is going to be a turning point when the supply is going to explode. When this happens, a sustainable quality product will be the minimum, and parties involved in the supply chain need to prepare for this.

Competitors:

If a cooperative from FORQLAB will be specializing in the export of avocados, the most relevant competitors can vary depending on factors such as geographical location, target markets, and specific services offered. Kenya currently has five major exporters of avocados, namely: Keitt, Kakuzi, Selina Wamucii, Mt Kenya Fresh avocados, and Sasini. Currently, Nandi cooperative, among others, is working with Keitt. To export to the Netherlands itself, more financial resources and an outlet market are currently needed.

Logistics

The ideal supply chain for the transportation of avocados by sea is quick and efficient, because of the long transport time. In practice, this means that the products are harvested, sorted, graded, and packaged in the same area while maintaining the cold chain. The containers are loaded and transported to Mombasa where they are shipped to the Netherlands.

Duration

The transport to the Netherlands by boat takes anywhere from 21 to 35 days, depending on the shipping line, shipping route, and other circumstances. Shipping to other European destinations like Genoa and Valencia is faster, but the costs are roughly the same, and the circumstances are less ideal because the containers are opened before the products are transported by truck to the desired destination. At the moment there are four companies that arrange transport by sea for reefers: Maersk, MSC, CMA, and Messina.

Best option sea freight routes

shipping line	destination	trans shipping	travel days			remarks
			ideal schedule	realistic schedule	disaster schedule	
CMA	Rotterdam	Jeddah	28	35	35	• Weekly sailing to Rotterdam • Frequently miss connections or have blank sailings • Mombasa port is the cause of some delays
	Marseille	Jeddah	25	32	32	
	Genoa	Jeddah	22	29	29	
Maersk	Rotterdam	Salalah & Algeciras	24*	31	38	• Weekly sailing • Dedicated berth in Mombasa for Maersk
	London Gateway	Salalah	28-29*	35	42	
MSC	Rotterdam	King Abdullah Port	24-28	31-35	42	• Not weekly sailing
Messina	Genoa	Direct	21	21	31	A sailing every 10 days

Figure 2 Sea freight routes. Embassy of the Netherlands. (2021). A study on sea freight for Kenya's agricultural exports. May.

Technical requirements

For the Kenyan 'Hass' avocado, the temperature during transport should be between five °C and seven for the early season fruit and four °C to five and a half °C for late season fruit. The optimum humidity is around 90-95 percent RH, Relative humidity. Also, ventilation has to be used to remove CO2 that is produced by the respiration of the avocados. If the avocados are transported by containers that have this possibility, the oxygen level should be set up between two percent and five percent. The Carbon dioxide is between three percent and ten percent. Those circumstances are important throughout the whole supply chain, not only during the voyage, and can be achieved by using Controlled Atmosphere reefers. The containers are constantly monitored and settings can be adjusted remotely. A critical point is when the container is transhipped and runs out of power. Care should be taken to ensure that the cut-off time is as short as possible.

Marketing

Customers

To transport containers, supplying growers are needed. There are several cooperatives working with the FORQLAB project. These are currently already working with various parties like Keitt exporters. However, they want to make a big growth in the next two to three years. This is because the cooperatives have the future dream of managing the entire chain. As this is not yet possible financially, an interim solution needs to be found in the form of collaborations. This means there may be opportunities for a partnership between companies and cooperatives. One of the best ways to acquire new customers would be to seek partnerships and collaborations with local avocado farmers, cooperatives, exporters, and importers.

Added value sustainability

Sustainability is becoming a very important driver in global supply chains. All stakeholders in the chain are becoming more aware and conscious of the choices they make regarding the consumption of food commodities. Customers (in the Netherlands) are starting to become aware of the negative impacts which come along with the consumption of air freight imported products. This has escalated to the point where several Dutch supermarkets are no longer offering air freight transported fruits and vegetables in their stores. Furthermore, the European Union has set a goal to become carbon neutral before 2050. This means an economy without the emission of greenhouse gases. Also, the European Due Diligence law drives companies to report on their sustainability and take responsibility for every stakeholder involved in the supply chain.

Requirements

In order to be able to transport containers, supplies are needed. In the first stages of setting up container transport, no additional equipment is needed. In a later stage cold rooms and technical equipment are needed to form a consolidation center. Additionally, more personnel is needed for sea freight operations. Sea freight transport from Kenya to the Netherlands involves various operational and external risks, such as quality control, insurance, documentation, infrastructure, geo-political stability, etc.

Legal matters

Because the avocado is sold to the European market, it must meet certain requirements. Only class 1 avocados are accepted for import into the European market. Therefore, growers, exporters, and importers must comply with various certificates and documents regarding food safety, phytosanitary regulations, customs, quality standards, and authorities (figure 3).

Figure 3 certification process - from, https://intracen.org/media/file/6478

Avocados imported into the European Union customs territory must be accompanied by a summary declaration, which is presented to the customs authorities of the place where they are to be unloaded. Goods are then placed under a temporary storage situation not exceeding 90 days in any case, which means that they are stored under customs supervision until they are placed under any of the following customs procedures or re-exported.

Implementation

For the implementation and safeguarding of the business plan, a plan has been made on the basis of eight steps. A timeline has been developed starting with creating urgency and ending with a functional transport service and consolidation center for the exportation of avocados. This makes it possible to visualize the change for a company working with FORQLAB (Table 1). Every step can be

checked if it is still viable for the company and finally, it shows how it can be applied to the entire organization so that it can be guaranteed in the future.

Table 1 Change process timeline

Short term: < 3 months			
Communicate the changes to office and operations department.	Determine dependencies	Form a leading team, with the marketing and operation manager, to appoint who is responsible for the communication in their team.	Designate a FORQLAB member with the responsibility of monitoring the implementation.
Communicate the vision and key milestones of sea freight by explaining the reasoning.	Plan evaluation moment between the leading team every two weeks.	Plan monthly evaluations for the shareholders.	Communicate the timeline to the shareholders.
The marketing team develops a plan to attract customers.	Operation departments contact shipping lines for planning, pricing, etc..		
Medium term: 3 – 6 months			
Evaluation of the past three months, with the leading team and making adjustments along the way.	Trails for quality and variety.	Trials for sea freight with different shipping lines, domestic transport routes and exporters.	Continuing improvements and adjustments where needed.
Estimated milestone duration for the stakeholders.			
Long term: > 6 months			
Evaluate the financial situation and the viability of operations.	Yearly evaluation.	Evaluate if set goals are achieved.	Looking back on last six months. What could be better and what are the future goals.

Conclusion and recommendations

Several recommendations have been given for the FORQLAB project, the business plan for the sea freight container transportation of avocados from Kenya to the Netherlands. The recommendations are divided into three time periods; short, medium, and long-term. The main (four) recommendations include;

- Shift to Sea Freight: Kenya should invest in developing infrastructure and equipment for a (partial) shift from airfreight to sea freight. This recommendation is supported by the increasing demand for sea freight in the European Union market and the need for optimal conditions to prevent perishability during transportation.
- Focus on Sustainable Practices: FORQLAB should prioritize sustainability throughout its supply chain to meet the growing demand for sustainable options. This includes reducing carbon emissions by shifting to sea freight, investing in fuel-efficient trucks, exploring technical innovations, and partnering with sustainable shipping companies. Additionally, FORQLAB can cater to the niche market for sustainable avocados by offering tailored export services and addressing sustainability concerns.
- Comply with Import and Export Regulations: FORQLAB must ensure compliance with the import and export regulations set by the European Union and other relevant authorities. This includes meeting maximum residue levels for pesticides and contaminants, adhering to phytosanitary regulations, fulfilling quality standards, and following proper import procedures and customs declarations. complying with these regulations will ensure a smooth and lawful importation and exportation process.