

# A Study on the Kenyan-Dutch Horticultural Supply Chain

May 2012



*Authorised by:*



Ministry of Economic Affairs,  
Agriculture and Innovation

Report title: "A Study on the Kenyan – Dutch Horticultural Supply Chain"

Date of publication: May 2012

A publication of: The Dutch Ministry of Economic Affairs, Agriculture & Innovation  
Prins Clauslaan 8  
2595 AJ The Hague  
The Netherlands  
[www.rijksoverheid.nl/ministeries/eleni](http://www.rijksoverheid.nl/ministeries/eleni)

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## Foreword

The trade in flowers between Kenya and The Netherlands is extremely dynamic and has become vital to Kenyan horticulture as well providing a vast group of consumers in Europe and beyond with fresh flower products. With The Netherlands – Europe's principal point of entry for flowers – buying 67% of their export tonnage and over 55% of their export value, Kenyan flower growers have achieved tremendous export growth over the last two decades. Fresh-cut quality flowers, especially roses, have become one of Kenya's biggest earners, providing many thousands of nationals with jobs and income.

With this growth, however, has come increasing pressure. Consumer demands regarding quality and production methods are getting more stringent all the time. While production in Kenya continues to flourish, West European flower markets are slowing down and in Europe the purchasing power is shifting. The industry itself is changing, and both Kenyan and Dutch players must change with it if they wish to retain and extend their leading role.

This study, commissioned by the Ministry of Economic Affairs, Agriculture and Innovation in the Netherlands and conducted by FlowerWatch and Hortiwise, essentially aims at kick-starting an ambitious set of sector-wide reforms necessary for the Kenyan–Dutch flower trade to retain and expand its leading role in global horticulture. The study, which covers the entire supply chain in both countries, pinpoints many, if not all, of the minor and major bottlenecks and inefficiencies that need to be tackled for further growth, grouping them in eight 'trouble spots'. The proposed solutions for each of these issues – some simple, others more complex – have been organised in five 'improvement themes'. It is my personal conviction that this report offers readers holding a stake in this sector the keys to a healthy, profitable and future-proof flower supply chain. Many players both in Kenya and The Netherlands are well aware of the pressing need for reforms. I would like to take the opportunity here and now to make an appeal for joint action. Sector-wide collaboration resulting in concrete partnerships and coordinated initiatives is the only way forward.

The Ministry of Economic Affairs, Agriculture and Innovation looks forward to seeing individual entrepreneurs and sector representatives both in Kenya and The Netherlands step forward to make the first moves. We are convinced that the entrepreneurship that launched Kenya's flower sector in its early days will pave the way to a new and colourful future for this excellent and highly valuable, sustainable supply chain.

Marcel Vernooij  
Head of Food Security and Agrocommodities  
European Agricultural Policy and Food Security Department  
Ministry of Economic Affairs, Agriculture and Innovation of the Netherlands

## Executive Summary

*Dutch government initiative to lift the bar for entire horticultural supply chain*

### **Kenyan-Dutch flower supply chain prepares for overhaul**

*A Dutch government-funded study of the Kenyan-Dutch cut flower supply chain exposes a host of minor and major bottlenecks and inefficiencies – and kick-starts sector-wide involvement in setting new industry standards for quality, cost efficiency and sustainability.*

Businesses operating in the Kenyan-Dutch cut flower supply chain will continue meeting with government agencies and trade promotion specialists from the two countries in the next few months to tackle a host of minor and major inefficiencies and bottlenecks hindering further growth. These so-called Platform Discussions, initiated by the Dutch Ministry of Economic Affairs, Agriculture and Innovation, are the result of a recent in-depth study of this supply chain. The aim of both the study and the meetings is to lift the Kenyan-Dutch cut flower supply chain to a higher level, setting new standards for the entire horticultural sector. The result, if the plan succeeds, will be reduced supply chain costs, a longer vase life for flowers and therefore increased value-for-money for consumers, and increased sustainability in terms of a lighter carbon footprint and reduced product and packaging wastage.

#### **Kenya, a horticultural trailblazer**

Already a trailblazer in global horticulture, Kenya has achieved tremendous export growth over the last two decades. Horticulture – with fresh-cut flowers holding first place in export volumes – has become one of the country's biggest earners, providing many thousands of Kenyans with jobs and income. Kenya has become the leading producer of roses for the European market and a major supplier of other varieties. Exporting largely to the Netherlands, Europe's principal point of entry for flowers (taking 67% of Kenya's tonnage and over 55% of its export value), Kenyan players have joined forces with Dutch players in creating one of the industry's most highly developed supply chains. With volumes steadily increasing and the horticultural product range widening, Kenya's Jomo Kenyatta International Airport became the biggest cargo hub of Africa in 2011, overtaking even Johannesburg and Cairo.

#### **Facing dramatic change**

This rapid growth, however, has put increasing pressure on the supply chain. While production continues to flourish, Western Europe's cut flower markets are showing signs of saturation, with annual growth settling at a moderate 2 to 4%. A major shift in purchasing power – from wholesalers and the Dutch auction system towards large and demanding mass-market retailers – is also contributing to the general sense that the industry is facing dramatic change.

A study commissioned by the Dutch Ministry of Economic Affairs, Agriculture and Innovation and performed by leading Dutch expertise centres Hortiwise and FlowerWatch, has shown that these combined factors are not only placing severe pressure on margins, but also changing the playing rules in the flower industry. The industry, the study shows, is evolving towards lean and transparent supply chains characterized by consolidation and vertical integration.

'The overall conclusion of the study,' says Jeroen van der Hulst, Director of FlowerWatch, 'is that the Kenyan-Dutch supply chain has reached the point at which it is struggling with the weight of its own success. The

many bottlenecks and inefficiencies exposed in our study have to be dealt with; it's a do-or-die situation. Moving forward to new levels of quality, cost efficiency and sustainability will require a major overhaul involving every link in the entire supply chain.'

### **Minor problems and major ones**

The study, conducted between January and May of 2012, exposed a surprising amount of room for improvement throughout the entire chain, says Milco Rikken, Managing Director of Hortiwise. 'One thing that struck us is the number of workarounds that have evolved all down the chain, with recognized problems being bypassed through solutions that are far from optimal.' One example is the re-cooling of flowers at the Kenyan airport through inefficient and relatively costly measures that would be superfluous if the flowers' were delivered at the airport at the correct temperature in the first place.

'Many minor issues came into view that in view of margin pressure clearly need resolving,' says Rikken. 'The good news is that many can be resolved without much effort. Just tackling the easy issues will cause a noticeable improvement in flower quality, cost efficiency and sustainability.'

Other issues will be a lot tougher to deal with, he adds. Some will require players across the chain, both Kenyan and Dutch, to muster up far more trust and commitment than they have done so far. Comments Rikken: 'One thing that stands out from this study is that in the flower supply chain, neglect by one player typically leads to costs for somebody else. Bringing all these parties together may well prove to be the greatest challenge of all in realizing the changes this chain so badly needs.'

### **Eight trouble spots, five improvement themes**

The study identifies eight trouble spots in which minor and major problems are holding the sector back:

1. *Cold chain management*
2. *Transport and logistics*
3. *Packaging*
4. *Information and communication*
5. *The relatively weak position of SME growers*
6. *Handler performance*
7. *The integration of the flower sector with mass-market retailers*
8. *Sector-wide teamwork*

In order to maintain their competitive edge over competitors both near and far in the global flower industry, Kenya and the Netherlands can deal with these trouble spots by focusing on five improvement themes, the study suggests:

#### *Theme 1 – Cold chain and packaging standards and protocols*

The absence of adequate standards and protocols in the cold chain, most notably, directly affects the quality and vase life of flowers. Temperatures right down the supply chain vary substantially and are often far higher than necessary, both in Kenya and in the Netherlands. The absence of clear agreements regarding temperature, as well as timing and quality of handling services (service levels), also negatively impacts flower quality.

Another area in need of solid standards and protocols to improve quality and cost efficiency is packaging. Currently, the supply chain lacks standard procedures for ordering, storing and erecting boxes, while packaging requirements related to storage, cooling and transport, are often contradictory. Also, loading

practices and shipments are often inefficient, with over- and under-packing resulting in volume inconsistencies, unnecessary expenses and damage to flowers.

#### *Theme 2 – Education on cold chain management and packaging*

Cold chain management and packaging are also begging attention when it comes to education. Farm staff, transporters, handlers, airlines and importers alike are not as aware as they should be of the basic requirements in these areas, nor how to meet them.

Retailers are another group in need of education on how to handle fresh-cut flowers, as their knowledge and experience with this product lag behind their increasingly dominant market position. Particularly at the retail level, product and packaging wastage figures are astonishingly high.

#### *Theme 3 - Synchronisation of (electronic) information*

A more effective exchange of (electronic) information throughout the supply chain will reduce time-to-market and handling expenses, increasing supply chain efficiency. Electronic systems, such as CLIENT (a Dutch system for phytosanitary checks), KePHIS' electronic service for phytosanitary issuance and E-freight (electronic messaging in the air cargo supply chain), need to be developed and implemented on wider scale. Current flower shipments often lack uniform documentation and labelling, while some of the parties involved in clearing shipments are not available 24/7.

#### *Theme 4 - Supply chain innovation*

Strategic, technological and structural innovations, as well as supply chain performance improvements, are vital if the Kenyan-Dutch supply chain wishes to move forward successfully. Sea transportation options need further investigation and packaging innovations geared to direct sales are conspicuous by their absence. Sector involvement in the carbon footprint debate is crucial for realizing acceptable sustainability standards. The CO<sub>2</sub> impact of specific industry activities needs further research. There is also a need for programmes aimed at improved use of natural resources, waste reduction and a better environmental performance.

#### *Theme 5 - Platform*

The Platform Discussions for the Kenyan-Dutch Horticultural supply chain initiated in the framework of this study must become a fixed part of the chain's agenda in order for the sector to move forward.

Communication and knowledge sharing can also be improved by means of sector- and supply chain- specific websites, training programmes and other forms of direct collaboration between key stakeholders, including associations and government bodies in both countries.

### **Concrete and practical**

'The Kenyan-Dutch flower supply chain has a lot of room for improvement in big and small ways,' says Rikken. 'We believe this study offers plenty of concrete and practical points of connection for every player in the chain eager to raise the standard and take the lead in the industry. Interest in the Platform Discussions so far has been encouraging. All but a few of the players in the chain seem eager to participate. Discussing change and actually realizing it are obviously two different things, but we're confident that by tying in with existing initiatives both in Kenya and the Netherlands, we can make a real difference. It's up to the supply chain itself to make it happen.'

## Executive Summary in Dutch

*Initiatief Nederlandse overheid moet de toon zetten voor de gehele tuinbouw supply chain*

### **Snijbloemenketen Kenia-Nederland klaar voor verbeterslag**

*Een door de Nederlandse regering gefinancierd onderzoek naar de aanvoerketen van snijbloemen tussen Kenia en Nederland heeft een groot aantal grote en kleine knelpunten blootgelegd en het startschot gegeven voor een sectorbrede verbeterslag. De beoogde hervormingen binnen de keten moeten vooruitgang opleveren in kwaliteit, kostenbeheersing en duurzaamheid en de toon zetten voor de gehele tuinbouw supply chain.*

In het kader van het onderzoek zijn er inmiddels een tweetal bijeenkomsten geweest met bedrijven die actief zijn in de snijbloemenketen tussen Kenia en Nederland, overheidsinstellingen en handelsbevorderende specialisten uit beide landen. Deze zogeheten Platformbijeenkomsten worden in de komende tijd voortgezet, met als doel het aanpakken van een groot aantal kleinere en grotere knelpunten en efficiencyproblemen die toekomstige groei in de weg staan. De besprekingen zijn geïnitieerd door het Nederlandse Ministerie van Economische Zaken, Landbouw en Innovatie (EL&I) en vloeien rechtstreeks voort uit het recente onderzoek. Doel van zowel de studie als de besprekingen is de Keniaans-Nederlandse bloemenketen naar een hoger niveau te tillen en daarmee nieuwe standaarden te vestigen voor de gehele tuinbouw supply chain. Als de pogingen slagen, zullen deze resulteren in verminderde kosten in de keten, een langer vaasleven voor de verhandelde bloemen en daarmee ook verhoogde klantwaardering. Verder zal de duurzaamheid toenemen door reductie van de CO<sub>2</sub>-voetafdruk en de hoeveelheid productverspilling en verpakkingsafval.

#### **Kenia en Nederland, voortrekkers in de tuinbouw**

Als voortrekker in de mondiale tuinbouw en bloementeel, heeft Kenia in de laatste twee decennia indrukwekkende exportgroei gerealiseerd. De sector als geheel is een van Kenia's belangrijkste inkomstenbronnen geworden en voorziet vele duizenden Kenianen van werk en inkomsten. De grootste volumes zijn daarbij voor het segment verse snijbloemen. Kenia is uitgegroeid tot de belangrijkste producent van rozen voor de Europese markt en een toonaangevend leverancier van andere soorten. De belangrijkste exportbestemming is Nederland, dat Europa's grootste toegangspoort vormt voor snijbloemen en 67% van het exportgewicht van Kenia en ruim 55% van de exportwaarde importeert. Keniaanse en Nederlandse spelers hebben samen een van de hoogst ontwikkelde ketens in de industrie opgebouwd. De voortdurende toename van volumes en assortiment leidde er in 2011 toe dat Jomo Kenyatta International Airport, de belangrijkste luchthaven van Kenia, de luchthavens van Cairo en Johannesburg voorbij streefde als grootste vrachtluchthaven van Afrika.

#### **Ingrijpende veranderingen op komst**

Deze snelle groei heeft echter steeds meer druk op de keten gelegd. Terwijl de productie in Kenia nog altijd floreert, vertoont de West-Europese markt voor verse snijbloemen tekenen van verzadiging. De jaarlijkse groei is afgevlakt op een bescheiden 2 tot 4%. Het algemene gevoel dat de industrie voor ingrijpende veranderingen staat wordt de laatste jaren versterkt door de geleidelijke verschuiving van koopkracht van



groothandelaren en het Nederlandse veilingssysteem naar grote, veeleisende retailers die massamarkten bedienen.

Volgens de studie, die in opdracht van het Ministerie van EL&I werd uitgevoerd door twee leidende Nederlandse expertisecentra, Hortiwise en FlowerWatch, zorgen deze factoren samen niet alleen voor forse druk op de marges, maar ook voor veranderingen in de spelregels binnen de bloemenindustrie. De sector verandert gestaag in een strakke, transparante waardeketen die gekenmerkt wordt door consolidatie en verticale integratie, aldus de onderzoekers.

'Onze algehele conclusie,' zegt Jeroen van der Hulst, directeur van FlowerWatch, 'is dat de Keniaans-Nederlandse bloemenketen het punt heeft bereikt waarop het gebukt gaat onder het gewicht van z'n eigen succes. De vele knelpunten en efficiencyproblemen die uit ons onderzoek naar voren komen moeten aangepakt worden. Het is een kwestie van erop of eronder. Als de sector wil doorgroeien naar een hoger niveau op het gebied van kwaliteit, kostenbeheersing en duurzaamheid zal er een grondige verbetering moeten plaatsvinden waarbij elke afzonderlijke schakel in de keten betrokken is.'

### **Kleine knelpunten en grote**

Het onderzoek, uitgevoerd tussen januari en mei 2012, toont door de gehele keten heen verrassend veel ruimte voor verbetering, zegt Milco Rikken van Hortiwise. 'Wat ons onder meer opviel is het aantal omleidingen, of workarounds, dat in de loop van de tijd is ontstaan, waarbij erkende problemen worden omzeild met maatregelen die verre van optimaal zijn.' Een voorbeeld is de herkoeling van bloemen op de Keniaanse luchthaven door middel van omslachtige en relatief dure ingrepen die overbodig zouden zijn als de bloemen op voorhand onder de juiste temperaturen werden afgeleverd.

'Er zijn heel wat kleinere probleempjes in beeld gekomen die gezien de margedruk nodig aangepakt moeten worden,' stelt Rikken. 'Het goede nieuws is dat veel van die zaken relatief eenvoudig op te lossen zijn. Alleen al het aanpakken van deze lichtere problemen zal een merkbare verbetering opleveren in bloemenkwaliteit, kostenbeheersing en duurzaamheid.'

Andere zaken zijn lastiger op te lossen, voegt Rikken toe. Een aantal daarvan zal van spelers in de gehele keten, zowel aan Keniaanse als Nederlandse zijde, aanzienlijk meer toewijding en wederzijds vertrouwen vereisen dan zij tot nu toe aan de dag hebben gelegd. Rikken: 'Een punt dat uit deze studie duidelijk naar voren komt is dat in de bloemenketen nalatigheid bij de ene speler stevast leidt tot verhoogde kosten bij een andere speler. Het bijeen brengen van al deze partijen en het komen tot overeenstemming over een gezamenlijke aanpak zou wel eens de grootste uitdaging kunnen gaan vormen voor de sector.'

### **Acht probleemgebieden, vijf verbeterthema's**

De studie legt de vinger op acht probleemgebieden waarin kleine en grote knelpunten de sector weerhouden van verdere groei:

1. *Beheersing van de koelketen*
2. *Transport en logistiek*
3. *Verpakking*
4. *Informatie en communicatie*
5. *De relatief zwakke positie van MKB-telers*
6. *De rol van agent/verwerkers bij in- en uitvoer*
7. *De aansluiting van de bloemensector met op massamarkten gerichte retailers*
8. *Sectorbrede samenwerking*

Om hun concurrentiepositie in de mondiale bloemensector te behouden en te versterken, kunnen Kenia en Nederland deze probleemgebieden het beste aanpakken door zich te richten op een vijftal verbeterthema's, zo bevelen de onderzoekers aan:

#### *Thema 1 – Standaarden en procedures voor koelketenbeheersing en verpakking*

Met name de afwezigheid van adequate standaarden en procedures in de koelketen heeft een directe invloed op de kwaliteit en het vaasleven van bloemen. Door de gehele aanvoerketen heen blijken temperaturen fors te variëren en vaak veel hoger te liggen dan wenselijk is, zowel in Kenia als in Nederland. Verder lijdt de kwaliteit van de bloemen onder de afwezigheid van duidelijke afspraken over temperatuurbeheersing en onder gebrekkige planning en uitvoering van de logistieke dienstverlening bij agent/verwerkers aan in- en uitvoerzijde (serviceniveaus).

Ook op het gebied van verpakkingen zijn deugdelijke standaarden en procedures hard nodig om kwaliteit en kostenbeheersing te verbeteren. Zo ontbreekt het aan standaardprocedures voor het bestellen, opslaan en oprichten van dozen. Bovendien zijn er vaak tegenstrijdige verpakkingsvereisten ten aanzien van opslag, koeling en transport. Verder worden bloemen vaak inefficiënt geladen en verscheept; over- en onderbelading zorgen voor wisselende volumes, onnodige kosten en productschade.

#### *Thema 2 – Onderwijs over koelketenbeheersing en verpakking*

Koelketenbeheersing en verpakking schreeuwen ook om aandacht in de zin van onderwijs en training. Medewerkers op de kwekerij, transporteurs, agenten, luchtvaartpersoneel en importeurs blijken over de hele linie onvoldoende op de hoogte te zijn van de fundamentele voorwaarden voor koeling en verpakking en weten daarom ook niet hoe zij daaraan moeten voldoen.

Ook retailers moeten getraind worden in het effectief omgaan met verse snijbloemen; hun kennis van en ervaring met dit product loopt niet in de pas met hun verovering van marktaandeel. Op retailniveau zijn met name de productverspilling en de hoeveelheid verpakkingsafval aanzienlijk, aldus het onderzoek.

#### *Thema 3 – Synchronisatie van (elektronische) informatie*

Effectievere uitwisseling van (elektronische) informatie binnen de keten zal zowel de time-to-market als de kosten van handling terugdringen en de efficiency binnen de keten verhogen. Elektronische systemen als CLIENT (een Nederlands systeem voor fytosanitaire controles), de elektronische dienst voor fytosanitaire documenten van KEPHIS (Keniaanse inspectiedienst) en E-freight (een elektronische berichtendienst die door luchtvrachtovervoerders wordt gebruikt), moeten op grotere schaal ontwikkeld en uitgerold worden. Huidige bloementransporten missen vaak uniforme documentatie en etikettering, terwijl partijen die betrokken zijn bij inkleding niet 24 uur per dag geopend zijn, maar op soms cruciale momenten hun kantoren gesloten hebben.

#### *Thema 4 - Keteninnovatie*

Als de Keniaans-Nederlandse supply chain succesvol wil blijven, zal zij strategische, technologische en structurele innovaties moeten doorvoeren en de prestaties van de keten als geheel moeten verbeteren. Zo vragen de mogelijkheden van zeetransport om nader onderzoek en is er dringend behoefte aan verpakkingsinnovaties die afgestemd zijn op het directe verkoopkanaal.

Om respectabele normen te vestigen op het gebied van duurzaamheid zal de sector actief moeten gaan deelnemen aan het debat over de CO<sub>2</sub>-voetafdruk. Daarvoor moet om te beginnen de CO<sub>2</sub>-impact van specifieke activiteiten binnen de keten in kaart worden gebracht. Verder is er behoefte aan programma's die gericht zijn op verbeterd gebruik van natuurlijke bronnen, afvalvermindering en verhoogde milieuprestaties.

### *Thema 5 - Platform*

De Platformbijeenkomsten die in het kader van dit onderzoek zijn opgestart moeten een vast agendapunt worden, wil de sector significante vooruitgang boeken. Communicatie en kennisuitwisseling kunnen ook worden bevorderd door middel van sector- en ketenspecifieke websites, trainingsprogramma's en andere vormen van directe samenwerking tussen de spelers in deze keten, waaronder ook brancheverenigingen en overheidsinstellingen in beide landen.

#### **Concreet en praktisch**

'De Keniaans-Nederlandse bloemenketen biedt vele mogelijkheden voor kleine en grote verbeteringen,' zegt Rikken. 'Wij zijn ervan overtuigd dat deze studie een overvloed aan concrete en praktische aanknopingspunten biedt voor elke schakel in de keten om het niveau te verhogen en de toon te zetten voor de gehele sector. Tot nog toe is de belangstelling voor de Platformbijeenkomsten zeer bemoedigend. Op een paar uitzonderingen na, krijgen we de indruk dat alle spelers in de keten graag willen deelnemen. Praten over verandering en daadwerkelijke hervormingen zijn uiteraard twee verschillende zaken, maar we rekenen erop dat we door aan te haken op bestaande initiatieven in zowel Kenia als Nederland een wezenlijk verschil kunnen maken. Het is aan de spelers in de keten zelf om dat verschil werkelijk tot stand te brengen.'

# 1 Introduction

## 1.1 Background

Kenya has seen impressive growth in horticultural exports over the last two decades. The horticulture sector has become one of the biggest earners for the Kenyan economy, along with remittances from Kenyans abroad, tourism and tea. What's more, the sector provides numerous Kenyans with much needed employment and income.

Kenya has become the leading producer of roses for the European market. With the Netherlands being an important entry point to the European market, the Kenyan-Dutch horticultural supply chain has developed rapidly. Volumes have increased and the product range has widened. In 2011, Kenya became the biggest cargo hub of Africa, bigger than Johannesburg or Cairo.

This rapid growth, however, has put pressure on the supply chain, creating bottlenecks that hamper efficiency and further development. Additionally, small and medium-sized (SME) producers in Kenya – not only smallholders, but also producers with less than about 10 hectares – are finding it increasingly difficult to access efficient supply chains in order to get their products to the market.

In the market, parties are showing increasing concerns about social and environmental aspects (CSR, certification, carbon footprints, etc.). Sustainability aspects are also communicated to consumers by means of information about the origin of the product. Some UK supermarkets print 'By Air' on the product, indicating that products have been transported by air. Other supermarkets highlight local produce. Other ways of indicating a product's carbon footprint are also being developed.

In response to this strain on the supply chain, several entrepreneurs in the Kenyan-Dutch flower industry have expressed their concerns to representatives of the Dutch Ministry of Economic Affairs, Agriculture and Innovation.

## 1.2 Objectives

The present study is part of a multiphase project. The aim of this study is to obtain detailed insight into the performance of the Kenyan-Dutch horticultural supply chain, its inefficiencies and bottlenecks. It has been deemed appropriate to focus on developments in the cut flower supply chain. As far as relevant, this study also deals with specific issues in other horticultural supply chains, e.g. cuttings, fruit and vegetables.

This study offers insight into projected future developments, identifying potential threats as well as opportunities to improve supply chain efficiency. Steps towards a more sustainable and climate-smart supply chain will also be proposed.

Finally, this project aims at creating a lasting platform for continued improvement of the Kenyan-Dutch horticultural supply chain.

### **1.3 Methodology**

The study is based on a comparison of theoretical standards with actual practice. What is today's practice, how did it evolve into the current situation and what is best for the product?

The following methodology has been used:

- Desk research aimed at reviewing existing research reports;
- Interviews with nearly 30 stakeholders aimed at obtaining specific insight (for a list of interviewees, see Appendix 1);
- Supply chain measurements: temperatures, packaging, flight routes, ethylene levels; and
- Two platform meetings with key stakeholders in both Kenya and the Netherlands (see meeting reports in Appendices 1 and 2).

### **1.4 Team**

The study was performed by Hortiwise, in close collaboration with FlowerWatch. Additionally, an external party with packaging expertise participated in this project (Packaging View).

### **1.5 Guide for the Reader**

Chapter 2 provides an overview of relevant historical and current developments in the global flower industry, and the Kenyan sector specifically. Readers who are not yet very familiar with the background and structure of the Kenyan floriculture sector are advised to read this chapter first. Chapter 2 also highlights the significance of the Kenyan and Dutch floricultural industries and the importance of an efficient supply chain from Kenya to The Netherlands.

Chapter 3 starts with a review of the Kenyan-Dutch (flower) supply chain as a whole, followed by a more detailed description of each link in this chain. Bottlenecks are also presented in this Chapter. For an important part, these were identified through interviews with actors in the supply chain. Results of temperature and ethylene measurements throughout the entire chain are presented in Chapter 4. Finally, our conclusions and recommendations are formulated in Chapter 5.

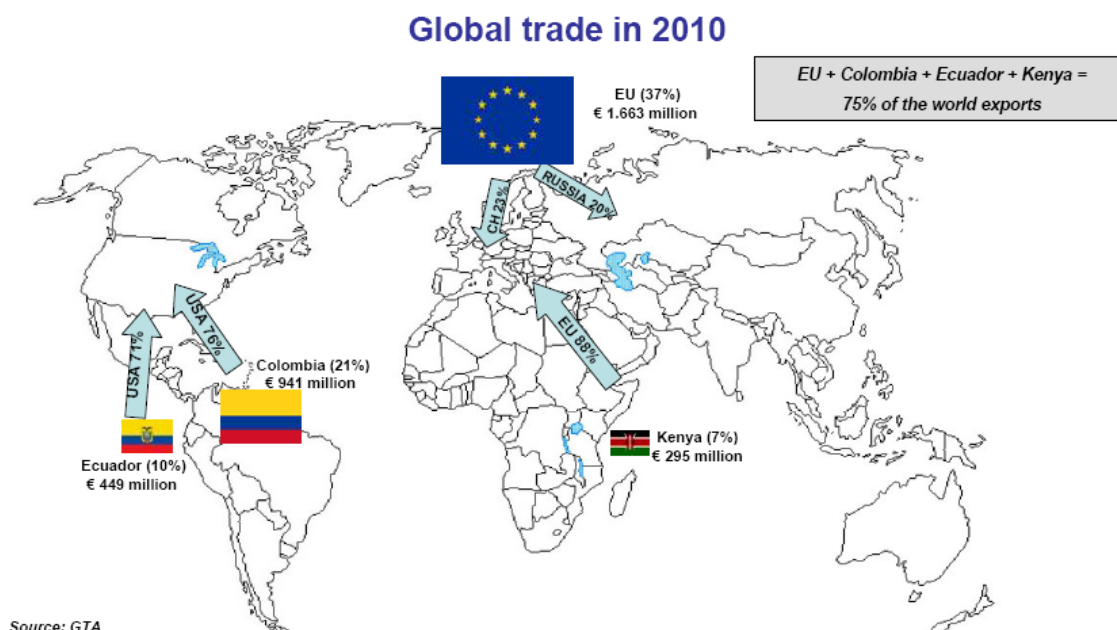
## 2 Development of the Flower Industry

### 2.1 Global

The present-day flower industry is dynamic and highly international. Until the 1960s, however, demand for cut flowers from consumers around the world was predominantly met by local production. In Europe, production was initially concentrated in the Netherlands. Expedited movements within the EU paved the way for producing cut flowers in Southern Europe for the Northern European markets. The energy crisis in 1973 put producers in the Netherlands and northern Europe under further competitive pressure because of the increase in cost for operating temperature-controlled greenhouses during the winter. Competition intensified when Israel began selling cut flowers at the Dutch flower auctions. Although further from the market, Israel could produce cut flowers throughout the year in open fields or plastic tunnels. African producers, especially from Kenya, began to enter the European market in the 1990s.

Nowadays, the international trade is largely organised along regional lines: African and European countries are the principal suppliers to the main European markets; the North-American cut flower market is mainly supplied by Colombia and Ecuador; and Japan and Hong Kong source primarily from Asia-Pacific countries (including China). Figure 1 shows the main global trade lines in 2010.

**Figure 1 Global trade in cut flowers, 2010.**



The European and North American markets are characterised by the largest intra-continental trade, as much flower production takes place here as well. An important share of the total floricultural trade in Europe and the US is not home-grown, but originates from other continents. Latin America, Africa, Asia and Europe are the main exporters to both continents. Consumption per capita has been rising due to rising income levels and demographic and cultural developments.

The recent global economic crisis has significantly affected the growth potential of the cut flower industry. Nevertheless, global exports continue to grow each year. Depending on the source, the annual consumption

of commercially grown flowers worldwide is estimated at € 30 to € 50 billion. Asia and Eastern Europe have big potential as new markets due to rising prosperity levels. This increasing prosperity in growing and emerging economies is expected to support a continued increase in worldwide demand for flowers, even against the background of the current economic turbulence.

For high volume bulk products the trade lines run from South to North rather than from East to West. For high quality products there are niche markets worldwide. While international trade is increasing, regional supply will be leading.

Consumers have become more refined in their tastes. The Russian market and its preference for very large flower buds is a good example. What's more, Eastern Europe markets have shown prime growth prospects. To meet this growing and changing demand, production has continued to move from countries that were traditionally consumers and growers, such as the Netherlands, to other relatively new production countries such as Colombia, Ecuador and Kenya and Ethiopia. This shift in production locations has mainly been driven by the availability of labour and land, and has been facilitated by developments in air transportation and refrigeration.

Other important developments include increased competition and the considerable progress that has been made in consolidation and vertical integration. For instance, the merger of the two largest Dutch cooperative flower auctions (FloraHolland and Bloemenveiling Aalsmeer) has given rise to the world's largest flower market place, called FloraHolland, with total flower sales of € 2.35 billion in 2011. Furthermore, steadily increasing demand from supermarkets and retail outlets has drastically changed the distribution channels. Worldwide, large retailers such as Wal-Mart in the USA and Tesco in the UK have increased their amount of purchases acquired directly from growers under long-term contracts.

There is a general feeling that the industry is facing a period of dramatic change as it responds to the challenges posed by today's economic conditions. Recently, growth has stagnated in some markets, while the supply of flowers has remained abundant. In the medium and long term, a moderate annual growth of only 2 to 4% is expected in Western Europe's cut flower markets. In addition, consumer demands, and subsequently trade requirements, are becoming more stringent and increasingly differentiated. Demand for sustainably produced and distributed products is rising.

As a result of all of this, margins are under pressure and the playing rules are changing significantly in the flower industry. The industry is evolving towards lean and transparent supply chains. Direct trade channels, bypassing the auction system, are growing. Technology and knowledge are developing rapidly, not only in the field of cultivation, but particularly in the way flowers are traded. Transactions are increasingly handled by means of computer systems. More than 60% of the roses traded at the FloraHolland auction are sold through the 'KOA' remote buying system. European wholesalers offer products in their own online web shops, where customers (wholesalers and retailers) can buy directly from stocks. Trade is becoming increasingly virtualised, making accurate exchange of information critical.

## 2.2 Kenya

### 2.2.1 Horticultural Production

The history of exports of fresh horticultural produce from Kenya dates back to the pre-independence era, when Kenya, then a British colony, was required to contribute to the budget for East Africa. Following the country's independence, the industry continued to flourish with exports reaching the European market and opening up more export potential for Kenya.

The success of the Kenyan export sector can largely be attributed to the strong involvement of the private sector. Initially, foreign-owned multinationals were responsible for this involvement. Present sources of investment include local private sector businesses (owned by both Kenyan Asians and Kenyan Africans), and agricultural sector investors from Europe and Israel. Additionally, some of the international aid agencies, such as the International Finance Corporation, are involved in financing horticultural activities.

The sector has witnessed the development of well-organised, commercial businesses willing to make the sort of investments required to build and sustain an export business. This has been possible for a number of reasons, not least the relative macroeconomic and political stability enjoyed in Kenya. This has given private sector entrepreneurs sufficient confidence to invest in their businesses on a long-term basis. The involvement of the international aid sector in the development of the sector has also been evident in Kenya. However, given the strength of private sector companies in this industry over the years, it is likely that a successful export sector would have been created even without this assistance (Neven, 2007).

Kenya's overall horticulture sector is of critical importance in terms of household income generation, foreign exchange earnings and food security at household and national levels. The horticulture sector accounts for 33% of the country's gross domestic agricultural product and 38% of national export earnings, making it one of the leading generators of the country's foreign exchange. According to the Kenya Horticulture Council (KHC), the sector employs approximately 4.5 million people countrywide directly in production, processing, and marketing, while another 3.5 million people benefit indirectly through trade and other activities ([www.fpeak.org](http://www.fpeak.org)).

#### ***Kenya as the Benchmark***

When it comes to supplying the EU with off-season horticultural products, Kenya leads the way, and the country has been doing so for an impressive 30 odd years. The sector is highly professional, with efficient growers and well-managed exporters. The infrastructure at Nairobi is unmatched in any other East African exporting country. Exporters are clustered around Jomo Kenyatta International Airport and have modern cold storage facilities, in which they continue to invest. The Kenyan off-season vegetable industry sets the standard, not just for East Africa, but indeed for the rest of the world. Kenya can supply all year round and is consistently price-competitive. Any new supplier (e.g. Tanzania) will be measured against this benchmark.



**Table 1 Kenyan horticultural exports, 2009 and 2011**

Quantity x 1,000 tonnes; Value x 1 billion KSh

	2010		2011		% change	
	Quantity	Value	Quantity	Value	Quantity	Value
Flowers	120.2	35.6	121.9	44.5	+1	+25
Vegetables	123.8	21.4	92.2	21.5	-26	0
Nuts	11.8	2.0	11.8	2.7	+10	+33
Fruits	32.5	2.8	13.0	3.6	+14	+30
Processed Vegetables	35.6	9.2	37.1	12.0	+12	+31
Processed Fruits	79.0	6.8	40.1	7.3	-1	+8
<b>Total</b>	<b>349.7</b>	<b>77.7</b>	<b>382.6</b>	<b>91.6</b>	<b>-5</b>	<b>+18</b>

Source: USAID-KHCP ([www.kenyaflowercouncil.org](http://www.kenyaflowercouncil.org))

In 2011, the sector earned KSh 91.6 billion (€ 811 million) in total horticultural exports. Exports have been growing at 10-20% per annum in recent years and demand for Kenyan produce appears to be growing in EU and other markets, including the fast-growing countries of Africa. Yet despite its profile, long-range exports of fresh horticultural produce represent only around 5% of total production volume.

Fresh fruits and vegetables represent about 15% of the national diet and are the main source of essential micronutrients for low-income households. Horticultural crops are also the raw materials for the agro-processing industry. Kenya exports only a small proportion of its total horticultural production, estimated at a weighted average of 10%. In value, these exports represent around 20% of national production. The main vegetables for export include beans (fine and extra fine), runner beans, peas and mixed vegetables.

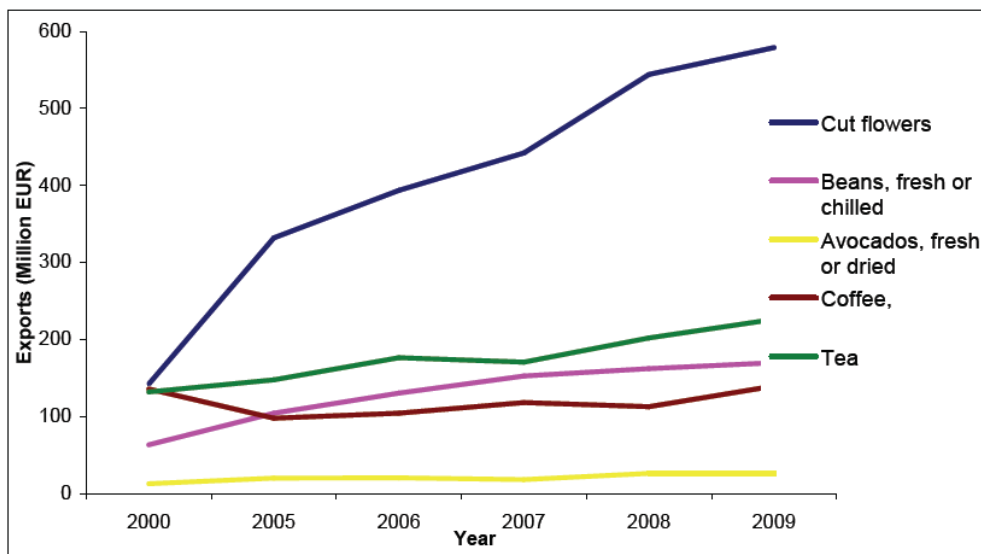
About 90% of all fruit and vegetable production is used for domestic consumption either on-farm or through domestic markets. About 96% of total horticultural production is consumed locally, while the remaining 4% is exported; yet in terms of revenues, the export segment earns the country huge amounts of foreign exchange (Kenya Ministry of Agriculture, 2010).

### Exports to the EU

Leading horticultural export products to the European Union are, in order of importance, cut flowers, tea, leguminous vegetables, coffee and fruits. Together, these products account for over 70% of the value of exports to the EU. In 2009, EU imports of green beans represented approximately 50% of total imports, with major import destinations being the UK (30%), France (26%) and Belgium (7%). Kenya exports a substantial amount of fruits, especially avocados and mangoes; it is the fourth largest avocado exporter to the EU after Israel, Mexico and South Africa (Eurostat, 2011).

Figure 2 illustrates how Kenya's exports of agro-food commodities to the EU have developed between 2000 and 2009. Particularly exports of fresh cut flowers have experienced remarkable growth. Green bean exports also grew noticeably. Typical African country cash crops such as tea and coffee have remained stable over the last decade. The same holds for fresh or dried avocados.

**Figure 2 Historic values of Kenya's main exports to the EU**



Source: COMTRADE (2011)

According to Gonzalez & Ferrari (2011), the rapid growth of the flower and green bean export horticulture can be attributed to a number of factors:

- Preferential treatment under the Cotonou Convention between developing countries and the EU provides concessionary access for Kenyan flowers and vegetables to the European market.
- A sustained demand for horticultural products from the EU providing a stable and growing market for Kenyan producers.
- The location of Kenya as a centre of air transport between Europe and the East and Southern African regions ensures that there is sufficient northbound air cargo to rapidly transport exports.
- The presence of ample local and international investors willing to invest in compliance with international standards and regulations provides Kenya with an added advantage. Other potential competitive export-oriented sectors, such as avocado, have not experienced the same increasing trends in exports (Figure 2).

### Milestone's in Kenya's Horticultural Sector

<i>World War II</i>	The start of Kenyan horticulture. The colonial administration launched an experiment with irrigated smallholder vegetable production to provide dehydrated vegetables for the Kenyan army and Allied troops. After World War II, the first steps towards export horticulture were taken by the colonial administration (e.g. controls on dollar imports, research and extension programs and price supports).
1957	First fresh produce exported to United Kingdom by air.
1960s	Duty-free access to UK market. Both large-scale European farmers and smallholder African farmers supplied produce for canning. Investments in private farms around Lake Naivasha.
1963	Kenya's Independence. Major changes in the horticulture sector and its relationship with the new government. Little funding for horticultural research and extension.

- 1967 The Horticulture Crops Development Authority (HCDA) was established as the executive branch of the Ministry of Agriculture for horticulture, but it had little funding or authority to regulate the sector.
- 1970s Development of mass tourism. Jumbo jets bringing tourists had spare cargo capacity for the return journeys and were therefore able to offer relatively low freight rates for horticultural exports. Egerton College began to offer degrees in horticulture.
- 1975 The Fresh Produce Exporters Association of Kenya (FPEAK) was formed.
- 1979 Rising transport costs after the second oil price shock slowed down the industry's growth.
- 1980s Flower production emerged as a strong component of horticulture. The range of flowers being produced expanded in response to European demand. Many new small- to medium-scale flower operations were started up. The industry was still characterised by low value and simple open field flowers with limited assortment. HCDA passed on EU trade enquiries to exporters.
- 1982 A large local vegetable producer, Oserian, invested in floriculture.
- 1984 Oserian established a subsidiary company called East African Flowers (EAF) to gain greater control over the marketing side.
- 1987 Exports doubled in five years. The horticulture industry was now large enough to attract (foreign) suppliers of inputs.
- 1990s The industry continued to attract investments. The airfreight situation improved, with the elimination of government interventions in the market. The foreign exchange market was liberalised, and import procedures for inputs were streamlined. Improvements in infrastructure, including the new airport at Eldoret, stimulated the westward expansion of the floriculture industry. The industry shifted to higher-value flowers grown in greenhouses. There was a marked increase in production, with growers increasing their planting areas by about 250%. The export value of cut flowers tripled.
- 1994 Dutch growers voted on banning foreign growers from participating in the summer auctions. This quickly led to the founding of Tele Flower Auction (TFA) by Oserian's East African Flowers.
- 1996 The Kenya Flower Council (KFC) was formed to represent independent Kenyan cut flower and ornamental plant growers and exporters.
- 1999 New fresh produce terminal built at Nairobi Airport.
- 2000s The increasing power of the supermarkets boosted their role as market drivers. A number of exporters invested heavily in growing their own high quality, certified crops to take advantage of the increased market opportunities for high-quality produce. The effect of these trends has been a much shorter supply chain, a higher degree of vertical integration, fewer active players, and significant upscaling of production and exports.
- 2003 Incorporation of the Horticultural Ethical Business Initiative (HEBI).
- 2004 Launch of the Strategy for Revitalising Agriculture (SRA). This new policy document gave a strong impulse to the export of horticultural produce to the EU.
- 2006 The Flower auction in Aalsmeer started accepting international members.

- 2007 KFC was accredited by the Kenya Bureau of Standards (KEBS) to audit flower growers. KFC's Code of Practice classifies growers with a Silver or a Gold Certification Standard. James Finlay's took over Homegrown and became one of the largest Kenyan flower growers. Karuturi Networks acquired Sher Agencies and became the world's largest producer and exporter of roses.
- 2008 Merger of the main Dutch flower auctions into FloraHolland.
- 2010 Flower auction FloraHolland took over Tele Flower Auction (TFA). Swissport Cargo Services, Total Touch Cargo/Triple-FFF and Trans Global Cargo Centre opened their new facilities, creating much more cold space for fresh produce at Nairobi airport.
- 2011 The Jomo Kenyatta International Airport (JKIA) became the largest cargo handling airport in Africa for exports, overtaking Cairo and Johannesburg. Dutch Flower Group (DFG) took over Bloom, Fast Track Flowers, Airflo and the trade activities of World Flowers (all part of the Mavuno Network, of which Oserian is the most important activity). Introduction of CLIENT Export (electronic phytosanitary certificates).
- 2012 The Kenya Airport Association (KAA) decreed that all flower boxes are to be scanned, putting an end to the random selections performed thus far. Closure of Gate 14 has also been announced as a security measure, to comply with US demands for direct export.

### 2.2.2 The Floriculture Sub-Sector

In its early stages, Kenyan flower production focused on strong plants (primarily carnations) that could withstand relatively crude open field growing conditions and less than optimal handling and transport conditions. The industry has since moved up from low-input open field flower production to greenhouse production at higher altitudes in order to produce higher-value flowers. An open policy that permits movement of production factors, including technology, across borders, recognition of breeder rights, collective efforts of producers and an emerging productive relationship with the government have helped the sector upgrade itself and remain globally competitive.

The Kenyan floriculture sector has been dynamic enough to move into higher value production. For an important part this can be attributed to a number of factors that have attracted large investments in floriculture, i.e.:

- Ideal natural conditions for floriculture;
- Experience gained from fresh produce exports;
- The presence of a commercial farming community;
- Favoured access to European markets; and
- Government support.

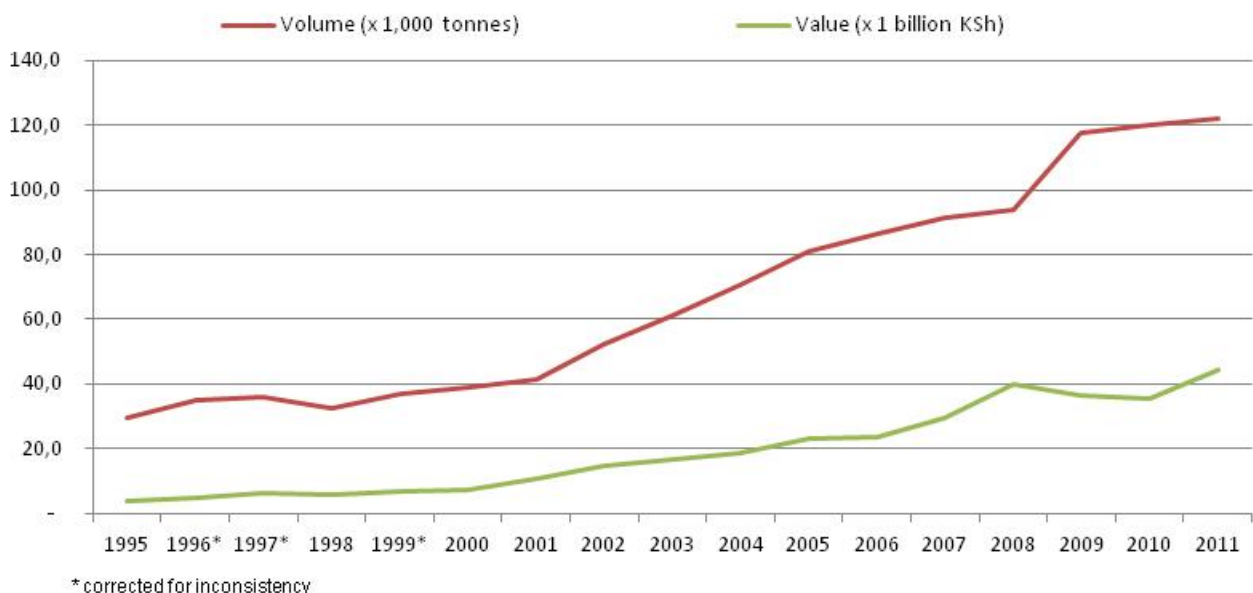
Nowadays, it is estimated that the floriculture sector employs over 50,000 - 60,000 people directly, and 500,000 people indirectly through affiliated services to the industry e.g. farm inputs, transport, packaging, banking etc. Assuming that each employee has four dependants, the total number of beneficiaries is 2 million– or about 7% of the population. The fact that these job opportunities exist in the rural areas is very important, as it not only stems urbanisation but also contributes to poverty alleviation, which is a major focus of the government ([www.kenyaflowercouncil.org](http://www.kenyaflowercouncil.org)).

There are currently about 160 flower growers in Kenya. They run mainly medium to large scale commercial operations, however, 20 to 25 of these growers are large to very large commercial enterprises, together accounting for roughly 75% of total flower exports. These large scale growers are a combination of foreign-owned businesses and/or joint ventures between foreigners and Kenyan entrepreneurs. The predominant investors are European producers who have opted for outsourcing the cultivation of flowers to Kenya year-round. Such operations are characterised by a high degree of vertical integration, high capital investments in greenhouses, excellent managerial skills and marketing infrastructure (such as freight-forwarding and cargo planes), research laboratories, advanced technology and cultivation techniques. The large-scale growers have marketing networks in Europe to assist in their sales, distribution and the acquisition of market information.

The Kenyan flower industry has grown tremendously since the turn of the century (Figure 3). In 2000, the total production area was an estimated 750 to 1,000 hectares with about 38,000 tonnes of flowers being exported. In 2004, the sector had already grown to 2,000 hectares. In 2010, there were about 3,400 hectares of flowers (greenhouse and outdoors) with 120,000 tonnes of flower exports that year. In the period 2000-2010, the value of Kenyan flower exports has shown a spectacular six-fold increase.

Growth has not always come easily in Kenya, however. The last years have brought particular challenges. In 2008, Kenya was confronted with political unrest, which affected the sector for a few weeks. Flowers could only be exported with difficulty. Some farms did not get their flowers out for some days. In the same year, the sector faced increasing transportation costs due to high oil prices. In 2009, there was the economic crisis that resulted in lower prices. Also, a long period of drought began, lasting well into 2010. Then there was the Icelandic ash cloud in April 2010, and the weakening position of the euro in relation to the dollar. Air freight costs increased and heavy rains in December affected production. These factors caused a depression in the value of cut flower exports in 2010 as compared to the year before (Rikken, 2011).

**Figure 3 Development of Kenyan cut flower exports**



Source: Hortiwise from HCDA and KFC (2012)

Fortunately, in 2011 the flower sector began to show signs of recovering from a two year dip in export value, with an increase of 12% compared to the record year 2008. Compared to 2010, the value of flower exports increased with 25% in 2011, while export tonnage increased by 1%.

### Exports to the EU

The EU is the leading destination for cut flowers produced in Kenya, with the Netherlands accounting for 67% of tonnage and over 55% of export value. The UK is the runner-up with 17% of tonnage and 25% of export value. Other countries follow in the margin (Table 2).

**Table 2 The main destinations of Kenyan cut flowers in 2010**

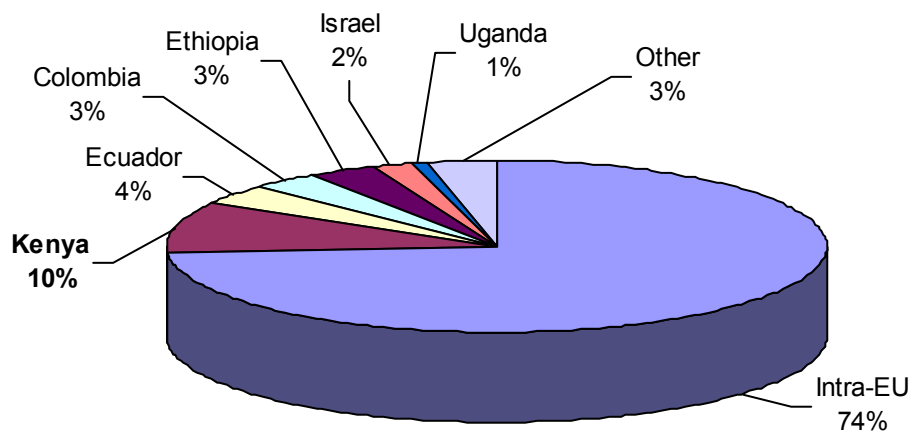
Quantity in tonnes; value in 1 million Euro (1 Euro = 101 KSh)

Destination	Quantity	Value
The Netherlands	72,318	158.94
United Kingdom	18,635	70.50
Germany	4,834	15.66
Russian Federation	2,178	7.57
Norway	1,174	3.23
France	1,051	3.58
Switzerland	1,027	3.96
United Arab Emirates	1,010	3.32
Japan	893	4.78
Australia	654	2.00
South Africa	610	0.77
Sweden	426	1.45
Others	2,301	8.83
<b>Total</b>	<b>107,478</b>	<b>284.61</b>

Source: HCDA Horticultural Crops Production Report 2010

Since 2002, important players from the past, like Israel and Spain, have been losing ground fast. Among the top 10 of cut flower suppliers to the EU, they dropped, respectively, from rank 3 and 5 in 2002, to rank 6 and 12 in 2012. The main cause of the drop is the rise of Ethiopia and the increasing shares of Ecuador and Colombia.

**Figure 4 Leading cut flower supplying countries to the EU market in 2010**

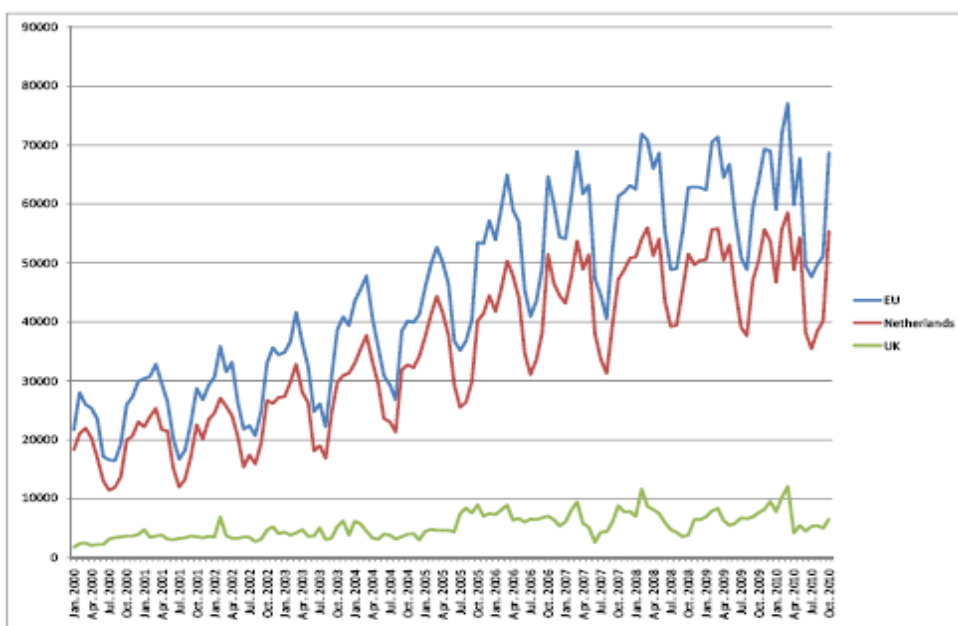


Source: Hortiwise from Eurostat (2011)

Roses represent nearly three-quarters of total Kenyan flower production. Sector insiders have estimated that an additional 150 ha of new greenhouses were erected for growing roses in 2011. For 2012, an expansion by another 200 hectares seems likely. This means that by the end of 2012, Kenya would possess 2,400 hectares of greenhouses with roses, spread over 110 farm locations.

**Figure 5 EU imports of roses from Kenya**

Quantity in 100kg



Source: Eurostat (2011)

The demand for flowers on Valentine’s Day in February and Mother’s Day in May leads to large seasonal peaks in demand for Kenyan roses. During Europe’s summer months, production in Kenya slows down as a result of colder weather, while EU demand also decreases in this period. Consequently, the main export season lasts from September to June.

## Key Trends in the Global Cut Flower Industry and Consequences for Kenyan Floriculture

- The flower export industry is highly internationalised; Kenya continuously faces strong international competition from other leading producer countries, like Colombia, Ethiopia and Ecuador.
- Dutch marketing institutions are still very important for Kenya's floriculture sector.
- The cut flower value chain is increasingly dominated by large and sophisticated European mass-market retailers such as Tesco, Sainsbury, Marks & Spencer, Carrefour and Migros. This is resulting in a gradual shift of purchasing power from wholesalers and the Dutch auction system towards mass-market retailers. Supermarkets increasingly set their own quality standards, which in some cases are more stringent than current industry standards.
- Supermarkets tend towards single-sourcing based less on price (as the Dutch auction system) and more on quality, delivery reliability and traceability. The consequent concentration of importers is leading to a consolidation of producers.
- Small scale and medium scale growers are threatened by the cost of implementing GlobalGAP, Fairtrade and other supermarket standards, as well the cost of developing a logistics infrastructure to sell directly to mass-market retailers.
- There is an increasing number of initiatives among supermarkets to indicate a product's carbon footprint, e.g. by showing whether it is locally produced (national flag) or transported by air (plane). Efforts are being made to develop a "universally accepted and commonly understood" carbon footprint measure.
- The cut flower sector has achieved critical mass for technical learning, market information and supply of equipment, advisory services and logistics. The sector meets the international environmental standards of Good Agricultural Practice and applies social codes. It is one of the most codified flower industries in the world. However, much knowledge is acquired from foreign consultants. Many innovative cultivars still have to be imported, but Kenyan farms are showing great promise in this respect, with several Kenyan companies active in rose breeding or with shares in overseas breeders. Kenya is still maturing into a more self-reliant, innovative and competitive industry.
- The sector operates in a weak domestic economy. Nevertheless, business confidence among the large growers is high. How the industry will stand up to possible economic decline or political instability remains is anybody's guess. The upcoming elections later this year will be a test case.

### 2.2.3 Cuttings

An important category of floriculture farms comprises propagators of cuttings and other young plant material. Although flower growers and propagators are often mentioned in one breath, the two are actually quite distinct.

Most propagators are subsidiaries of European breeding companies who supply their mother companies in Europe on direct order. In Europe, the cuttings are forwarded to the final customers (growers who cultivate them into end products). In other words, the farms in Kenya tend to produce according to fixed supply contracts and are not directly involved in selling the cuttings to the final customers.

The farms propagating cuttings in Kenya often feature high-tech and sophisticated production systems. Many breeders have extensive experience in other non-European countries. As a result, they are able to set up high-quality production locations in which cuttings are propagated according to highly developed and tested production systems. Technical knowledge is not a limiting factor.



While local investors have been able to enter into the cut flower business, the young plant business remains a somewhat closed line of trade. The young plant business is dominated by a relatively small number of European breeding companies specialised in developing new varieties and their propagation. They sell their cuttings to growers worldwide. Under strict breeders' licences, young plant material is increasingly propagated at production facilities in low-cost countries under optimal climatic conditions. Compared to flower farms, propagators are a more homogenous group.

European imports of young plant material (pot plant and cut flower planting material) are still growing steadily. In 2010, imports amounted to € 765 million, compared to € 731 million in 2007. Kenya is an important supplier from outside the EU. In 2010, Kenyan exports of cuttings (as reported by Eurostat) amounted to almost € 32 million, of which € 22 million was imported into the Netherlands.

Exports of cuttings and other plant material are characterised by a high value to volume ratio. They are less voluminous than cut flowers.

All companies listed in Table 3 below have a substantial part of their production located in Kenya.

**Table 3 Top-5 cutting producers**

Rank	Company	Quantity produced (estimate)	Headquarters	#Countries
1.	Fides B.V.	800-850 million	The Netherlands	5
2.	Beekenkamp	635 million	The Netherlands	6
3.	Syngenta Flowers	550-600 million	Switzerland	7
4.	Selecta Klemm	230-250 million	Germany	3
5.	Dümmen	200-220 million	Germany	3

Source: *www.GreenhouseGrower.com (2009)*

## 3 The Kenyan-Dutch Cut Flower Supply Chain

### 3.1 Description of the Cut Flower Supply Chain

Cut flowers can follow different channels from grower to consumer. On these routes, a variety of players can be involved in handling the products. The main routes for Kenyan flowers entering the European market are:

1 The Traditional Supply Chain:

Cut flowers are delivered from the farm to a forwarder/handling agent at the airport. The products are flown to Europe and received by a handling agent at the airport. The flowers are processed by an importer who prepares them for auctioning. At the auction, the flowers are bought by a wholesaler who sells them to retailers, where consumers constitute the end buyers concluding the supply chain.

2 The Auction Import Supply Chain:

Identical to Supply Chain no. 1, but the importer is cut out. The import division of the auction itself receives the products and unpacks and prepares the products for auctioning. A shipment is often spread over several auction days and auction locations to ensure a continuous supply to the auction clock.

3 The Auction-Retailer Supply Chain:

Identical to Supply Chain no. 2, but the wholesaler is cut out as well. Retailers themselves buy the flowers they need directly at the Dutch flower auctions.

4 The Traditional Direct Supply Chain:

The importer and flower auction links present in the supply chains described above are cut out. Flowers are received by a handling agent who directly forwards the boxed products to a European wholesaler, who takes care of import handling and possible processing (e.g. bouquet making), before selling the products to domestic and foreign customers.

5 The Mass-Market Direct Supply Chain:

This is the shortest currently used supply chain, cutting out two or three of the links mentioned in Supply Chain no. 1 and reducing the total length of this traditional supply chain by one third. Products are imported by an importer, who is selected by a retailer (in most cases a large supermarket chain). In fact, there is one case in which a retailer goes even one step further by skipping the importer and importing flowers itself.

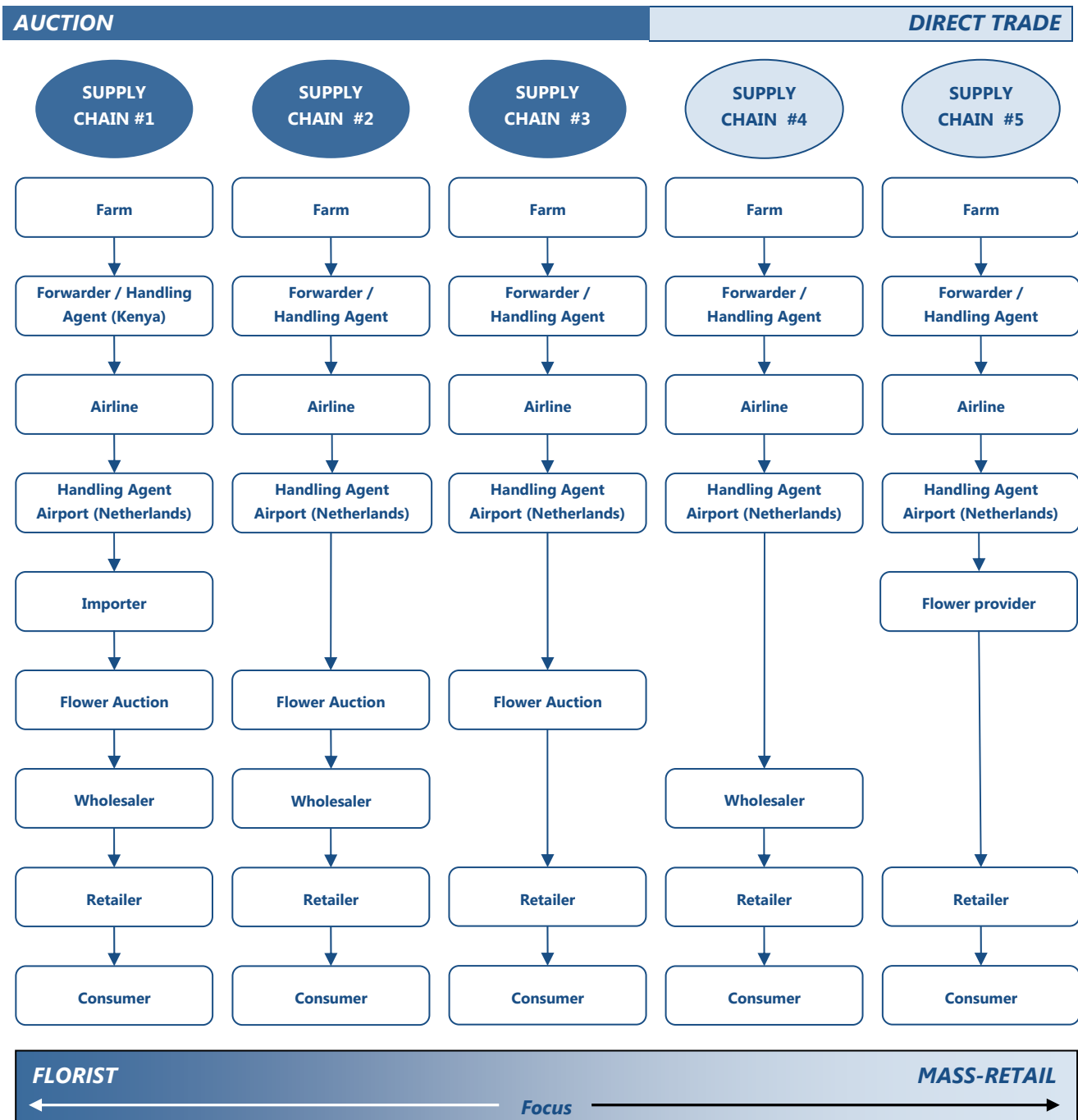
The chart on the following page gives a more detailed insight into these routes (Figure 6). The longest Supply Chain (no.1) counts 9 identified links. However, this is a somewhat simplified presentation of the chain. In reality, each arrow in this picture represents a transport link of its own. One could break this chain down even further, for example, by adding the numerous internal transport links that may exist at the farm or at the flower auction. Transport moments can strongly influence the cold chain and thus the quality and vase life of the product.

In Supply Chains no. 1, 2 and 3, products pass through the auction system. Supply Chains no. 4 and no.5 bypass the auctions (often referred to as "direct trade"). The move from Supply Chain no. 1 to no. 5 may be considered illustrative of the evolution of the cut flower supply chain over the last 20 years or so. During this process, former chain partners have become competitors. Driven by cost reduction, as well as the desire to

maintain product quality, more and more activities are being vertically integrated in the chain. A major trend in the current floricultural landscape is represented by Supply Chain no. 5: Direct sourcing by large European retailers.

Florists are concentrated in Supply Chains no.1, 2 and 3, while the rise of mass-retailers (e.g. supermarkets, and florist franchise formulas) is bringing Supply Chains no. 4 and 5 to the foreground.

**Figure 6 Cut flower supply chains from Kenyan producers to European consumers.**



As noted above, the role of specialised wholesalers has changed significantly over the last decade. Functions carried out by today's wholesalers involve coordination, quality control, logistical services, facilitating the

movement of goods to buyers, and so on. For the leading companies in the UK and other EU fresh-produce businesses, this means that buyer/supplier relationships now look more like genuine partnerships, as “category management” has become the preferred method of sourcing produce for the larger retailers.

As a result, a whole series of joint ventures and vertical and horizontal strategic alliances has emerged. These alliances allow closer links between growers, packers, and importers than ever before, and ensure consistency of supply and the ability to supply major customers on a year-round basis.

In terms of vertical strategic alliances, most of the leading Kenyan exporters have a series of well-established relationships with EU-based importers. These range from vertical integration to trading partnerships that, although loosely based, are still very well established and can go back 20 years or more. These integrations involve joint ventures and co-investments (an example is Homegrown, Kenya’s largest vegetable exporter – recently taken over by Finlay).

All in all, the African-European cut flower supply chains can be brought back to two distinctive strands. Cut flowers sold via auctions to wholesalers and direct sales to supermarkets and other retailers via wholesalers or flower providers. The Dutch auctions have historically been the most important channel, but direct trade has been gaining ground fast. This increasing power of retailers faces African growers with two challenges: an increasing demand for social and environmental standards and a shift of risks towards the supplier. In the traditional market (auction) growers have the guarantee that their entire product, if it meets the minimum quality standards, will be auctioned. However, prices are determined by supply and demand and can be lower than the expenses. The auction system also enables growers to specialise, i.e. producers can grow monocultures and gain advantage of economies of scale.

**Table 4 Potential effect on quality throughout the retail supply chain**

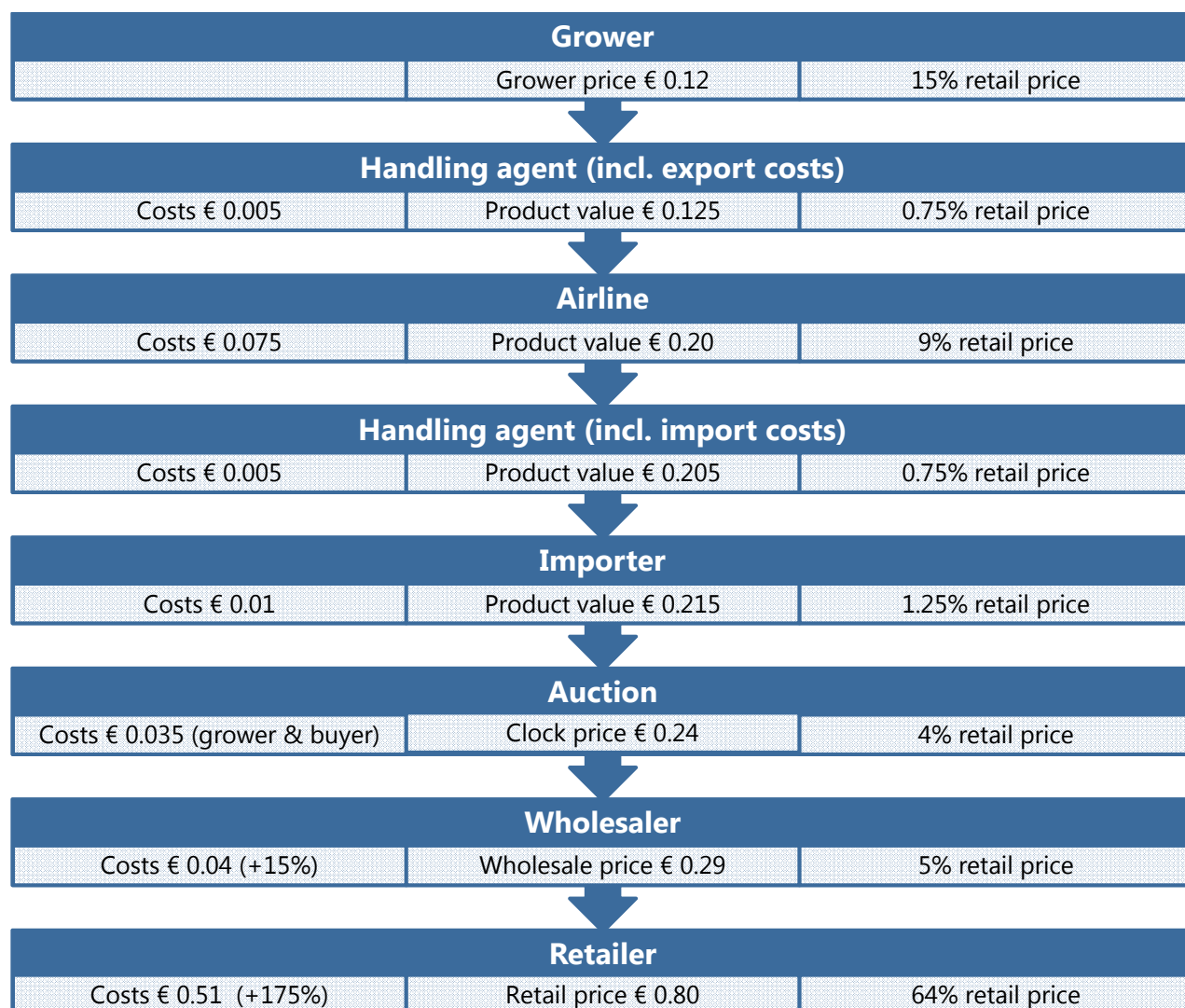
Process	Time	Potential to affect quality		
		Low	Medium	High
Post-harvest on farm, Kenya	4 - 8 hours	Low	Medium	
Storage on farm, Kenya	12 - 72 hours		Medium	
Dispatch for transport to JKIA	1 hour			High
Transport to forwarder/handling agent (JKIA)	1 - 10 hours			High
Storage at forwarder/handling agent airport (JKIA)	4 hours			High
Palletising at forwarder/handling agent airport (JKIA)	6 hours			High
Customs clearance (JKIA)	0.5 hours	Low		
Loading to aircraft (JKIA)	1 - 2 hours		Medium	
Flight NBO – AMS nonstop	9 hours		Medium	
Customs clearance (Schiphol Airport)	4 - 12 hours	Low		
Depalletising (Schiphol Airport / Importer)	2 - 4 hours			High
Storage at handling agent (Schiphol Airport)	4 - 72 hours		Medium	
Transport to European retailer	2 hours - 5 days		Medium	

Source: FlowerWatch

Direct sales, by contrast, require an adequate range of varieties. They also require consistency in volume, quality and timing of supply. One of the big challenges for Kenyan growers is to align (climate-driven) production fluctuations with the changes in demand. So-called “just-in-time delivery” requires products to be delivered at the right time to the right location, so as to reduce the risks and costs involved in storage.

Companies aiming at direct market channels need greater marketing and logistics capabilities than those selling at the auctions.

**Figure 7 Example value chain for Kenyan roses to the EU market**



*Note: This value chain analysis is indicative for a 50cm rose variety. It takes into consideration several examples contained in World Bank, UNIDO and CBI reports, updated with recent price levels and indications by interviewed stakeholders.*

Source: Hortiwise (2012)

### Sea transport

The cost of transport to Europe is the main expense faced by Kenyan growers. Flying flowers to Europe is more costly than shipping those products by sea. If successfully developed, sea transport can make Kenyan growers more competitive and can improve profitability. More importantly; the cold chain can be controlled much better as shipments by sea face less handling and environmental exposure compared to air freighted fresh produce. Both in terms of cost and quality, much can be gained through viable sea transport.

The port of Mombasa is the hub for sea freight of horticultural produce destined for export markets. With rather high-priced air freight charges, most bulk produce (especially fruits and generally non-leafy

vegetables) are increasingly being transported by sea. Trials with flowers have been executed by flower growers, FloraHolland and the HCDA, but they have resulted in little or no continuous shipments to this date.

### Issue no. 1 - Sea transport

#### Observations:

- Few shipping lines service Mombasa sea port, and there is little service to European destinations from Kenya.
- No direct connections currently possible, trans-shipping is necessary.
- No regularity in departures, only 1-2 per month.
- Delays at the sea port of Mombasa have a limiting effect on exports of fresh horticultural produce.
- Long handling times at sea ports. On average, logistics for air freight in Kenya are concluded within 24 hours, whereas sea freight logistics are completed within 96 to 120 hours.
- Piracy in the Gulf of Aden and on the East Coast of Somalia causes ship liners to take alternative routes which take 22-32 days to Europe depending on the destination, where 14-16 days through the Gulf of Aden could be possible. Piracy has also increased costs for sea transport (security measures, risk calculations).
- Current facilities at farms and forwarders are not capable of cooling and loading large volumes of flowers (a reefer can transport 8-10 tonnes of flowers) at temperatures close to 0°C.
- Trials thus far have not been very encouraging. In addition to the above, they brought to light issues such as inadequate pre-cooling, underestimation of cold chain importance and the unavailability of packaging designed for sea freight.

#### Bottlenecks:

1. Poor shipping connections between Kenya and Europe.
2. Inadequate facilities for handling fresh produce.
3. Poor service of shipping lines.
4. Piracy threat.
5. Shortcomings on packaging possibilities for sea transport.
6. Underestimation of cold chain importance.

## 3.2 Cold Chain

High value crops like fresh vegetables and cut flowers only fetch premium prices when they make it to the markets in Europe quickly and in the best possible shape. For example, a rose from a Kenyan greenhouse has a potential value of € 0.10 – 0.35 per stem at the Dutch flower auctions. However, such prices are received only if the product makes it to the main flower markets without any loss of quality and value. An optimal cold chain from farm to export market is an essential part of the Kenyan flower business.

More often than not, cut flowers arrive in The Netherlands at temperatures that are too high (see Section 4.1). The cold chain starts at the farm. If the quality (incl. temperature), of cut flowers that feed into the supply chain is compromised, the supply chain can at best only maintain this input quality. Adequate storage facilities and handling procedures are of the greatest importance to ensure that flowers start their journey through the supply chain at the right temperature (for roses this means departure temperatures of 0-1 °C). From the farm's facilities, the flowers are transported by truck to the airport, where a forwarder or handling agent takes the flowers for export. While many farms have their own truck(s), others use the truck services of the forwarding companies. Trucks transporting flowers from farm to airport are not always refrigerated. Consequently, many flowers undergo temperature increases on their way to the airport.

As quality is a critical variable for Kenyan flowers, it is, obviously, necessary to tackle the factors that influence quality. Temperature is the primary factor here. It is crucial to ensure that the whole supply system, from grower to retailer, is designed to optimally preserve input quality.

## Issue no. 2 - Cold chain

### Observations:

- Flowers often depart from farms at too high temperatures, due to both external (high ambient temperatures) and internal factors (respiration). These excessive temperatures are rarely brought back to acceptable levels. Consequently flowers, arrive at their destinations too warm.
- Handling times can be reduced (increased speed in documentation and certificates);
- The most ideal cold chain would be a reefer loaded on the farm and directly delivered to the buyer.
- Good business relations between all parties involved are essential for achieving an optimal cold chain. All players currently recognise the importance of a proper cold chain, but nobody is willing to pay the price.
- Information exchange is the key.
- The first parties in the chain to make improvements will not benefit. For example, a small grower with a daily supply of 100 boxes investing in cold storage facilities and a refrigerated truck will gain nothing if the other boxes on the airplane pallet are too warm, or if the importer breaks down the pallet too late. There are neither fines for warm product delivery nor rewards for good practice.
- The general knowledge level regarding the cold chain is too low and is hindering progress.
- It is not clear what the costs caused by a 'poor' cold chain are. In other words, the relations between temperature, time, product quality and product value are not clear.
- There are no cold chain standards and protocols.

### Bottlenecks:

1. No direct incentive for improving and maintaining the cold chain.
2. Inadequate cold chain facilities and equipment.
3. Lack of cold chain standards and protocols (incl. monitoring compliance).
4. Lack of cold chain knowledge and awareness of the importance of cold chain management.
5. Poor information exchange.

## 3.3 Packaging

Packaging is another essential quality factor, both in terms of presentation and protection. Packaging can be divided into sleeves and wraps in paper or plastic materials, and external packaging in boxes, up to the sealed pallet.

Flower packaging has to satisfy a number of conditions, mainly in the field of handling and quality protection. The transport volume must be as efficient as possible, and a high level of uniformity is desirable. In order to optimise transportation, it is recommended to use boxes with dimensions matching the size of an airfreight pallet.

**Figure 8 The four functions of a proper flower box**

<b>Protection</b>	<b>Cooling and maintaining cool temperatures</b>
<b>Distribution</b>	<b>Information disclosure</b>

In Kenya, there is a wide range of boxes available to growers and exporters. The reasons for selecting a specific type of box are not always clear. Pack rates and cost efficiency seem to be prevailing motives. The outcome, however, is not always what would be best for the product. Detailed current practices in cut flower packaging are described in Appendix 2.

The trade in cut flowers generates a considerable amount of packaging waste, such as boxes, wraps, and plastic sleeves. The ideal solution would be environmentally sound packaging that offers flowers sufficient protection. It is important to use re-usable and recyclable material and to limit the amount of packaging where possible.

Each of the supply chains described in Section 3.1 has its own specific requirements regarding packaging. For instance, in the traditional supply chain, the first packaging (the packaging applied by the grower) is removed by the importer, who places the flowers in buckets of water before they enter the auction process. On the opposite end of the supply chain evolution, direct trade has very different requirements. Ideally, the link at destination (often larger retailers) receives ready-to-use products. This means fewer handling procedures and lower costs, less loss of quality and wastage of product and packaging material in the chain. Special packaging designed for this type of receiver (unpacked) is in high demand in the international flower business.

### Issue no. 3 - Supply chain-oriented packaging designs

#### Observations:

- The grower decides which initial packaging is used. Currently, there are dozens of different boxes in use. This number can be narrowed down to maybe 5 different boxes. Regardless of box sizes, there is no minimum quality standard for boxes determined.
- Packaging design is not optimised for aircraft pallet dimensions. Different box sizes and over-packed boxes on a single aircraft pallet can cause inefficient load rates.
- Mostly, packaging is developed only for the next link in the chain.
- The variety of load carriers in the chain makes it difficult to determine the ideal flower box dimensions (stacked individually in the truck, aircraft pallets, Danish trolley, auction trolley, Euro pallet, block pallet).
- Current packaging designs and practices do not efficient aircraft pallet loading. An improved load factor can reduce airfreight costs.
- Cold chain requirements of packaging and the effect on export value are not clear.
- Packaging requirements vary for different sales channels (e.g. box sizes).
- Re-packaging and adding additional packaging is a common and accepted activity in the chain,



especially in the traditional supply chain. This means that the supply chain provides a correction step. Damaged or otherwise inadequate products can be graded out, and/or additional cooling measures can be taken. However, this is a costly step and in a well-organised and efficient supply chain it would not be necessary.

- Direct trade supply chains do not offer these correction steps. Presently, product waste is accepted.
- Options for auctioning in a box have not yet been fully explored.
- The importance of direct sales is rapidly increasing. Buyers in these channels are strongly geared to standardised products and procedures. Pack rates for direct sales are often fixed for administrative reasons.
- Difference in pack rate requirements: e.g. direct trade requires set pack rates, as opposed to auction clock sales in which pack rates are unrestrained. An additional difficulty here is that the size/volume of the same type of flower can fluctuate throughout the year under the influence of weather circumstances, crop age, ground shoots, products being mixed in one box, etc.
- The market (growers, trade and buyers) does not recognise the importance of packaging quality for reducing product waste.
- There is a lot of packaging waste in the supply chain.
- Loss of value due to packaging issues is not clear.
- Underestimation of importance and functions of packaging material.

Bottlenecks:

1. Current packaging creates inefficient supply chains.
2. Current packaging is not optimal for the direct sales channels.
3. Acceptance of product and packaging waste.
4. Costs of packaging material will increase when improvements are made.

#### Issue no. 4 - Packaging knowledge

Observations:

- The price/quality ratio of a box is not transparent.
- Growers buy inferior quality because the returns of their flowers are too low.
- Cooling function of packaging is currently inferior.
- Lack of specific packaging knowledge: Are there alternatives for cardboard? Can weight capacity be increased?
- Cardboard manufacturers use price and availability of input paper as the main criteria, not quality.
- Not all cardboard suppliers may be able to manufacture and guarantee the desired quality.
- Boxes in Kenya are considered the best available for flower packaging in Africa.
- One grower interviewed for this study made a striking statement: "We spend a fortune on producing beautiful products and then pack it in the cheapest and most easily available box".

Bottlenecks:

1. Insufficient packaging knowledge throughout the floricultural industry.
2. Capabilities and possibilities of cardboard suppliers.

#### Issue no. 5 - Handling packaging materials on the farm

Observations:

- No order strategy for packaging material (e.g. no ordering of small volumes ahead of rain season).
- No storage system for pre-erected boxes (e.g. no first in/first out).
- No controlled storage climate (temperature and relative humidity) for pre-erected boxes.

- Each farm maintains its own method for erecting boxes, often determined by knowledge level and available materials (e.g. ropes, tape, staples or glue as fastening material).

**Bottlenecks:**

1. Lack of specific knowledge about handling packaging materials.
2. No standard procedures for ordering, storing and erecting boxes.

**Issue no. 6 - Pack rates**

**Observations:**

- Direct trade requires set pack rates, as opposed to auction clock sales in which pack rates are unrestricted.
- Variation in product quality due to climatic circumstances (stem weight, bud size).
- Flowers release moisture which is absorbed by packaging material and causes it to lose structural integrity.
- Flower damages due to over-packing.
- Heating due to over-packing (efficient transport requirements, load factor). To remove this heat inside a cold store the boxes need to be restacked. This involves extra handling.
- Inefficient forced air cooling due to over-packing.
- Bulging boxes due to over-packing results in unstable loads.
- Impact of pack rates on product quality and value is not clear.
- Air freight costs not always calculated on volumetric basis.
- Determination of optimal load factor is difficult, due to large variation in box sizes etc.
- Packaging is designed for a certain load factor and not for keeping flowers cool.

**Bottlenecks:**

1. Efficient pack rates (over- and under-packing).
2. Moisture transfer from flowers to packaging material.
3. Contradictory requirements regarding the storage, cooling and transport function of packaging.

**3.4 Carbon Footprint**

Carbon dioxide footprinting has been promoted as a tool for European consumers to make sustainable consumption choices for nearly 5 years now. The 2007 Re:Fresh conference, a leading meeting of produce sector stakeholders in the UK, was devoted to the topic. Partly driven by a desire to protect local foods, the emphasis is now on the transport of produce– the impact of “food miles” (moving food over long distances either by road, air, or rail) on the environment.

In many ways, this whole trend is a backlash against the trends of supermarket domination and the internationalisation of the agrifood supply chain.

It is not fully clear whether better information in CO2 emissions actually promotes sustainable development. The general consensus is that for many food products carbon counting procedures should amplify the comparative advantage of developing countries – particularly during the European winter months (Keane et al., 2010).

The food miles debate is still in an early stage. Apart from the likely unwillingness of consumers to give up the convenience and health benefits of having produce year-round, there are two counterarguments. First, blocking produce from developing countries implies a politically undesirable hampering of the economic

development of these countries. Kenya is already trying to shift the debate to “fair miles”. Second, from a rational point of view, we need to look at the complete carbon lifecycle footprint (and water footprint) of a product from production to final consumption. It may turn out to be more carbon-efficient to air-freight off-season produce from developing countries than to grow it in greenhouses in Europe (Keane et al., 2010).

Studies have shown that products grown near the equator often have a lower footprint than those produced locally using artificial heat and lights. According to Edwards-Jones (2008), Kenya is six times more carbon-efficient when it comes to growing roses than The Netherlands, even if the emissions associated with airfreight are included (see Table 5).

**Table 5 Carbon efficiency in rose production – GHG emissions comparison**

Supply chain section	Kenya	Netherlands
Production	300	36,900
Packaging	110	160
Transport to airport	18	0
Transport to distribution centre	5,600	0
Transport to distribution centre from airport	5.9	50
Total	6,034	37,110

*Note: Emissions are shown as Global Warming Potential (GWP) expressed in kg of CO2 equivalents using the IPCC (2001) conversion factors. GWP and CO2 emissions from Kenya include the IPCC altitude factor.*

*Source: Adapted from Edwards-Jones et al. (2008) with reference to Williams (2007)*

However, the food miles debate is not really translating into consumer pressure at this point. For example, when Tesco put airplane logo stickers on air-freighted vegetables, a survey revealed that 60% of consumers actually thought the presence of the logo was a good sign, as it shows produce is flown in and is therefore apt to be fresher and of better quality.

**Figure 9 CO2 logos and marks used by retailers to promote environmental awareness**



## Issue no. 7 - CO2 efficient transport

### Observations:

- Different initiatives, likely that the local-to-local trend will prevail.
- Lack of uniformity and standards in packaging causes inefficient transport. A lower carbon footprint can be achieved through more efficient loading of the cargo space in airplanes.
- Food miles debate is not really translating into consumer pressure.
- Consumers are not always aware of the fact that Kenyan produce, despite being air-freighted, can have a relatively low carbon footprint.
- Sea transport results in a lower carbon footprint.
- Indirect flights between Kenya and The Netherlands have a negative effect on the carbon footprint.
- Few old and polluting cargo planes are still being used.

### Bottlenecks:

1. Uncertainty about future requirements with respect to carbon footprint.
2. Lack of knowledge about impact of specific activities (like vacuum cooling) on CO2 production.
3. Air transport has a relatively high impact on the carbon footprint of Kenyan products.
4. Air freighters are not judged on carbon footprint performance.

## 3.5 Links in the Chain

### 3.5.1 Grower

The cut flower value chain can be viewed from two perspectives: large scale flower producers and small scale flower growers. The largest flower producers are vertically integrated across the entire value chain. Large scale estates also utilise their size and economies of scale to invest in advanced post-harvest cold chain infrastructure, including refrigerated trucks for transportation to the airport.

The developments in the market, at the outlets and at wholesale level have implications for producers in their role as suppliers. To be able to supply the chains of supermarkets, producers have to be able to supply enough quantity. To beat the competition, they need economies of scale and they have to specialise in supplying this chain. Investing in ICT infrastructure in order to be able to communicate the right information at the right time can be a part of these efforts. The focus should be on decreasing supply chain costs and lead times to get a fresher product in the store. Suppliers must be able to meet the quality assurance schemes of the supermarkets, and assure they produce in a sustainable way.

Growers have to make clear choices as to crops, target markets, quality aspirations and meeting production requirements (time, sustainability, etc.).

## Issue no. 8 - Cold chain at farm level

### Observations:

- Cold stores are not always designed to "make cool before departure" or set up with the right temperature criteria.
- Ineffective or insufficient pre-cooling.
- Farms have increased production. Capacity of cold storage has not always grown proportionally.
- Growers are changing their marketing strategies (towards the needs of direct sales). This requires bigger cold stores and a different approach. Grower awareness is increasing (investments in cold

storage facilities).

- Cold store temperature settings are not always correct. Also, in practice, the temperature setting often differs from the temperature achieved.
- Doors of cold storage not always closed as soon as possible.
- Excessive volumes of (warm) flowers placed in a cold storage room.
- Temperature settings and (refrigerated) truck loading methods are not always adequate.
- Boxes are loaded onto trucks as loose items; this creates extra handling and increases handling time. Transport to the airport takes too long (at high temperature exposure).
- Uncertain decision making due to lack of knowledge: Refrigerated transport or not? If so, only cool at dispatch, or also during transport?
- Product remains property of the grower who thus bears the risk of damage or quality loss, anywhere in the chain up to the buyer in Europe.
- Uncertainty among growers as to which improvements/investments will lead to the desired results. The first parties in the chain to make improvements will not benefit. For example, a small grower with a daily supply of 100 boxes investing in cold storage facilities and a refrigerated truck will gain nothing if the other boxes on the airplane pallet are too warm, or if the importer breaks down the pallet too late.
- The tight market of recent years has drawn a lot of attention to growers' cost efficiency. Post-harvest issues and cold chain management have suffered as a result.
- Growers find it hard to estimate the results of their own investments in the cold chain (e.g. refrigerated truck etc.).
- Some growers put their need to be in control into practice and perform as many tasks as possible themselves throughout the chain.

Bottlenecks:

1. Lack of standard procedures regarding temperature management.
2. Lack of cold chain knowledge and acknowledgement of the importance of cold departure.
3. Design and capacities of cold storage facilities.
4. Need for reorganisation of on-farm processes (and further down the chain) due to changed marketing strategies.
5. Need for improved pest and disease management, post-harvest handling and packaging to improve quality of the finished product (to reduce chance of inferior produce being packed for export.)

### Local transport

The supply chain starts at the farm location. Local transporters deliver the flowers to the forwarders at the airport. Some larger farms own their own trucks, some forwarders provide trucks for collecting the flowers, and government agencies like HCDA can also take care of local transport. Much of the dispatch and the transportation is unrefrigerated and road conditions can heavily affect transport quality and time.

### Issue no. 9 - Local transport situation

Observations:

- Inadequate infrastructure causes delivery delays and warming up of flowers.
- Poor roads in production areas delay delivery and cause deterioration of quality. In rainy seasons, the situation is worsened.
- Inadequate allocation of funds for road development and maintenance in production areas.
- Unrefrigerated and often slow transport to airport. Refrigerated trucks are still not the industry

norm.

- Uncertain decision making due to lack of knowledge: Refrigerated transport or not? If so, only cool at dispatch, or also during transport?
- There is no good communication system to inform all parties involved about delivery times, temperatures, etc.

Bottlenecks:

1. Road development and maintenance in remote production areas.
2. Road congestion.
3. Unrefrigerated transport to airport.

### **Smallholders**

By definition, agricultural growth is the primary source of poverty reduction in most agriculture-based economies. The expansion of smallholder farming can lead to a faster rate of poverty alleviation by raising the incomes of rural cultivators and reducing food expenditure, and thus reducing income inequality. Revitalising the agricultural sector, and in particular smallholder agriculture, is a precondition for achieving high and sustainable growth, poverty reduction and food security in East Africa (Salami et al., 2010).

In Kenyan floriculture, smallholders are confined to summer flowers (or tropical flowers). These require minimal technological and capital investments, since the flowers can be grown in the open fields (outdoors) through rain-fed agriculture. The smallholders access export markets mainly through intermediaries who are either specialised export companies or medium and large scale exporters who also grow and export their own flowers. In most cases, the exporters provide extension and technical support to the smallholders.

The partnerships between exporters and smallholders are a double-edged sword. On the one hand, exporters protect the activities that generate premium revenues by locking farmers out of the value addition processes. This helps them 'cut off' the smallholders from the export market by withholding value addition and flower processing knowledge. Thus farmers producing high quality flowers but lacking post-harvest handling knowledge are severely limited in their ability to sell the flowers. On the other hand, the exporters invest heavily in building farmers' production capabilities. To the benefit of smallholders, the knowledge gained from these partnerships provides "receptor sites" for more advanced knowledge in cut flower production (Bolo, 2010).

Small and medium-sized producers – not only smallholders, but also producers with less than about 10 hectares – will find it increasingly difficult to compete internationally. Growers face ever stricter requirements, which generally favour larger companies. Not all smaller growers have access to the resources needed to keep up with the professionalisation of the global flower industry. The competition is scaling up, and quality and efficiency are continuously improving.

*Key success factors:*

- farmers who are trained and organised;
- farmers who are capable of delivering quantity and quality;
- a public sector with a favourable business environment, including infrastructure, contract enforcement mechanisms and financial intermediation;
- a receptive business sector.

*Key issues:*

- Access of smallholders to markets with the highest production standards is tied to their link with an exporter. Smallholders who remain in the certified export system need to navigate a steep learning curve in terms of improving their production system as well as their business and marketing skills.
- From an exporter's perspective, it is beneficial to work with groups who have already been exposed to production standards under contract with another exporter. This reduces the investment required in capacity-building and infrastructure.
- Successful smallholder groups tend to have a functioning group constitution, which not only provides incentives, but also sanctions mechanisms, and supports the success of smallholders.
- Groups can be further strengthened through clear rules and additional goals that translate into benefits such as savings schemes, all of which can increase cohesion and trust within the group.
- Traditionally, Kenya is renowned for its roses, carnations and hypericum, which constitute over 80% of flower exports. However, market demand for bouquets, both domestically and abroad, has turned the fortunes of smallholders. These farmers are now planting "fillers", predominantly green foliage and a range of coloured flowers, that are less resource-intensive and can be grown in open fields.
- The demand for bouquets in the direct market channel is on the rise. This provides increasing opportunities for smallholders in developing countries. Smallholder farmers have low labour costs and are planting growing assortments of (outdoor) flowers, including the highly popular *Ornithogalum*, *Eryngium*, and *Asclepias* (var. 'Moby Dick'). The demand for fillers is also on the rise. The Kenya Horticulture Development Programme (KHDP) is working with farmers in the Central and Rift valley provinces, providing them with technical assistance and market linkages for their products.

#### **Issue no. 10 - Smallholders and the direct trade supply chain**

Observations:

- Large retailers are becoming increasingly important for Kenyan exports.
- Increasing need for compliance with environmental and ethical standards and regulations. Export companies are setting subsequent standards for their smallholder farmers, which is causing difficulties for the smallholders. This has reduced export opportunities for smallholders.
- The success of the Kenyan cut flower industry can be largely attributed to large-scale growers, who tend to overshadow the often struggling small- and medium-sized producers.
- Smallholders are often characterised by local ownership, low capital investments, weak managerial skills and less advanced technology.
- As smallholders use small amounts of chemicals, fertilisers and maintenance, they face relatively high costs for inputs.
- Smallholders lack access to information on the latest growing methods, have poor equipment and face a shortage of surveillance and quality monitoring.
- No capacity to store water.
- Limited access to electric power, computer literacy and the Internet.
- Limited access to credit and what is available is at 16-20% rates.
- Smallholders face high associated costs of freight and strict phytosanitary requirements. Therefore, they focus more on local markets than on export markets.
- Contracts with large retailers demand steady and reliable supplies.
- Smallholders cannot guarantee consistent supply reliability.
- Bouquet making in Kenya is gaining importance (opportunities for growing filler products).
- The VAT rebate system is very inefficient: it is well known that nearly all produced flowers are

exported, but at the same time, all growers must pay VAT on their input materials and afterwards submit a claim for a rebate, which usually is not paid back until 6 to 12 months later. Large estate farms with access to financing or a strong cash base may have no problems supporting long repayment delays, but for small and medium growers they are a significant burden. The VAT rebate system leads to a gradual reduction of smallholder turnover, forcing them into lower value-added flower production.

**Bottlenecks:**

1. Difficulties complying with export requirements.
2. Access to up-to-date information.
3. Access to capital.
4. Government regulations, such as the VAT rebate system.

### **Issue no. 11 - Smallholders and the cold chain**

**Observations:**

- Little access to post-harvest cold storage facilities and transport makes it difficult for smallholder producers to maintain the levels of product quality and consistency required to sell in European markets.
- Non-refrigerated transport to collection points of organisations.
- Cold stores / trucks are operated by government bodies like HCDA. Several stakeholders interviewed for this study mentioned that cold stores and truck services should be privately operated. Government involvement has proven unsustainable.
- No cooling points near the farms.
- Lack of knowledge of cold chain requirements.
- Lack of awareness of cold chain importance.
- Farm-to-market time is longer for smallholders than for bigger farms.
- Last minute arrival at the airport. Smallholders often pick their flowers late in the day, and this can result in overnight stays at (inferior) facilities. This leaves no time for adequate re-cooling of the products.
- Lack of transport vehicles suitable for the poor roads weighs heavier for smallholders than for the large farms.
- Boxes are loaded onto trucks as loose items, which means extra handling and increased handling time.
- Erratic power supply in many production areas can heavily affect the start of the cold chain.
- Export packaging is often done by the final exporters at their facilities. This means extra handling.

**Bottlenecks:**

1. Cold chain knowledge and awareness.
2. Access to post-harvest cold storage facilities and transport.
3. Minimal financial leverage for acquiring modern cold storage technology.
4. Smallholder concept means it takes longer to get flowers to market (= losing money).

### **3.5.2 Forwarder / Handling Agent in Kenya**

Approximately 80% of the international trade in cut flowers travels by air. Cut flower exports from Kenya began in the late 1960s, when wide-bodied jets were introduced to transport tourists and the airlines offered the additional cargo capacity to the fresh produce industry. Currently, over 90% of fresh horticultural



products are air freighted, which makes securing air cargo space a priority. Large exporters have been able to exercise some control over space through joint ventures with freight forwarders.

A recent development in this respect is the FloraHolland Freight Group, which was formed in 2007. The objective of this cooperation agreement is to achieve a better position in the chain through consolidation of volumes. FloraHolland also provides other chain-related services to its growers. Currently, this group exports over 200 tonnes per week and uses the services of freight forwarder Kuehne+Nagel. The main benefits for the group are lower air freight costs and better conditions through insight in the air freight price construction. The services of the FloraHolland Freight Group are available for all auction members. At present, this group consists of 11 growers with 16 farm locations.

The importance of reliable transport and the volume of exports have led to the development of an air freight forwarding sector specialising in transporting cut flowers to Europe. The freight forwarders inspect and document flower and temperature conditions, palletise packed flowers, store them in cold storage facilities at the airport, clear them through export customs, obtain phytosanitary certification, and load the cargo onto commercial or charter flights. Some forwarders also offer cooled transport for growers.

Kenya-to-Europe routes are served by about a dozen commercial airlines as well as charter companies using wide-body planes. A considerable share of Kenyan freight is flown to Europe with passenger aircrafts. New models, such as the Boeing 777, can transport up to 20 to 30 tonnes. Currently, common cargo aircrafts are the Boeing MD-11, with a load capacity of about 75 tonnes, and the Boeing 747-400 which can transport up to about 110 tonnes. Freight forwarders and exporters with enough regular volume can negotiate prices for regular blocks of air cargo space.

Freight Forwarders (JKIA) a.o.	Cargo Handling Agents (JKIA) a.o.
<ul style="list-style-type: none"> <li>• Airconnection</li> <li>• Airflo</li> <li>• Flowerwings</li> <li>• Kuehne+Nagel</li> <li>• Siginon</li> <li>• Total Touch Cargo</li> <li>• Transglobal Andy &amp; Andy</li> </ul>	<ul style="list-style-type: none"> <li>• Nairobi Cargo Center</li> <li>• Swissport</li> <li>• Triple FFF</li> <li>• Transglobal</li> </ul>

Cargo handling agents deliver direct services to the airlines, and are responsible for all cargo-related service requirements between the time an aircraft arrives at a terminal gate and the time it departs on its next flight. Fast, efficient and accurate ground handling services are vital minimising the turnaround time (the time during which the aircraft must remain parked at the gate).

Since flowers are highly perishable by nature, speed of delivery is of the utmost importance, as are appropriate temperature control measures during transit. For cargo handling companies it is important to invest in adequate infrastructure facilities, such as cold stores and pre-cooling facilities, testing and cargo handling and internal container depots suitable for floriculture products. The infrastructure at Nairobi International Airport (JKIA) is catching up with the increase in production of recent years (Figure 9). Due to recent investments (new facilities Transglobal, Swissport, Triple FFF), current capacity is expected to meet industry needs, even in peak periods like Valentine's Day.

**Figure 10 Increase of forwarders' and handling agents' facilities at Nairobi Airport**

Current situation

January 2007



Source: Google Earth

#### Issue no. 12 - Keeping air freight costs acceptable

##### Observations:

- Exports to the USA are still too expensive, as no direct flights are possible due to non-compliance with their security standards.
- The Kenya Airport Authority (KAA) requires freight forwarders to scan all packaging items rather than accepting the random sampling practiced so far. Forwarders have invested heavily to meet this requirement.
- Each box is now scanned before palletising, and left waiting in the warehouse. This has moved the delivery time forward, which poses a big problem for remote growers who now supply too late, often incurring even more delays.
- The KAA has announced closure of Gate 14 at JKIA (a.k.a. 'The Yellow Gate') for cargo, as the outdoor transport is considered unsafe. The consequences are still unclear.
- The 'scanning-every-box' obligation lengthens processing times and is likely to put great pressure on supply times of flowers in peak periods such as Valentine's Day.
- The KAA plans to raise the costs for the Airways Bill (AWB) with US\$ 0.01 per kg. Forwarders object.
- KEPHIS introduced an Electronic Certification System, other players in the chain (HCDA, KEBS) delay the certification process.
- Proliferation of rules and regulations (airport security, shipment documentation, phytocertificates etc.).
- Some information is filled in up to 3 or 4 times. E-freight is considered important. Synchronisation of export documents is a big need.
- Government bodies involved with phytocertificates and export documents are not available 24/7. Need for matching phytosanitary inspections (Kenya en NL) with 24/7 requirements of freight forwarders.
- Shipment differences of more than 10% require completely renewed export documentation, which results in delays/next flight.
- According to some stakeholders interviewed for this study, government interventions do not always produce clear and sustainable results. Improvements need to come from the sector or private

parties, as these tend to be much more sustainable.

- Carbon dioxide compensation may become an issue.
- High oil prices (fuel costs) increase air freight costs.
- Heavy fresh produce balances the weight-volume ratio of light-weighted flowers. Fish and (heavy) vegetables are gradually disappearing from Kenya. Fish is increasingly shipped to Europe on holiday flights from Mombasa.
- Little transparency of air freight rates (“wheeling and dealing”).
- Many of the flower boxes are supplied by growers as loose items. Loading on pallets would decrease handling times and improve cost efficiency.
- Current flower box dimensions and stacking practices can be improved to achieve a better load factor and consequently lower freight costs.
- During palletising, the products of different growers are often put on 1 pallet. This means extra handling, as products move from A to B, to C and D (administration, transport transfers, re-loading, sometimes re-stacking). It also affects the cold chain, as it creates more sensitive transit moments.
- Fluctuations in production volumes (weather-related) or in market demand (growing in flushes for Valentine’s Day, etc.) result in a lot of expensive “dead freight”. Forwarders make pre-bookings of ‘standard’ volume for which they are obliged to pay.
- Some growers have organised forwarding themselves, putting into practice their strong need to stay in control.
- Green Lane: Companies complying with specific requirements (logistics and security) are allowed to make use of a ‘green lane’, allowing goods to almost freely pass EU borders. Faster and cheaper. However, the difficulty is that this kind of project has to be coordinated on EU level.

#### Bottlenecks:

1. Increased transit times related to the increased security level at Kenyan airports.
2. Increased costs (oil prices, security measures).
3. Services of Government bodies fail to keep keep in step with 24/7 sector requirements.
4. Synchronisation of export documents.

### Issue no. 13 - Cold chain at KAA airport

#### Observations:

- Arrival temperatures are too high.
- Very late grower delivery times. This reduces the time available to handle and re-cool the boxes properly.
- Re-cooling of boxes upon arrival is possible at extra cost, however, these costs are not always accepted by the growers.
- The announced closure of Gate 14 will put an end to the five-minute outdoor transport flowers were required to follow from the forwarders in the second ring to the handling agents at the airside of JKIA. This will be a great improvement for this part of the cold chain. In case of flight delays, flowers will spend less time waiting outside (‘tarmac time’), as they will have been delivered directly to cold storages situated close to airplane departure sites. Currently, flowers spend an average 4 hours waiting on the tarmac.
- Closure of Gate 14 has been put on hold as forwarders have objected heavily to the increased costs involved for them, as they will be obliged to make use of the services of handling agents at the airport.
- Boxes are loaded onto trucks as loose items, which means extra handling and increased handling

time. This practice does not allow for good air circulation and contributes to heat build-up in and among the products. Loading and unloading times could be shortened by the use of load carriers (pallets/trolleys).

- Vacuum cooling and forced air cooling have been major improvements in the past. A side note is that there are questions about the dehydration caused by vacuum cooling and its possible negative effect on flower quality. The impact of vacuum cooling on CO<sub>2</sub>-emission is also not known.
- Thanks to recent investments, the air port has sufficient cold storage capacity to deal with peak days in the market and the growth of the coming years.
- Inefficient availability and use of handling equipment as well as refuelling are causing prolonged tarmac time during aircraft loading at NBO.
- No agreements have been made between forwarders and their customers with regard to temperature and time. Customers of forwarders are either growers (CIF) or end buyers (FOB).
- For years, there has been a procedure whereby forwarders asked the growers to sign a disclaimer for flowers delivered at temperatures over 7°C. The aim of this practice is to avoid airline liability. However, this minimum temperature is too high for preserving product quality.
- There are several existing initiatives for better communication and feedback, but these are not linked.

#### Bottlenecks:

1. Tarmac time is too long.
2. Lack of protocols regarding cold chain communication between growers and forwarders.
3. Lack of standards and knowledge of how to deal with flowers in case of flight delays.
4. Lack of supply chain standard procedures and control on building pallets.
5. No use of load carriers (pallets/trolleys) for truck transportation.

### 3.5.3 Airline

When it comes to delivering an attractive flower product to the consumer, post-harvest handling is as important as growing. In this sense, the reliability of air connections is just as crucial as the cost. As well as creating additional cargo space, airports must continuously improve their infrastructure, including perishable goods handling facilities. Handling floriculture cargo calls for a high frequency of international flights and chartered flights. Air freighting tends to be the logistical option that poses the greatest difficulties for maintaining the cold chain. The main problem lies at the airports, and the fact that airports and air traffic movements are not designed to deal with the special needs of fresh produce.

**Table 6 Airlines and cargo flight information Nairobi – Amsterdam**

Airline	Flight pattern	Flight route	Frequency
Cargolux	Direct	Nairobi → Amsterdam	Once per week
Emirates	Direct	Nairobi → Amsterdam	
Kenya Airways	Direct	Nairobi → Amsterdam	Daily
KLM	Direct	Nairobi → Amsterdam	Daily
Martinair	Direct	Nairobi → Amsterdam	Daily
Singapore Airlines	Direct	Nairobi → Amsterdam	
Cargolux	Stopover	Nairobi → Luxembourg → Maastricht	Four times per week
Cargolux	Stopover	Nairobi → Luxembourg → Amsterdam	Five times per week
Etiihad Airways	Stopover	Nairobi → Cairo → Amsterdam	Twice per week
Lufthansa	Stopover	Nairobi → Frankfurt → Amsterdam	Daily
Qatar Airlines	Stopover	Nairobi → Doha → Amsterdam	Twice per week
Saudi Arabian Airlines	Stopover	Nairobi → Jeddah → Amsterdam	Twice per week

Source: Hortiwise (2012)

As much as 90% of shipments to the UK are carried as belly cargo on Kenyan Airways. Air cargo carriers, such as Lufthansa Cargo and Cargolux, provide dedicated cargo space from Nairobi to Frankfurt and Maastricht (World Bank, 2009). The main points of entry into the EU market for air-freighted produce are Amsterdam Schiphol (Table 6), London Heathrow and Frankfurt International. De Gaulle International in Paris also features as a “gateway to Europe”, but to a lesser extent. All these airports have state-of-the-art produce handling facilities and are well serviced by the leading international airlines connecting East Africa and the EU market, especially those operating out of Nairobi.

#### Issue no. 14 - Flight route efficiency

- Flight delays (punctual communication with the airline on changes required).
- Indirect flight routes: impact on product quality and CO2 emission (Section 3.4).
- Growers weigh the importance of direct or indirect flights against costs, mainly; cold chain quality and consistency arguments appear to be of secondary importance to them. Some growers interviewed have expressed their need for regularity; they need to know where they stand.
- Cost differences between airports: Landing rights at Schiphol airport are lower than those of, for example, Frankfurt. Handling costs, however, are substantial (by commercial parties). Airlines are not only interested in landing rights, but want full loads on the return flights as well.
- Lack of transparency on airline performance.

Bottlenecks:

1. Flight delays.
2. Indirect flight routes.
3. Deliveries outside regular working hours.

#### Issue no. 15 - Maintaining the cold chain in the air

Observations:

- Temperature settings in the cargo hold of airplanes are too high (at best 4 °C, >10 °C also occurs).
- Lack of transparency on how airlines are instructed to set the temperature and who is responsible for this. Some airlines hardly perform any temperature measurements and give little feedback.

- Temperature setting requirements not always mentioned on the AWB (Airways Bill) or NotoC (Notice to Captain).
- Difference in cold chain performance between airlines. Interviewed stakeholders state specifically that certain airlines are cooler than others. One stakeholder consistently uses the same airline, although it is the most expensive one ("Certainty is worth more than US\$ 0.10/kg savings on air freight costs").
- Differences between cargo and passenger planes. Temperatures in full freighters can be set according to the requirements of the load. Passenger aircrafts carrying flowers as well (combi aircraft) need to make compromises. The same situation occurs with mixed cargo holds in cargo planes (e.g. live animals and perishables).
- Flowers often remain in the open air for a long time during flight delays ("tarmac time"). It appears that sometimes this is caused by insufficient loading machine capacity at JKIA.
- Growing awareness at Schiphol that flowers are different from general cargo.

**Bottlenecks:**

1. Flight delays.
2. Indirect flight routes.
3. Lack of transparency on airline performance, airline instructions on temperature settings and who is responsible for this.
4. Lack of awareness among growers of the impact of direct vs. indirect flights on product quality and value.

### 3.5.4 Forwarder / Handling Agent in the Netherlands

The main handler of Kenyan fresh grown cargo in the Netherlands is J. van der Put Fresh Cargo Handling. Kuehne + Nagel acquired J. van der Put in 2011, enabling the company to operate more efficiently under continuing global changes. Other handling agents at Schiphol Airport are Flowerwings Cargo and Flowerport Logistics.

Services provided include handling the import process (customs and phytosanitary requirements), cold storage and (refrigerated) delivery at the customer's doorstep. Optionally, additional logistical services are available, such as vacuum cooling, repackaging, splitting or order picking.

#### Issue no. 16 - Performance of forwarders / handling agents

**Observations:**

- Handling agents focus on cost management, rather than on quality management (little effort to understand customer desires). Some interviewed stakeholders mentioned that handling agents are "losing the personal touch".
- Forwarders / handling agents are not geared to reacting to delays or handling late afternoon, night or weekend deliveries. Arrivals during the work day often receive better treatment.
- Price is the decisive criterion for customers in selecting a handling agent, while no minimum quality limits are determined. These could be settled in agreements like an SLA (Service Level Agreement).
- Handling agents only give feedback to growers on how boxes arrive in case of big problems. Points for improvement are seldom communicated.
- Track and trace systems are in place and are continuously under improvement. Contrary to official regulations, however, an AWB-number is not present on every box. This would improve tracking and tracing. All parties in the supply chain can access the track & trace system.

- Interviewed handling agents mention the necessity of 24/7 availability of all parties dealing with perishables. Closed offices cause delays in the release of shipments (import documentation, phytosanitary certificates). Matching phytosanitary inspections (Kenya and NL) with the 24/7 requirements of freight forwarders is also necessary.
- Client Export is not linked yet with a digital AWB. This would significantly speed up the process, especially when flights are delayed. E-freight is important and synchronisation of import documents is much desired.
- Pallets containing boxes for several different customers cause delays.

**Bottlenecks:**

1. No structural system for feedback, or the system is not optimally utilised.
2. Lack of awareness of price/quality ratio.
3. Not every box is labelled with an AWB-number.
4. Not all parties involved with clearing shipments are available 24/7.
5. No electronic synchronisation of all import documents and certificates yet.

**Issue no. 17 - Cold chain at forwarders / handling agents**

**Observations:**

- Temperature is only checked upon arrival. No checks later on (e.g. after cooling down the flowers or upon dispatch to importer).
- Not all incoming airplane pallets that might require it are actually re-cooled (e.g. in a vacuum cooler). Usually, transit pallets are re-cooled, as are delayed and warm incoming pallets. Regular incoming pallets destined for importers in the Netherlands are not re-cooled, unless the customer specifically requires it. Re-cooling is considered an emergency measure.
- Temperature settings and of refrigerated truck loading method are not always adequate.
- Pallets waiting to go through the customs scanner are queued up under a shelter, at ambient temperatures.
- Cold chain improvements are required when transiting on European airports.

**Bottlenecks:**

1. No standards and protocols for temperature monitoring and information sharing.
2. Lack of standard and protocols (and control) on breaking pallets.
3. Decision making for vacuum cooling.
4. Non-conditioned facilities at first handlers.

**3.5.5 Importer**

Import agents have always been an important link in the supply chain via the Dutch auctions. They facilitate the transfer of flower imports from airport to auction, providing the necessary care to keep cut flowers fresh until they reach the auction. Increasingly, importers have also offered other services to clients, including marketing information, product development and consulting services.

Importers have developed financial linkages with overseas flower producers on the one hand and, on the other they have begun selling directly to wholesalers and retailers as well as through the auctions. While many exporters work through import agents, some of the larger Kenyan operations have opened their own European sales offices to more effectively manage the supply chain from production to sale.

One group of importers receives and resells flower boxes to customers without opening the boxes. Other importers unpack the incoming boxes and place them in buckets of water for the auctioning process or for direct delivery to retail customers. Sleeving and labelling for end sales can also be part of their handling activities. Bouquet making is another common practice. Often, unpacked flowers sold at the auction are re-packed into boxes by exporting companies for distribution to their customers. All of this extra handling, transportation and packaging wastage reduces the efficiency of the supply.

#### Issue no. 18 - Performance of importers

##### Observations:

- Importers are often confronted with inefficient documentation supplied by previous links in the supply chain. Failure to report flight delays in time causes downtime and forces them to work overtime (labour is expensive).
- Delays at the airport create higher costs for unpacking and cause problems with filling the orders (no product, no trade!). Substitutes for certified or customised products (e.g. Fairtrade) are not always available in The Netherlands.
- High costs due to delays.

##### Bottlenecks:

1. Poor communication about delays by suppliers.

#### Issue no. 19 - Cold chain at the importer

##### Observations:

- No structural temperature measurements and feedback to growers.
- Costs involved with vacuum cooling are seen as a reason not to do it.
- Importers are not geared to reacting to delays or handling later afternoon, night or weekend deliveries. Arrivals during the work day receive better treatment.

##### Bottlenecks:

1. Lacking (cold chain) standards and protocols.

### 3.5.6 Flower Auction

The Dutch flower auctions have historically been the most important channel through which Kenyan flowers reached European wholesalers and retailers. However, changing consumption patterns and supermarket supply chain rationalisations have started to erode the auctions' position.

A critical point is that Kenyan exports – which are 2-5 days old – must compete directly with local and regional producers at the auction house. From there, the flowers have to be redistributed to various points of sale, which affects their vase life. Direct sales can drastically reduce the “farm-to-vase” time.

Nevertheless, the Dutch auctions continue to play a central role in the European flower trade, both as a market place and as a distribution hub for flowers from developing countries. The auctions handle about 80-90% of local Dutch produce and 60% of flowers imported into the Netherlands. The auctions heavily influence global trade and serve as a price-setting institute for a large part of the flower market, in particular in Europe.

Auctions are cooperative wholesale markets set up by growers to market their products. In 2006, the Dutch auctions started accepting international members, after having refused them for many years. This refusal led



to the establishment of Tele Flower Auction (TFA) by East African growers (1994). Many Kenyan growers have since joined the auctions, especially after the take-over of TFA by Dutch flower auction FloraHolland in 2010. Several growers interviewed mentioned that they missed TFA, as it represented them very well in the past.

There are several flower auctions in Europe. The most relevant ones with respect to flowers from developing countries are the Dutch FloraHolland auctions in Aalsmeer, Naaldwijk and Rijnsburg and the new Rhein-Maas auction in Germany (a joint-venture of Landgard and FloraHolland). Their main customer base consists of wholesalers who typically focus on exports, selling all over Europe.

Most products submitted to the auctions are sold by means of the auction clock system. A smaller share is sold through the auctions' direct trading service (FloraHolland Connect).

An important development in floriculture is the virtualisation of the trade: more and more flowers are traded without the traders actually seeing the product. The FloraHolland auction has set up several services to develop and foster e-commerce. The one with the largest impact is Remote Buying (Kopen op Afstand, KOA). This system was introduced a few years ago to enable traders to purchase products online using their computer. It is also used by Dutch exporters to allow their larger clients to become more involved in the buying process. The KOA service has gained momentum in the last couple of years and currently accounts for 60% of the auction's turnover (Rikken, 2010).

#### Issue no. 20 - Cold chain at the auction

##### Observations:

- Unpacking in unrefrigerated areas.
- Incoming pallets can stay unbroken for a long time.
- Temperature settings in cold stores do not comply with international standards.
- Internal distribution process is not refrigerated.
- Currently, many growers with the same consignee might follow different routes. Efficiency can be gained by operating on a consignee basis. For instance, put all boxes for the Rijnsburg auction market on the same aircraft pallet.
- Imported flowers have special characteristics and requirements. Currently, there are no specific product specifications for imported flowers.

##### Bottlenecks:

1. Cooling settings and procedures within the auction buildings are not always ideal for imported flowers.
2. Inefficient shipments (not composing aircraft pallets on a consignee basis).
3. Product specifications are not designed specifically for imported flowers.

### 3.5.7 Wholesaler

Wholesalers form vital links in the supply chain, connecting growers to retail and the end consumers. Together with the flower auctions, wholesalers fulfil the break bulk function. Two types of businesses can be differentiated within the link of wholesalers.

### Traditional wholesalers

Most traditional wholesalers purchase their flowers at auctions or from import agents. Some wholesalers import themselves. Large (export) wholesalers tend to buy from all the important flower auctions, in order to obtain the best products at the best prices.

There are numerous traditional wholesalers active in the EU. They have a fine distribution network and their main customer base consists of florists. While most traditional wholesalers are typically small- to medium-sized companies, others have grown into large multinational enterprises. Strong competition, cost management and necessary investments have contributed importantly to this development. Domestic customers are usually florists and other retailers, whereas export wholesalers (re-)export their flowers and plants to wholesalers and retailers abroad.

### Flower providers

Supermarkets have gained market share in the flower retail sector, particularly in the UK. In many cases, supermarkets outsource the actual purchasing of the flowers. They purchase flowers from specialised wholesalers, also called 'flower providers'. Flower providers are typically large scale wholesale enterprises, often with their own bouquet-making departments.

Preparing fresh produce for supermarket shelves is cheaper in the country of origin. This also shifts the responsibility for inventory control and traceability towards the exporters, which takes away even more pressure from retailers. The flower providers have partly taken over the function of the supermarket's category managers. Supermarkets generally require fixed quantities at fixed prices. For this reason, flower providers cannot always rely on the auction system, where the mood of the day tends to dominate. They acquire the necessary economies of scale to cut out intermediaries by purchasing large quantities from major wholesalers and importing directly.

Many of today's trends are based on the flower providers' desire to secure supplies and improve efficiency. Examples of actions to achieve this include direct investments in overseas farms and cold chain facilities at the airport. These specialised wholesalers also provide technical advice in the fields of quality control, packaging, cold chain etc. At times, flower providers even help out their suppliers with cash-flow issues. The latter appears to be the key trend paving the way towards more vertical integration and shortening of the supply chain.

#### Issue no. 21 - Cold chain at wholesale level

##### Observations:

- Cooling prior to departure is not a common practice.
- Product specifications are not designed for the special needs of the wholesaler but for general auction purposes.
- Temperature settings in refrigerated trucks are often 8-10°C, with deviations down to 2-4°C and up to 12-14°C.
- Building transportation units (usually trolleys) often takes place at ambient temperatures, sometimes in conditioned surroundings (10-15°C), and occasionally in a refrigerated area (2-4°C).
- Mixed loads with general cut flowers like roses (ideal storage temperature 0-1°C), and tropical flowers like Anthurium (minimum storage temperature 15°C) require compromises. Mixed loads of cut flowers and potted plants present similar situations.

- Warehouses and docks are often not cooled, and if they are, the temperature is often not set at the right level.
- Cold stores are used for the distribution process, but are not actual storage facilities. Doors are opened with a high frequency, optimal storage temperatures are not achieved, etc.
- Short notice ordering creates fluctuations in demand. Increasing commitment (fixed quantities for fixed terms) will stabilise the supply in the chain and will contribute to a better cold chain.

**Bottlenecks:**

1. Lack of standards and protocols.
2. Too few measurements.

### **3.5.8 Retailer**

#### **Florists**

Traditional florists still dominate the retail distribution of flowers in most EU countries. Presently, special occasions and gifts continue to be the most important motivation for people to purchase flowers. With their specific expertise and creativity, florists are best equipped to service these consumers. What's more, florists sell a wide assortment of flowers, whereas the range offered at other types of outlets tends to be narrower. Flower quality, general service and the presentation are generally better compared to their retail competitors. On the whole, florists are also more willing to introduce novelties.

It is safe to assume that florists will always maintain their right to exist. The large retail outlets, such as supermarkets, are focused on maximising volumes and efficiency of logistical systems. This typically excludes tailor-made or sensitive products, which their standard procedures cannot handle. The special needs of corporate clients and consumers of flowers for weddings, funerals, gifts etc. will continue to require the florists' specialism.

An important trend in the florist segment is the rising number of florists that join partnerships aimed at collective purchasing and marketing. This also allows for efficiency in the area of logistics.

An important share of European florists collect their products from their flower wholesaler (so-called Cash & Carries) with their own transportation. Other florists have their purchased flowers delivered at their doorstep by transportation arranged by the wholesaler. The flowers are always delivered in boxes or on water in buckets. Often, flowers are sleeved or wrapped in foil or paper. Usually, this packaging is again removed by the florists, resulting in a lot of packaging waste. Some florists have their own cold store, but most do not. In any case, florists are an end sales point and the relative product wastage is the largest here.

#### **Supermarkets and other large retail chains**

In general, supermarkets, convenience stores and other retail chains in Europe have experienced significantly increased flower sales and have been gaining importance over the past decade as buying behaviour has shifted from occasional towards impulse flower purchasing. Simultaneously, several large European supermarkets are putting a lot of effort into gaining control over their horticultural supply chains, by sourcing directly from growers. In recent years, the UK has been one of Kenya's fastest growing markets. To improve their position in the vertical integration process of the supply chain and to remain profitable, many Kenyan growers have started value adding services, such as tailor-made packaging of flowers and bouquet making.

However, the market share of supermarkets has stabilised in some countries. The main strength of supermarkets is the convenience they offer. Some supermarket chains, the so-called discounters, rely on price competition to grab a share of the flower market (examples are Aldi and Lidl). Other supermarkets have made a strategic decision about their market orientation, moving away from reliance on price-based factors to strategies based on quality and service. This has resulted in supermarkets investing in supply chain relationships and pushing value-added activities down the chain towards exporters, as previously explained in Section 3.5.6.

Besides their need for considerable quantities of uniform products, supermarkets also have very strict quality requirements, not only with respect to stem length, bud size and other visual quality characteristics, but also vase life guarantees (7 days in many supermarkets). Other typical requirements for the supermarket channel are high-performance logistics (99.8% in the case of Tesco in the UK), long-term planning, and certification according to standards.

New large retail players have entered the flower and plant market in the past years. Home decoration outlets like IKEA, Do-It-Yourself chains and petrol stations have had a huge impact in the impulse segment. Their requirements are often very similar to those of the supermarket channel (Rikken, 2010).

Due to clear market positioning, increased buying power and often promotion of their private labels, large retailers have become large buyers with high, specific demands. Professionalised and specialised wholesalers ("flower providers", see Section 3.5.7) relieve these retailers by teaming up with growers and working very closely with them. Together, they cope with the strict demands of the supermarkets, with certification schemes and quality audits to prove they produce in a sustainable way.

In many retail outlets, staff has little specific knowledge of flowers and their handling requirements. This is another area where the expertise of today's flower providers is called in. A new development is that the largest of retailers (i.e. ASDA in the UK) appear to want to take care of everything themselves, cutting out the flower providers as well.

#### Issue no. 22 - Integration in the retail supply chain

##### Observations:

- Mixed transports with other ethylene producing perishables.
- Mixed transports with other produce that has different temperature requirements.
- Delivery times are crucial and largely determine the quality of the product. Supermarkets will always seek out the limits of what is possible. The supplier must show the courage to indicate that, at a given moment, the quality of the product cannot be guaranteed anymore. Growers and wholesalers are trying to find a balance between working in the traditional chain, where they have more time, and the faster supermarket chain.
- Often, much packaging is added (flowers are often packed in a sleeve, placed in a bucket, and in cardboard protecting the bucket).
- High levels of wastage. Reducing wastage will increase net earnings (for the entire chain).
- High costs of distribution.
- Product value is the highest at the end of the supply chain.
- Product volume at retail level is 3 to 10 times higher than in the first half of the supply chain (placed in buckets, bouquet making, etc.)

- Rising requirements with respect to standards and certification, particularly pertaining to social and environmental aspects.
- The retail supply chains have achieved enormous success in setting social and environmental standards, but this power has not (yet) been leveraged to improve efficiency in the supply chain.
- Flowers are still relatively new for supermarkets. They generally have less knowledge about the specific aspects of the flower business. They are learning the tricks of the trade fast, the situation is gradually improving. How can the floriculture industry better inform their supermarket partners?

**Bottlenecks:**

1. Logistical inefficiencies.
2. High levels of waste.
3. Lack of specific knowledge.

## 4 Results Measurements

### 4.1 Temperature

In the supply chain of fresh produce, temperature is the most important factor affecting shelf or vase life. The correct storage and transport temperature for nearly all cut flowers is 0-1°C.

With every transport and handling movement between one link in the chain and the next, products are exposed to different conditions. In current practice, this results in changing and often rising temperatures. Excessive temperatures result in an accelerated aging process, moisture loss, increased susceptibility to fungi (such as Botrytis) and ethylene, and ultimately a poor vase life. Consequently, customers are disappointed profits for all parties in the flower supply chain decrease.

Flowers are not just influenced by ambient temperatures. The respiration of flowers does not stop when they are harvested (cut off the plant). The higher the temperature, the higher the respiration rate. A by-product of respiration is heat. If this heat is not properly removed, it causes a rise in product temperature. If boxes with flowers are stacked in a way that hinders good (cold) air circulation, and the packaging has the same adverse effect, flowers will heat up quickly.



*Flowers on an aircraft pallet on their way to the market and fresh waste on a compost heap: in both cases respiration will lead to higher temperatures and decay. For flower transports, starting cool is the only way to control this process.*

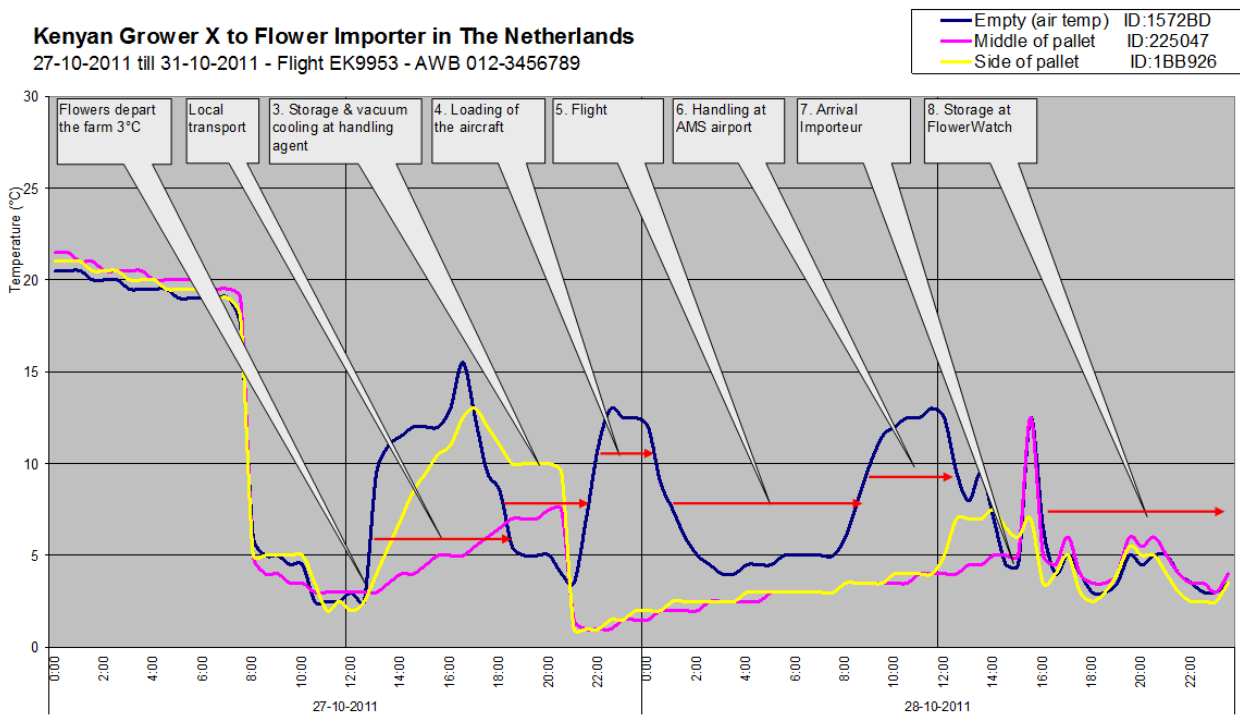
The temperature, multiplied by the number of hours the flower is exposed to it, results in the important parameter called 'temperature exposure', which is expressed in 'degree hours'. Degree hours are a commonly accepted concept, and are used in current practice by several parties in the flower business. Temperature exposure can also be translated into vase life days for flowers: Assuming the consumer's room temperature is 20°C, every 24 hours of exposure results in 480 degree hours. In other words, every 480 degree hours of temperature exposure in the supply chain results in a loss of 1 day of vase life.

#### About the measurements

FlowerWatch has been performing many temperature measurements in the Kenyan – Dutch supply chain of flowers in recent years, using data loggers. The procedure is to send three data loggers with each shipment (one inside a box in the middle of the aircraft pallet, one inside the box on the side of the aircraft pallet and

one in an empty box on top of the aircraft pallet to measure the ambient temperatures). The graphs in Figure 11 and Figure 12 are examples of the lowest and highest temperature peaks throughout the supply chain, as shown by these measurements. In these graphs the pink lines represent temperature development in the middle of the aircraft pallet, giving an indication of the build-up of heat resulting from flower respiration. The yellow line represents the development of temperature at the side of the aircraft pallet, showing the effect of the respiration heat in combination with the effect of ambient temperature development (the blue line).

**Figure 11 Example graph: one of the measurements with the coldest supply chain**



**Figure 12 Example graph; one of the measurements with the warmest supply chain.**

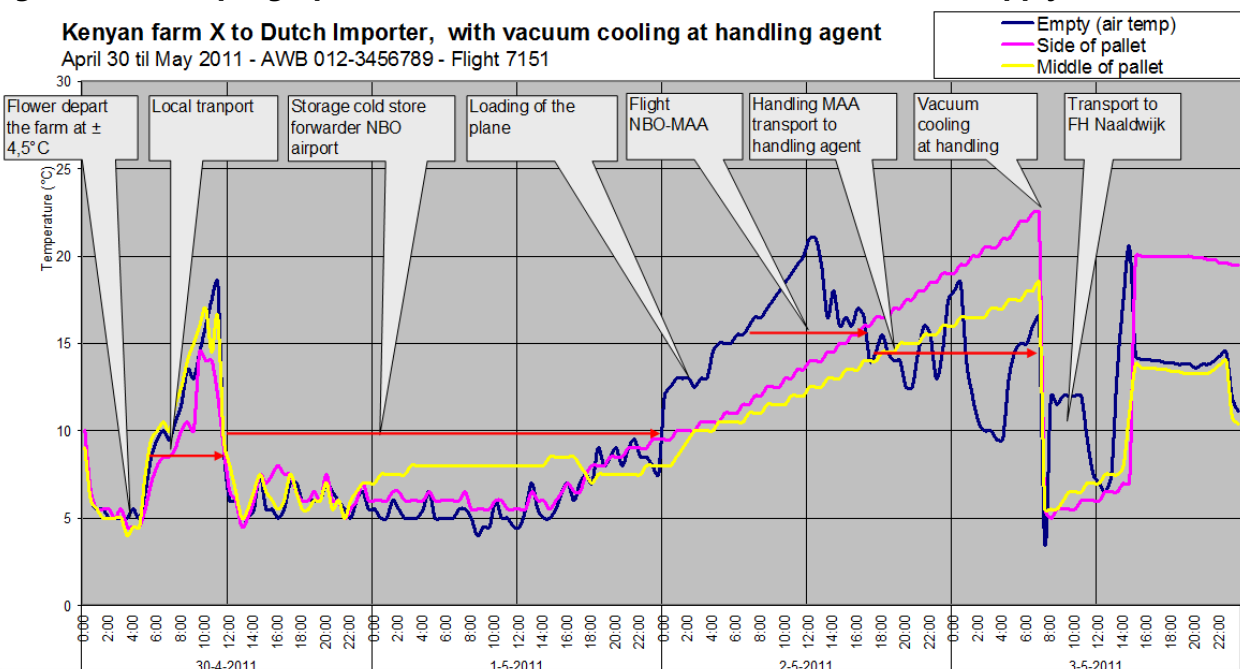
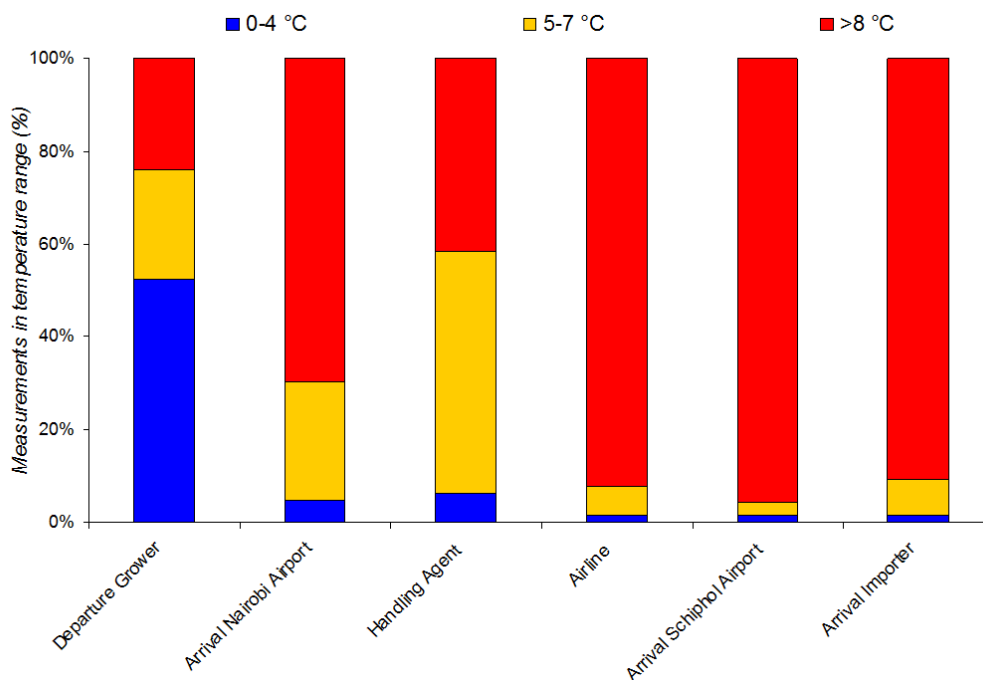


Figure 12 gives an overview of the results of the seventy most recent measurements. In about half of the measurements, the flowers start their journey at a good temperature level, as shown in Figure 12. Local transport to the airport more often than not causes the temperature to rise significantly. The graphs in Figures 10 and 11 also clearly make this visible, and the collapse of 'blue' results in Figure 14 is a final confirmation of this finding. Corrective measures, such as vacuum cooling, cause the average situation to improve at the handling agent. Temperatures then often rise again during the flight, leading to excessive temperatures upon arrival at Schiphol Airport. The slight increase in 'orange' results can be explained again by the vacuum cooling technique.

**Figure 13 Product temperatures at different stages in the Kenyan-Dutch flower supply chain**



Source: FlowerWatch (2012)

It should be noted that the development of temperature in the supply chain always starts at the grower. If flowers are not properly cooled here, respiration will continue to heat up the flowers in the following steps of the chain. Currently, departure temperatures up to 4 °C are considered good practice (although, as mentioned earlier, 0-1 °C is ideal). Between 5-7 °C is commonly accepted, but involves the risk of a rapid increase in temperature during transport due to respiration. Any higher temperatures will negatively affect flower vase life too much and are unacceptable.



**Table 7** Temperatures in the Kenyan-Dutch flower supply chain

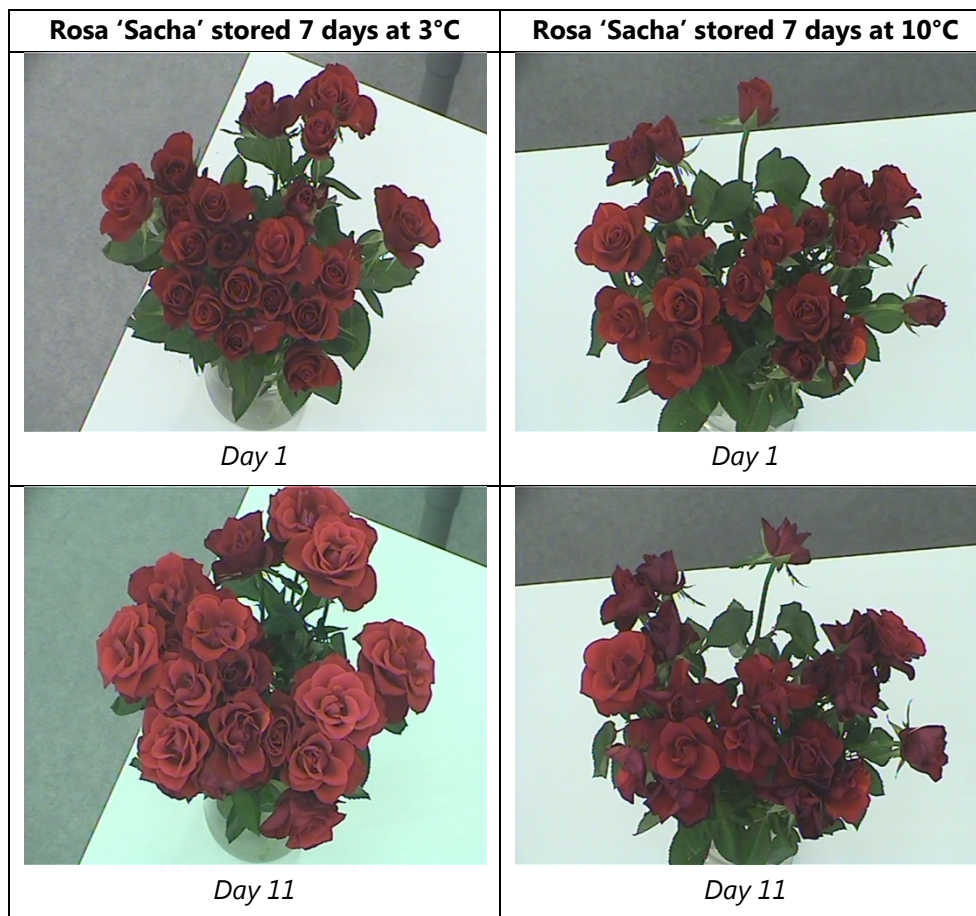
	T-average (°C)	T-min. (°C)	T-max. (°C)	Standard deviation (°C)
<i>Product measurements:</i>				
Departure Grower	6	2	13	3.0
Arrival Nairobi Airport	10	4	17	3.3
Handling Agent Nairobi	8	3	17	2.6
Airline	12	4	19	3.4
Arrival Schiphol Airport	13	4	20	3.6
Arrival Importer	13	4	23	4.2
<i>Ambient measurements:</i>				
Forwarder/Handling Agent Nairobi	6	2	16	3.0
Airline	9	4	22	3.7

Source: FlowerWatch (2012)

In this set of temperature measurements, the average flower shipment starts at 6 °C and arrives at 13 °C. The differences between individual results are substantial, as the standard deviations in Table 7 make clear. In this same table, the temperature curves of the highest and lowest temperature peaks (taken from all the different measurements), confirm the large variation in temperature levels of flower shipments from Kenya to The Netherlands.

Ambient temperatures at the handling agent and during the airline phase are equally variable and range from occasionally cold to regularly very warm.

**Figure 14 Influence of temperature on vase life of roses.**



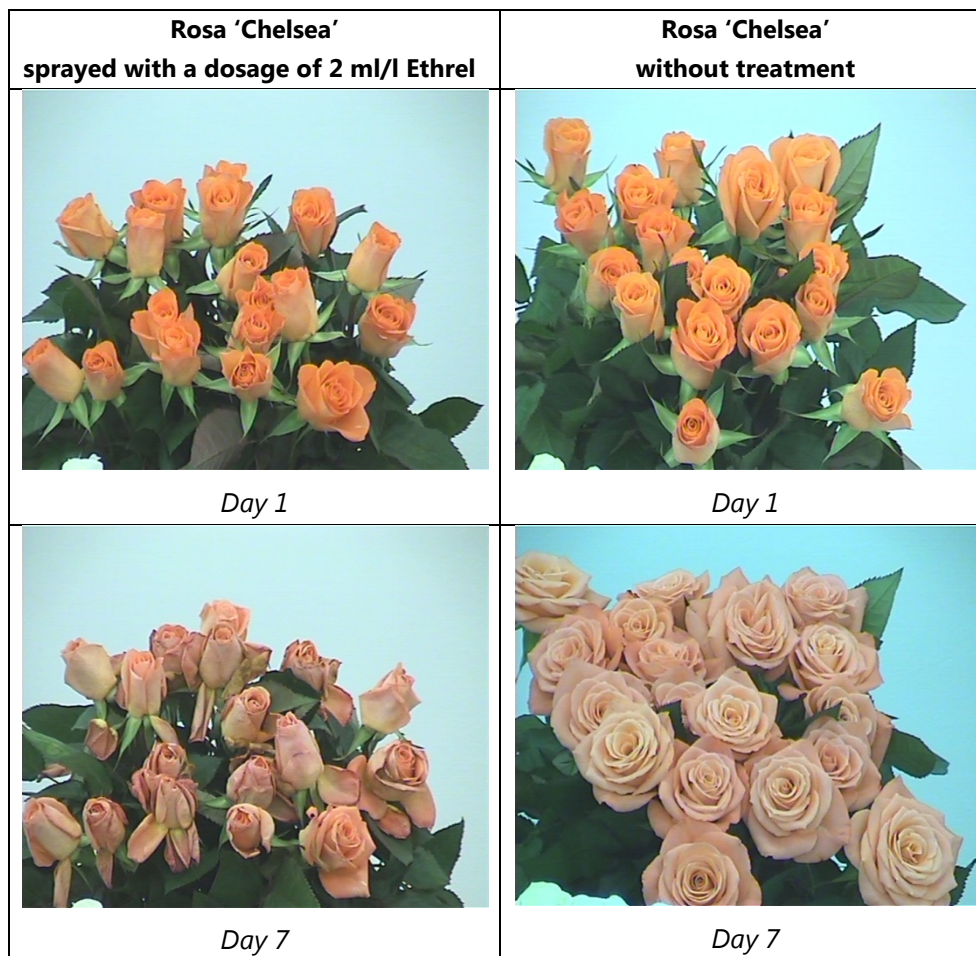
Source: FlowerWatch (2012)

## 4.2 Ethylene

Ethylene is a plant hormone which triggers ripening. Sensitivity to ethylene varies among different horticulture products. Flowers in general are relatively sensitive to ethylene exposure. Even very small quantities can cause premature ripening and then senescence. Other ethylene-related effects include poor opening of flowers and increased sensitivity to secondary damages (e.g. Botrytis).

There is a difference in susceptibility to ethylene levels between varieties within the same genus of flowers. The largest Kenyan flower crop, by far, is roses. In general, roses are sensitive to the negative effects of ethylene. Hard facts are not available, but at least part of the current assortment of roses grown in Kenya is ethylene-sensitive. A good example is the common Kenyan rose variety 'Chelsea' in Figure 15.

**Figure 15 Influence of high ethylene levels on vase life of roses**



Source: FlowerWatch (2012)

Possible preventive measures include growing ethylene-resistant varieties and eliminating sources of ethylene (e.g. ripening fruit and exhaust fumes). Sensitive (rose) varieties should not be stored in an environment that increases their own ethylene production. Ethylene can accumulate within enclosed areas, such as cold storage rooms and flower boxes. Both time and temperature have a marked effect on the response of flowers and plants to ethylene. For example, it takes much more ethylene to damage crops at low temperatures than it does higher temperatures.

Recent research by Macnish et al. (2010) has revealed the sensitivity to ethylene of Hybrid Tea rose genotypes. Although the tested roses originated from South-America, comparable results are likely for Kenyan grown varieties. Results of this research show that protection against ethylene damages can be provided by an additive within individual shipping boxes with roses. The duration of the protection was greatest when flowers were kept at a low temperature.

## 5 Conclusions & Recommendations

### 5.1 Conclusions

#### **Growing volumes...**

Kenyan horticultural exports have seen tremendous growth over the past two decades with the EU as the leading destination. Export volumes of fruits and vegetables such as green beans, avocados, and mangos are substantial, but cut flowers account for the lion's share of Kenyan horticultural exports.

The EU is the leading destination for cut flowers produced in Kenya, with the Netherlands accounting for 67% of tonnage and over 55% of export value. The UK is the runner-up with 17% of tonnage and 25% of export value. Kenya has become the leading producer of roses for the European market.

With the Netherlands being the principal entry point to the European market, the Kenyan-Dutch horticultural supply chain has developed rapidly. Volumes have increased and the product range has widened. The fact that Jomo Kenyatta International Airport is now the largest cargo handling airport in Africa can largely be attributed to horticultural exports.

#### **and changing market conditions...**

In the market, there is a general feeling that the industry is facing a period of dramatic change. Recently, market growth has stagnated in some markets, while the supply of flowers remained abundant. In the medium and long term, a moderate growth of only 2 to 4% annually is expected in Western Europe's cut flower markets.

In addition, the cut flower value chain is increasingly dominated by large and sophisticated European mass-market retailers. This is resulting in a gradual shift of purchasing power from wholesalers and the Dutch auction system towards these mass-market retailers. Supermarkets are increasingly laying down quality standards, which are becoming more stringent and increasingly differentiated. Demand for sustainably produced and distributed products is rising.

As a result, margins are under pressure and the playing rules are changing significantly in the flower industry. The industry is evolving towards lean and transparent supply chains characterised by consolidation and vertical integration.

#### **have resulted in pressure on the supply chain.**

The present study has shown that the strong growth in export volumes has put pressure on the supply chain, creating bottlenecks that hamper efficiency and further development. Other opportunities for further improvement in the efficiency of the supply chain are directly linked with changing market conditions and the different requirements of supplying the mass-market channel as opposed to the traditional florist channel.

We found that a proportionally large share of the consumer price is added at retail level. This is not only due to regular costs of operation or bargaining power at this tier, but also results from massive amounts of wastage produced at this level. Actually, the cost of wastage (product and packaging) throughout the entire

supply chain cannot be overstated. Tackling identified supply chain inefficiencies and further improving cold chain performance can make an important contribution to the reduction of wastage.

Many supply chain inefficiencies are the result of a lack of communication and coordination between key actors in the supply chain. It is impressive to see how the industry has developed generally accepted 'workarounds' to bypass recognised problems, such as flight delays and flowers arriving at the airport at excessive temperatures. Furthermore, in the flower supply chain, neglect by one player typically leads to costs for somebody else.

The study has identified over 80 bottlenecks throughout the supply chain. These were then validated and prioritised into 8 main challenges during two platform meetings in Kenya and the Netherlands. It has become clear that there are ample opportunities for further improvement of the supply chain. Actually, the current situation is no longer tenable as export volumes continue to grow, while pressure from alternative suppliers and logistical chains increases.

In order to maintain their competitive edge over competitors both near and far in the global flower industry, Kenya and the Netherlands will need to address the following trouble spots:

#### CHALLENGE 1 - COLD CHAIN MANAGEMENT

- Lack of knowledge & awareness about the importance of cold chain requirements
- No cold chain standards and protocols (incl. monitoring compliance)
- Inadequate cold chain facilities and equipment
- Poor information exchange

#### CHALLENGE 2 - TRANSPORT AND LOGISTICS

- Uncertainty about CO2 discussion (carbon footprint)
- Flight delays and indirect flight routes
- Increased transportation costs (oil prices, security measures)
- Tarmac time
- No use of load carriers for truck transportation (in Kenya)
- Sea transportation

#### CHALLENGE 3 - PACKAGING

- Insufficient packaging knowledge throughout the industry
- Lacking specific knowledge and standard procedures about handling packaging materials
- Awareness of price/quality ratio of boxes
- Current packaging not optimal for direct sales channels
- Pack rates (over- and under-packing)
- Packaging waste

#### CHALLENGE 4 - INFORMATION AND COMMUNICATION

- Absence of electronic information and documentation of all import documents and certificates
- Absence of a structural system for feedback through the chain
- Poor communication about delays

#### CHALLENGE 5 - THE RELATIVELY WEAK POSITION OF SME GROWERS

- VAT rebate system
- Difficulties complying with export requirements (direct market)
- Lack of cold chain knowledge and awareness
- Access to capital
- Access to post-harvest cold storage facilities and transport

#### CHALLENGE 6 - HANDLER PERFORMANCE

- No standards for handlers
- No structural and constructive system for feedback
- Logistical inefficiencies (aircraft pallets not composed on consignee base)
- Price is the decisive criterion. No minimum quality limits determined (SLA's)

#### CHALLENGE 7 - INTEGRATION WITH MASS-MARKET RETAILERS

- Retailers lack specific flower supply chain knowledge
- Product and packaging wastage (at retail level)
- Mixed transports (temperature requirements, ethylene production)

#### CHALLENGE 8 - SECTOR-WIDE TEAMWORK

- Lack of standards and protocols targeting supply chain improvements
- Matching phytosanitary (and other government) services with 24/7 requirements
- Road development and maintenance in production areas

## 5.2 Recommendations

To take up the identified challenges, the following interventions are suggested (see following pages):

THEME 1 - STANDARDS AND PROTOCOLS

THEME 2 - EDUCATION

THEME 3 - SYNCHRONISATION OF ELECTRONIC INFORMATION

THEME 4 - SUPPLY CHAIN INNOVATION

THEME 5 - PLATFORM

## THEME 1 - STANDARDS AND PROTOCOLS

Suggested interventions	Scope	Bottlenecks addressed
1. Develop standards and protocols for: - cold chain - packaging	<ul style="list-style-type: none"> <li>Develop an industry-wide system of supply chain standards.</li> <li>Platform Workgroups for Cold Chain and Packaging to determine standards and ensure industry-wide acceptance.</li> <li>Integration with existing standards: GAP, KFC codes, IATA time &amp; temperature task force, etc.</li> <li>Learning from other countries and sectors: USDA protocols, etc.</li> <li>Participation of associations and coordination in KEBS Technical Committee, KEPHIS, Customs Services Department of KRA, KAA, etc.</li> </ul>	<ul style="list-style-type: none"> <li>No cold chain standards and protocols (incl. monitoring compliance).</li> <li>No structural system for feedback through the chain.</li> <li>Poor communication about delays.</li> <li>No use of load carriers for truck transportation (in Kenya).</li> <li>Tarmac time.</li> <li>Logistical inefficiencies (aircraft pallets not composed on consignee base).</li> <li>No standard procedures for ordering, storage and erecting of boxes.</li> <li>Contradictory requirements for packaging regarding storage, cooling and transport function.</li> <li>Lack of transparency on airline performance and airline instructions on how to set the temperature and who is responsible for this.</li> <li>Decision making for vacuum cooling.</li> <li>Inefficient shipments (not composing aircraft pallets on consignee base).</li> </ul>
2. Develop framework for compliance with standards	<ul style="list-style-type: none"> <li>Joint initiative between industry and Government regulatory bodies to develop an inclusive and credible industry-wide national compliance system, involving private stakeholders and the regulatory authorities.</li> <li>Embed best practices in industry with incentives &amp; disincentives.</li> <li>Set up a compliance inspection framework.</li> </ul>	
3. Training on implementation of standards and protocols	<ul style="list-style-type: none"> <li>Local associations / existing institutions like the Technical Training Centre (Thika) can play a supporting role.</li> </ul>	

## THEME 2 - EDUCATION (AWARENESS AND KNOWLEDGE)

Suggested interventions	Scope	Bottlenecks addressed
1. Training in knowledge & awareness about cold chain requirements	<ul style="list-style-type: none"> <li>Target groups: SME growers, handling agents, airport personnel, etc.</li> <li>Local associations and existing institutions like the Technical Training Centre in Thika can play a supporting</li> </ul>	<ul style="list-style-type: none"> <li>Lack of knowledge &amp; awareness about the importance of cold chain requirements.</li> <li>Inadequate cold chain facilities and equipment.</li> <li>Price is the decisive criterion. No minimum quality</li> </ul>

	<ul style="list-style-type: none"> <li>role.</li> <li>Associations to facilitate more with logistics and relevant content.</li> <li>Coordinate efforts with training providers like CBI.</li> </ul>	<ul style="list-style-type: none"> <li>limits determined (SLA's).</li> <li>Absence of specific knowledge and standard procedures about handling packaging materials.</li> <li>Awareness of price/quality ration of boxes.</li> </ul>
2. Training in knowledge & awareness about packaging	<ul style="list-style-type: none"> <li>Target groups: Growers, packaging manufacturers, handling agents, airport personnel, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Pack rates (over- and under-packing).</li> <li>Acceptance of packaging waste.</li> </ul>
3. Informing and training retailers	<ul style="list-style-type: none"> <li>Target group: European retailers.</li> <li>Sector-initiated information and knowledge transfer.</li> <li>Specific flower supply chain knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>High levels of waste.</li> <li>Retailers lack specific flower supply chain knowledge.</li> <li>Product and packaging wastage (at retail level).</li> <li>Lack of awareness among growers of the impact of direct vs. indirect flights on product quality and value.</li> </ul>

### THEME 3 - SYNCHRONISATION OF ELECTRONIC INFORMATION

Suggested interventions	Scope	Bottlenecks addressed
1. Improve system for electronic information exchange	<ul style="list-style-type: none"> <li>Evaluate effectiveness and efficiency of existing platforms.</li> <li>Further development and implementation within Kenyan-Dutch route of systems like: <ul style="list-style-type: none"> <li>CLIENT (Dutch electronic system for phytosanitary checks)</li> <li>KePHIS electronic service for phytosanitary issuance</li> <li>E-freight (electronic messaging in the air cargo supply chain)</li> </ul> </li> <li>Service providers work with associations to create awareness among clientele</li> </ul>	<ul style="list-style-type: none"> <li>Synchronisation of export documents.</li> <li>Absence of electronic information and documentation of all export/import documents and certificates.</li> <li>Not all parties involved with clearing shipments are available 24/7.</li> <li>Increased transit times related to the increased security level at Kenyan airports.</li> <li>Not every box is labelled with an AWB-number.</li> </ul>



## THEME 4 - SUPPLY CHAIN INOVATION

Suggested interventions	Scope	Bottlenecks addressed
1. Stimulate sector-specific supply chain innovation	<ul style="list-style-type: none"> <li>• Targeting strategic, technological, and structural innovations, as well as supply chain performance improvements</li> <li>• Packaging innovations</li> <li>• Link with existing research and development structures: Universities; WUR; Topconsortium Kennis en Innovatie (TKI); Greenport Holland International, etc.</li> <li>• Initiative for collaborative R&amp;D funding</li> </ul>	<ul style="list-style-type: none"> <li>• Sea transportation.</li> <li>• Lack of specific packaging knowledge: Are other materials than cardboard an option? Can weight capacity be increased?</li> <li>• Lack of knowledge about impact of specific activities (like vacuum cooling) on CO2 production.</li> <li>• No use of load carriers (pallets/trolleys) for truck transportation.</li> <li>• Current packaging not optimal for direct sales channels.</li> </ul>
2. Sector involvement in carbon footprint discussion	<ul style="list-style-type: none"> <li>• Quick scan 'Status of CO2 discussion', i.e. review of existing studies on impact on Kenyan-Dutch supply chain</li> <li>• Coordination with ongoing IDH sector programme for cut flowers</li> <li>• Research into CO2 impact of specific industry activities</li> <li>• Improvement programme to develop processes that make better use of natural resources, generate less waste and have reduced impact on the environment</li> </ul>	<ul style="list-style-type: none"> <li>• Uncertainty about CO2 discussion (carbon footprint).</li> <li>• Lack of knowledge about impact of specific activities (like vacuum cooling) on CO2 production.</li> </ul>

**THEME 5 - PLATFORM**

Suggested interventions	Scope	Bottlenecks addressed
1. Platform for Kenyan-Dutch Horticultural Supply Chain	<ul style="list-style-type: none"> <li>• Continue platform meetings on a regular basis</li> <li>• Platform can play an important role in developing standards</li> <li>• Explore possibility of periodical annual/bi-annual collective dissemination forums (workshops, conferences, seminars etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Poor information exchange.</li> <li>• Insufficient packaging knowledge throughout the industry.</li> </ul>
2. Enhance existing communication platforms	<ul style="list-style-type: none"> <li>• Identify existing communication platforms, for instance, KFC's Network forums, Technical Committee, association websites, etc.</li> <li>• Identify opportunities for enhancement and/or integration</li> </ul>	
3. Website for Kenyan-Dutch Horticultural Supply Chain	<ul style="list-style-type: none"> <li>• Knowledge platform</li> <li>• Home base for dissemination of information on supply chain standards</li> <li>• Online training tool for implementing standards and protocols</li> <li>• Potential to develop into platform for logistical information exchange</li> <li>• Collaboration between key stakeholders, including associations and government bodies</li> </ul>	
4. Coordinated (Kenyan-Dutch) industry advocacy	<ul style="list-style-type: none"> <li>• To create and maintain strategic linkages</li> <li>• Lobby to modify VAT rebate system</li> <li>• Matching government services with 24/7 requirements</li> <li>• Lobbying through the Shippers Council</li> <li>• Proliferation of rules and regulations (airport security, shipment documentation, phytocertificates etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• VAT rebate system.</li> <li>• Mismatch between government services and industries 24/7 requirements.</li> <li>• Road development and maintenance in production areas.</li> </ul>

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## Appendix 1 Interviewees

### Growers

- Florius B.V. Mr. Bas Vloet (Owner)
- The Flowerhub Ltd. Mr. Paul Walker (General Manager)
- Sian Kenya Ltd. Mr. Jos van der Venne (Managing Director)
- Van den Berg Roses Ltd. Mr. Johan Remeeus (General Manager)
- Waridi Farm Ltd. Mrs. Zing Yeo (General Manager)
- Wilmar Agro Ltd. Mr. Wilfred Kamami (Owner)

### Forwarders / Handling Agents (Kenya)

- Kuehne + Nagel Nairobi Ltd. Mr. Myles Hechle (Managing Director)
- Total Touch Cargo Ltd. Mr. Karel Swings (Managing Director)
- Triple-FFF (Kenya Airfreight Handling Ltd.) Mr. Harry van der Plas (CEO)

### Airliners

- Schiphol Cargo Mr. Bart Pouwels (Director Business Development)

### Handling Agents (The Netherlands)

- Flowerport Mr. Willem Kaandorp (Director)
- J. van der Put Fresh Cargo Handling Mrs. Monique van de Put (Director)

### Importers

- C.A.R.M.S. Mr. Rob Letcher (General Manager)
- DecoFresh Mr. Matti Arielle (Owner)
- Kneppers Rozen (also grower) Mr. Richard Kneppers (Owner)

### Exporters / Wholesalers

- Intergreen Mr. Mark Zweistra (Supply Chain Manager)
- Sierafor Mr. Peter de Jong (Project Manager)
- Top Flora Mr. Frans de Jeu (Quality Manager)

### Retailers

- Bama Blomster Mr. Nick Kalkdijk (Unit Manager Flower & Plants)
- Jumbo Supermarkten Mr. Paul Swinkels (Unit Manager Flower & Plants)
- Migros Mr. Bruno Akermann (Einkaufsleiter Zierpflanzen)

### Logistics Service Provider

- TGW Mr. Adrian Blaser (Geschäftsleiter Logistik / Betrieb)

### Organizations

- FloraHolland Kenya Mr. Geert-Jan v.d. Kooij (General Manager)
- Horticultural Crops Development Authority (HCDA) Mrs. Florence Masia (Horticulturist technical)
- Kenya Flower Council (KFC) Mrs. Jane Ngige (CEO)
- Kenya Plant Health Inspectorate Services (KEPHIS) Dr. Esther Kimani (General Manager)

## Appendix 2 Current Practices in Packaging

Packaging operations at the farmer's site are carried out in three stages: bunching, wrapping bunches and packing them into boxes.

### Bunching

Each bunch contains a certain number of roses, depending on the final markets. Bunches are held together by elastic bands. Some farmers realise square bunches in order to fill boxes more efficiently.

### Wrapping

Bunches are sleeved soon after harvest. The purpose is to unite the bunch, protect the flower heads, prevent tangling, and identify the grower or shipper. Materials used for sleeving are paper and/or single faced corrugated board. The paper material is mainly from recycled material and has thus a moderate resistance against humidity. Different types of fluting are used for the single faced corrugated board wraps: B flute – 3 mm height and E flute – 1,5 mm.



Flower heads protected by a wrap

### Boxes

Corrugated cardboard boxes are used for shipping Kenyan roses. The type of box used is a classic telescopic box, RR with a bottom and a lid. Ventilation is possible via cut holes and through cut openings at the ends that can double as lifting "handles".



Telescopic style; bottom and lid

The sizes, construction and board grade of the boxes depends on their origin (grower) more than on their destination. Traditionally, boxes were – and still are – designed for the auction supply chain. However, most growers try to adapt box dimensions to airplane loading efficiency for transporting roses to Holland.

Many different box sizes are used in Kenya. The three most frequently used boxes are:

1) "Kenya Box"

Outside dimensions: 985 x 295 x 210 mm  
Bottom: double wall corrugated board, BB flute  
Lid: single wall corrugated board, B flute  
Erection style: stapled

2) "Zimbabwe Box"

Outside dimensions: 960 x 455 x 220 mm  
Bottom: single wall corrugated board, C flute  
Lid: single wall corrugated board, C flute  
Erection style: folded

3) "Zimbabwe Box Special"

Outside dimensions: 995 x 440 x 200 mm  
Bottom: double wall corrugated board, BB flute  
Lid: double wall corrugated board, BB flute  
Erection style: stapled



From left to right: Zimbabwe Box, Zimbabwe Box Special and Kenya Box.

*N.B. There are several variations within these three.*

The strongest of these three is the Zimbabwe Box Special. The bottom and lid of this box are made of double wall corrugated board, which results in a high resistance to compression. Also, its bending performance is quite high, due to the use of double wall corrugated board for the bottom as well as for the lid.

### Packaging materials

In the use of corrugated cardboard packaging, a number of factors affect the performance characteristics of the final packaging:

- 1) The type of paper;
- 2) The grammage of the paper;
- 3) The type of fluting, or the height of the fluting;
- 4) A possible combination of fluting types.

In current packaging standards, various types of paper are used. For wraps, basic raw paper material is used, originating from both recycled paper and from cellulose (trees), respectively called testliner and kraftliner. Both types of paper are also applied in the boxes, in different grammages.

The performance characteristics of both types of paper vary. Kraftliner has a reasonably good resistance to moisture and a high tear resistance, more so than testliner. The origin of the paper or paper manufacturer is also a decisive quality factor. The packaging manufacturers mainly import paper from the USA, South Africa and Europe. Price and availability are the main criteria.

For the wraps, a 3mm (B-fluting) variant is often used. This packaging material is so-called single faced corrugated cardboard and consists of a flat layer of paper and a fluting layer.



The current boxes consist of a large variety of fluting types. In the bottoms and lids, 3, 4, 5, 6 and 7 mm of corrugated cardboard is used, respectively B, C, A, BB and BC-fluting. The combination of paper type, paper weight and type of fluting determines whether packaging is able to meet the requirements of transport and storage.

### **Packaging production process**

Kenyan manufacturers of corrugated cardboard boxes have various skills. One manufacturer is reasonably well equipped for safeguarding constant quality, while the other mainly manufactures manually, making the tolerances on quality somewhat broader.

The pursuit of consistent quality is vital at two points in the packaging production process: in the production of creating corrugated cardboard and when die-cutting the construction. Shortcomings in both processes will significantly weaken the bearing capacity of the boxes. The bearing capacity (compression strength) is the most important performance characteristic for Kenyan rose boxes.

### **Packaging construction**

All boxes have a telescopic construction, a bottom and a lid. However, there are many variations in folding constructions. The main differences have to do with the way in which the bottom and the lid are folded, combined with the method of sealing. Some constructions can be fully folded together without the use of glue or staples. Most boxes are sealed by means of stapling. Glue is not used at all, or only rarely.



**Folding construction without the use of glue or staples**



**Example of insufficient stapling**

The methods of sealing and stapling co-determine the performance characteristics of a box. If a box is stapled insufficiently or at the wrong spot, it is more prone to tear or collapse.

### **Graphic design of packages and labels**

Most Kenyan boxes are printed with 1 or 2 colours. Brand, address, name of products and company logos are printed on the natural brown top or on white cardboard. Colour printing on white board is more distinctive but expensive, despite the fact that white board is easily marked. A section at the end of the boxes is used for the box code, the length of flowers and the variety and quantity of flowers. Ideally, labels must be large and clearly visible at both ends of the box for easy identification.

### **Packing process**

Sheets for corrugated cardboard boxes are often stored in open areas. One of the characteristics of paper is that it adapts to the humidity circumstances of its environment. If the relative humidity is high, the paper will absorb moisture and lose strength. If the paper (liner and fluting) has not been correctly glued, sheets that have absorbed moisture will peel off easily when they are drying.

To erect boxes, the lid and bottom are usually stapled; pre-glueing in a folded, flat state is uncommon. Some can be erected by folding without the use of staples or glue. It is crucial to have a good junction between the width and length sides to create a good corner. The corners are entirely responsible for resistance to vertical compression (bearing capacity). If the corrugated cardboard is damaged in the corner or if the staples are too small or placed near each other, the box will suffer heavily during handling and shipping. Staples are sometimes applied inside out rather than outside in. This can cause injuries during handling.

The packing of cut flowers is part of the packing house operations, which include grading. Ideally, the packaging house should be temperature-controlled, but this is not common in Kenya. Once they've been packed, cut flowers are difficult to cool. Unless measures are taken to ensure temperature reduction, their high rate of respiration and the high temperatures of greenhouses and most packing areas result in heat build-up in packed flower containers.

### Transport and storage

The temptation is to put a maximum quantity of products in the box, causing the lid to bulge like a "balloon" box. Overloaded boxes hinder effective stacking at any stage in the distribution chain. Loads are rendered unstable, ventilation is impaired and, finally, flowers are crushed. Boxes are often over-packed / overfilled.



**Over-packed / overfilled box**



The rigidity of the original boxes decreases as a result of the moisture absorbed from flowers and ambient conditions. The loss of structural integrity makes boxes more vulnerable to damage during handling and transport.



**Damaged / collapsed boxes**



Damage is likely to occur in many stages of manual handling. The heavier the box, the more likely it is get damaged.

### Requirements from cut flower perspective

Packaging for roses must be adapted to the products, the specific characteristics of each variety, their fragility and lifespan. The choice of a packaging concept will depend on the ultimate product, market, the distance from the market and the mode of transportation.

Roses must be protected against bruising. Wrapped bunches should be tightly packed into the boxes to prevent sliding within the box. The head of the flowers should be placed a few centimetres from the end of the box to allow effective pre-cooling and to eliminate the danger of petal bruising should the contents of the box shift. To avoid longitudinal slipping, some Kenyan packers use straps. Generally, two plastic bands are anchored by making holes on opposite sides of the bottom, creating a rigid and tight package. However, this approach also invites overfilling. Also, the tension of the strap can damage the bottom of the box, affecting its resistance.



**Space between flowers and end of box**



**Strapping to prevent sliding in box**

Source: *Packaging View*, 2012

## Appendix 3 Report Platform Meeting in Kenya

8 March 2012 - Nairobi, Kenya

### 1 Introduction

#### Background

The Dutch Ministry of Economic Affairs, Agriculture and Innovation (EL&I) is carrying out a study to obtain detailed insight into the performance of the Kenyan-Dutch horticultural supply chain. As part of a larger project, the study specifically aims at identifying opportunities for further improvement in the efficiency of the supply chain.

The first phase of this study consisted of a draft report, based on desk research and interviews with key stakeholders in the supply chain. The second phase consisted of two meetings with key stakeholders, one on the Kenyan side and one on the Dutch side of the supply chain.

This report describes the results of the first meeting of key stakeholders on the Kenyan side, which also marked the start of the Platform for the Kenyan-Dutch horticultural supply chain.

The discussions on Thursday 8 March were continued and deepened during a parallel platform meeting for stakeholders in the Netherlands on 12 April. The study itself was then completed, marking the end of the exploratory phase and the transition towards the implementation of improvement projects.

#### Objectives of the Workshop

The purpose of the meeting was to share interim results with key stakeholders and to obtain feedback in order to develop ideas for pilot projects. With this first meeting, we also aspired to create a lasting platform for continued improvement of the Kenyan-Dutch horticultural supply chain.

#### Approach

This included the identification of 6 main challenges, which were formulated from 22 previously identified challenges presented in the draft report for this project. For each main challenge the main identified bottlenecks were offered. In the workshop the bottlenecks were discussed. The key stakeholders present were asked whether they recognised the bottlenecks, whether the bottlenecks were clear to them and whether or not they found any bottlenecks lacking.

### 2 Participants

Over 30 key stakeholders in the Kenyan-Dutch horticultural supply chain were invited. The focus was on high-ranking persons (decision makers) from a selected group of companies and organisations. The selection was made with the aim of composing a mixed group representing all of the links that are important on the Kenyan side of the horticultural supply chain.

The meeting was attended by 23 participants in total. The main organisations were well represented with people from the HCDA, FPEAK, KEBS and KEPHIS. Flower auction FloraHolland was also present with 2 persons. Martinair Cargo represented the airlines. Cargo forwarders and handlers were very well represented. Only a few of the invited growers took part in the meeting.

The only absentee on the side of the organisations was KFC. The invited packaging company (EAPI) was also unable to attend the meeting.

Participants were highly involved in the meeting. Much interaction and a positive and open atmosphere contributed to the outcome of this meeting. The meeting confirmed that the outcomes of the study, i.e. the need for further improvements in the supply chain with the help of regular and constructive communication, were broadly supported.

<b>Attendance List First Platform Meeting</b>	
Ole-Sereni Hotel, Nairobi, 8 March 2012	
1. Flower Sourcing Africa	Mr. Jan Smit
2. The Flowerhub Ltd.	Mr. Paul Walker
3. FloraHolland Kenya Ltd.	Mr. Peter Bouma
4. FloraHolland Kenya Ltd.	Mr. Geert-Jan van der Kooy
5. Florensis Kenya Ltd.	Mr. Eddy Verbeek
6. Fresh Produce Exporters Association of Kenya (FPEAK)	Mr. Francis Wario
7. Triple FFF	Mr. Eric Agufana
8. Kenya Bureau of Standards (KEBS)	Dr. Karanja Thiongo
9. Kenya Plant Health Inspectorate Services (KEPHIS)	Dr. Esther Kimani
10. Kenya Plant Health Inspectorate Services (KEPHIS)	Mr. Josiah M. Syannda
11. Kuehne + Nagel Nairobi Ltd.	Mr. Myles Hechle
12. Martinair Cargo	Mr. Bob Bover
13. Siginon Freight Kenya Ltd.	Mr. Moses Wahome
14. Swissport Kenya Airside Ltd.	Mr. Johnston
15. Wilmar Agro Ltd.	Mrs. Ruth Kamami
16. Van Kempen Koudetechniek	Mr. Jan Vliet van Zante
17. FlowerWatch Kenya Ltd.	Mr. Isaya Henia Muiru
18. FlowerWatch B.V.	Mr. Jeroen van der Hulst
19. FlowerWatch B.V.	Mr. Ruud Warmerdam
20. Hortiwise	Mrs. Dana van Hes
21. Ministerie van EL&I	Mrs. Ingrid Korving
22. Netherlands Embassy	Mr. Hans Wolff
23. Netherlands Embassy	Mrs. Phyllis Karanja

### 3 Workshop

#### Setup

First, the interim results of the study were presented, followed by a step-by-step approach to obtain feedback and input:

Stage 1: Bottleneck evaluation in groups;

Stage 2: Central discussion on findings of groups; and

Stage 3: Prioritising bottlenecks.

The participants were divided into two groups of 7 and 8 persons to discuss the bottlenecks of the 6 main identified challenges (Cold Chain, Transport, Packaging, Distinction Small & Large Growers, Performance at Handlers and Integration into Mass Market Supply Chain). The 6 main challenges and bottlenecks are attached to this report.

The stakeholders were asked to classify these bottlenecks into three categories within their group:

- A. Confirming recognition ("I support this comment");
- B. Requiring clarification ("I do not understand this comment"); and
- C. Adding bottlenecks ("I missed something").

Due to time constraints, one group treated challenges 1, 2 and 3. The other group discussed challenges 4, 5 and 6. The groups classified all bottlenecks into categories A, B or C (on coloured notes). In the following stage, the findings of the two groups were centrally discussed and the groups explained their choices where necessary.

In the third stage of the workshop, the stakeholders were asked to prioritise the bottlenecks, using coloured stickers to be put on the coloured notes. Finally, the stakeholders, individually or together, filled out forms with their personal comments on areas for improvement.

### **Organisation and logistics**

The venue was suitable for this occasion. The space was adequate and allowed for close interaction, the (technical) equipment met our the expectations and the catering was well organised.

The workshop was characterised by a positive atmosphere and a high degree of interaction. The aim was to bring together a good blend of all the links in the supply chain. This was difficult due to the absence of important stakeholders such as KFC, a packaging company and most of the invited growers. Therefore the balance in the two groups was not ideal. Nevertheless, the constructive attitude of the participants created the best possible circumstances for a useful outcome.

The meeting started later than planned due to late arrival of some participants. Time pressure led to the decision to divide the 6 main challenges over the two groups, which meant that participants did not all cover each of the bottlenecks.

### **Findings**

#### *Challenge #1: Cold Chain*

All bottlenecks were recognised. The following additional remarks were made:

- There is no incentive for improving and maintaining the cold chain;
- Fines for warm product delivery and rewards for good practice;
- Cold Chain when transiting on European airports requires improvements;
- Handling equipment and refueling are important bottlenecks when loading aircrafts at NBO;
- Initiatives for better communication and feedback are there, but need to be linked;
- Refrigerated trucks should be an industry norm;
- The priority of handlers is to avoid dead-freight, which can harm the cold chain;
- Create an industry protocol.

### *Challenge #2: Transport*

All bottlenecks were recognised, with the exception of the first one mentioned. Road developments and maintenance in production areas should be altered to "Road congestion". One additional remark the stakeholders made is that they miss feedback. There is a need for a good communication system to inform all parties involved about delivery times, temperatures etc.

### *Challenge #3: Packaging*

All bottlenecks were recognised. The following additional remarks were made:

- Narrow down the number of boxes used (maybe 5 different boxes);
- Regardless of box sizes, minimum quality standards of boxes should be determined;
- Explore options for auctioning in a box;
- Mismatch logistic and commercial value of a box. Therefore, the focus is on maximising pack rates to achieve the weight limit, instead of maximising product quality control.

### *Challenge #4: Distinction Large & Small Growers*

All bottlenecks were recognised. Additional remarks all pointed to a better information exchange. Structuring and spreading of information needs to be improved.

### *Challenge #5: Performance at Handlers*

All bottlenecks were recognised. No new additional remarks.

### *Challenge #6: Integration into Mass Market Supply Chain*

All bottlenecks were recognised. No new additional remarks.

Prioritising the bottlenecks led to the following Top-10 of the 'Wish list for improvements':

- 1. Information exchange**
- 2. Lack of knowledge**
- 3. Synchronisation of electronic information and documents**
- 4. Packaging inefficiencies**
5. Unrefrigerated transport
6. Standards and protocols
7. Incentives for maintaining cold chain
8. Understanding each other's business
9. Reduce product and packaging waste
10. Reduce flight delays

### **Outcome**

On the individual forms, the following remarks regarding the above Top 4 wishes were added for consideration,;

#### **1. Information exchange**

- Continue platform meetings like this one;
- Regular stakeholder meetings;
- Setup a discussion forum;

- Setup of a centralised centre where all information can be obtained or that manages a website for information exchange;
- Separate “sub-platform” meetings for more specific topics;
- Harmonise the various existing initiatives;
- Close communication and feedback between grower and retailer to understand each other’s position;
- KEBS proposes to circulate a memo on competency and standard settings in the industry;
- Transparent tracking and tracing systems for the entire supply chain;
- Choose mode and method of communication;
- Controlled data warehouse (limited access, for stakeholders only).

Proposed executive parties: KEBS, Ministry of Trade, KFC, FPEAK, FloraHolland, Stakeholders

## **2. Lack of knowledge**

- Setting up a resource centre where one can visit and get all information affecting the industry;
- Establish a website or link up the relevant websites;
- Organise forums to reach different stakeholders;
- Educational and capacity building sessions;
- Set up an industry portal: a common platform for all stakeholders in the supply chain;
- Test market identification;
- Training and exposure of knowledge to all stakeholders in the supply chain;
- Awareness creation for product sensitivity.

Proposed executive parties: KFC, FPEAK, FloraHolland, FlowerWatch, Embassy

## **3. Synchronisation of electronic information and documents**

- Central website where stakeholders can login to obtain all available information;
- Standardisation and harmonization of electronic documents. Implementation of single window (KENTRADE);
- A web-based platform for posting information and distribution to relevant stakeholders;
- One main stakeholder to set global standard;
- Export documents processed by different bodies for a single consignments. Need to link up the process of applications;
- Early deliveries and submission of documents will facilitate better pre-cooling opportunities due to less time pressure.

Proposed executive parties: Ministry of Trade, KFC, FPEAK, KEPHIS, KENTRADE

## **4. Packaging inefficiencies**

- Feasibility study / Pilot project;
- Organise a stakeholder forum on packaging;
- Inventory, setup and apply standards for the industry (define specifications);
- Impose minimum box quality (strength) to all stakeholders;
- Market-orientated specifications (different for auction and direct trade);
- Create incentives for doing things right;



- Agree on packaging rate.

Proposed executive parties: FloraHolland, Mass Market Retailers, Packaging manufacturers

## 4 Conclusions

The platform meeting validated the necessity of this study on the horticultural supply chain and the initiative to create a lasting platform for continued improvement. All stakeholders present acknowledged the need for improvements and showed an openness to interaction and close communication. The meeting was characterised by a positive and open atmosphere.

The workshop prioritised the bottlenecks discussed:

1. Information exchange
2. Lack of knowledge
3. Synchronisation of electronic information and documents
4. Packaging inefficiencies

Organising platform meetings on a regular basis is a common desire. Who will organise these meetings is open to discussion. Organisations such as KFC and FPEAK were mentioned most frequently in this respect. Many participants consider these organisations to be the driving force behind supply chain improvements. Unfortunately, KFC was not present at the meeting to comment. The lack of participating growers and the absence of the packaging industry also limited the discussion on the 'who question'.

The setup of this meeting turned out to be a good choice. A first step has been made for better communication among supply chain partners.

## Appendix 4 Report Platform Meeting in the Netherlands

*12 April 2012 - Schiphol, the Netherlands*

### 1 Introduction

#### Background

The Dutch Ministry of Economic Affairs, Agriculture and Innovation (EL&I) is carrying out a study to obtain detailed insight into the performance of the Kenyan-Dutch horticultural supply chain. As part of a larger project, the study specifically aims at identifying opportunities for further improvement in the efficiency of the supply chain.

The first phase of this study has resulted in a draft report, based on desk research and interviews with key stakeholders in the supply chain. The second phase consisted of two meetings with key stakeholders, one on the Kenyan side (held on 8 March 2012) and one on the Dutch side of the supply chain.

This meeting report describes the results of the first meeting of key stakeholders on the Dutch side, which was held on Thursday 12 April.

The study itself was completed following these meetings, marking the end of the exploratory phase and the transition towards the implementation of improvement projects.

#### Objectives of the meeting

The purpose of the meeting was to share interim results with key stakeholders, to obtain feedback in order to develop ideas for pilot projects. With this meeting, we also aspired to create a lasting platform for continued improvement of the Kenyan-Dutch horticultural supply chain.

### 2 Participants

About 40 key stakeholders in the Kenyan-Dutch horticultural supply chain were invited. The focus was on decision makers from a selected group of companies and organisations. The selection was made with the aim to compose a good mixture of participants representing all the important links on the Dutch side of the chain.

A total of 28 participants attended the meeting. Most segments of the supply chain were well represented growers, import agents, wholesalers (both specialised and supermarket channel), logistical service providers, and representatives of government institutions. Flower auction FloraHolland was also present with 2 persons. Unfortunately, invitees representing the retail chains did not attend.

Participants were highly involved in the meeting. Much interaction and a positive and open atmosphere contributed to the outcome of this meeting. The meeting confirmed that the preliminary results of the study, i.e. the need for further improvements in the supply chain with the help of regular and constructive communication, are broadly supported.

<b>Attendance List First Platform Meeting</b>	
Schiphol, 12 April 2012	
1. ADI consulting	Pieter van Leeuwen
2. BSI	Rinus Bouwman
3. C.A.R.M.S.	Rob Letcher
4. DecoFresh	Pini Cohen
5. Douane	John van Dongen
6. FloraHolland	Bernard Piet
7. FloraHolland	Marcel Orië
8. Flowerwings	Peter Schrama
9. Fresco Flowers	Gerjan Telleman
10. Intergreen	Marc Zweistra
11. J. van der Put Fresh Cargo Handling	Jeroen Borst
12. Karuturi	Henri Müller
13. Min. EL&I	Frederik Heijink
14. Min. EL&I	Lex Moret
15. NVWA	Martin Boerma
16. Schiphol	Berend-Jan Rietveld
17. Schiphol Cargo	Bart Pouwels
18. Sierafor	Peter de Jong
19. Stamina Group	Harry vd Plas
20. Total Touch Cargo NL	Ragnar van Beek
21. Van den Berg Roses	Robert van der Lans
22. Xpol platform	Tom Vermeer
23. FlowerWatch	Jeroen van der Hulst
24. FlowerWatch	Ruud Warmerdam
25. FlowerWatch Kenya	Isaya Henia Muiru
26. Hortiwise	Dana van Hes
27. Hortiwise	Maarten van Schie
28. Hortiwise	Milco Rikken

### 3 Workshop

#### Organisation and logistics

The meeting was organised on the premises of the Schiphol Group, with all necessary facilities and (technical) equipment available. The space was more than adequate and allowed for close interaction.

We would like to thank the Schiphol Group, and in particular Mr. Bart Pouwels, for offering their facilities for the meeting.

## Approach of the workshop

A step-by-step approach was followed to obtain feedback and input:

Step 1: First, Jeroen van der Hulst presented the interim results of the study, focusing on the main 6 challenges in the Kenyan-Dutch supply chain. These 6 main challenges were formulated from a much longer list of observations and bottlenecks identified in the study.

Six challenges: Cold Chain  
Transport  
Packaging  
Distinction Small & Large Growers  
Performance at Handlers  
Integration into Mass Market Supply Chain

Step 2: Subsequently, the key stakeholders were divided into six smaller groups, each group concentrating on one of the six challenges. Per group, participants were asked to classify bottlenecks into three categories:

- A. Confirming recognition ("I support this comment");
- B. Requiring clarification ("I do not understand this comment"); and
- C. Adding bottlenecks ("I missed something").

Step 3: In the following stage, the collected findings were centrally presented and discussed. Additionally, results were complemented with findings from the study.

Step 4: Finally, participants were given the opportunity to prioritise the identified bottlenecks.

## 4 Findings

### **Challenge #1: Cold Chain**

Confirming recognition:

- Use of refrigerated road transport.
- Need for standardisation.
- Knowledge & awareness: understanding cold chain requirements and effect on export value.
- Impact of pack rates on product quality & value.
- Cold store capacity (and temperature settings).

Requiring clarification:

- Gate 14 discussion: 1<sup>st</sup> and 2<sup>nd</sup> ring. What is the impact on product quality? What if Gate 14 closes?
- What is the impact of vacuum cooling on CO2 emission?
- Use of load carriers (pallets/trolleys) in farm to airport transport for faster unloading (10-15 minutes).
- Cooling capacity at the airport.

Additional bottlenecks:

- Flowers spend on average 4 hours waiting on the tarmac.
- What is impact of vacuum cooling on product quality?

Plenary discussion:

- It is estimated that flowers spend an average of 4 hours waiting outside on the tarmac, while it should be possible to get them into the plane within a maximum of an hour. One of the explanations mentioned is

that growers prefer to drive around the airport (through gate 14 directly to the planes), because that is for free.

- Dilemma: all players recognise the importance of a proper cold chain, but nobody is willing to pay the price.
- It is critical to develop proper cold chain protocols, but also crucial that all parties live up to them.

### **Challenge #2: Transport**

Confirming recognition:

- Pack rates: boxes too full (damages) or too empty (collapse).
- CO2 emissions.
- Need for 24/7 services.

Requiring clarification:

- Need for coordination.
- (Heavy) vegetables and fish are gradually disappearing. Fish is increasingly shipped in holiday flights from Mombasa. Heavy products balance the weight-volume ratio of light-weighted flowers.
- Standardisation, supply chain protocols and certification of forwarders.
- Transfer trade (directly from Kenya to other markets like Russia).

Additional bottlenecks:

- Documentation: some information is filled in up to 3 or 4 times.

Plenary discussion:

- The sector has accepted delays and has developed work-around ways to cope with the situation. Nevertheless, delays cause costs. Flight delays not only cause delayed arrival at the auction, but also higher unpacking costs.
- What is the average auction price of flowers flown in directly (Amsterdam) versus flowers arriving via one of the other airports (Frankfurt, Brussels, etc.)? FloraHolland: difficult to calculate and prove. Importance of raising awareness among growers of the impact on quality of direct vs. indirect flights.

### **Challenge #3: Packaging**

Confirming recognition:

- Load rate of aircraft pallets.
- Many different types of boxes in use.
- Too fast turnaround required: from harvest to forwarding.

Requiring clarification:

- Which box is best for exporting?
- Packaging for vacuum cooling / forced air cooling.
- Effect of colour of box / pallet cover on temperature.
- What % loss due to packaging issues?
- Information on packaging is crucial for faster handling.
- Quality of box vs. cost price of box.

Additional bottlenecks:

- Can other materials be used?
- Can we increase weight capacity of ULDs?
- Which box limits heat generation during transport best?
- Do we need to develop an entirely new box?

Plenary discussion:

- Need for protocols for building and breaking air cargo pallets.
- Pack rates (stems per box) should fluctuate throughout the year as flowers can differ in weight per season. Product quality will be affected if using same pack rates year around. Discussion between supplier and customer. Often, pack rates are fixed because of administrative reasons.

#### **Challenge #4: Distinction Large & Small Growers**

Confirming recognition:

- Costs of certification.
- Mass market not an option for small growers.
- Compliance.

Requiring clarification:

- Bouquet making - VAT discussion.
- Develop standards that are accessible to small growers.
- Transfer pricing.

Plenary discussion:

- How to generate more market for small growers? For example, by supplying through larger growers. However, in that case, growers face a VAT-issue due to the fact that the sale is considered domestic supply of goods. It takes a long time to get VAT-refunds from the Kenya Tax Authorities. Producers with companies both in Kenya and the Netherlands need a clear transfer pricing policy.

#### **Challenge #5: Performance at Handlers**

Confirming recognition:

- Price awareness.
- E-ticket / E-freight.
- Matching phytosanitary inspections (Kenya en NL) with 24/7 requirements of freight forwarders.

Requiring clarification:

- Safety, security, compliance (25% screening).
- Certification for handlers.
- Checks in the Netherlands compared to other countries (coordination).
- Create and conform to standards.
- Green Lane Nairobi-Schiphol.

Plenary discussion:

- Green Lane: Companies complying with specific requirements (logistics and security) are allowed to make use of a 'green lane', allowing goods to almost freely pass EU borders. Faster and cost reduction. However, difficult as this kind of projects need to be coordinated on EU level.

#### **Challenge #6: Integration into Mass Market Supply Chain**

Requiring clarification:

- Mass market: 24/7 channel.
- Importance of proper understanding and working based on facts.

Additional bottlenecks:

- Government export and import services.
- Retail: time stress, cold chain, critical.

Plenary discussion:

- Delivery times are crucial and largely determine the quality of the product. Supermarkets will always seek out the limits of what is possible. The supplier must show the courage to indicate that, at a given moment, the quality of the product cannot be guaranteed anymore. Growers and wholesalers try to find a balance between working in the traditional chain, where they have more time, and the faster supermarket chain.
- Cost differences between airports: Landing rights in Schiphol airport are lower than, for example, in Frankfurt. Handling costs, however, are substantial (by commercial parties). Airlines are not only interested in landing rights, but want full loads on the return flights as well.
- Flowers are still relatively new to supermarkets. They generally have less knowledge about the specific aspects of the flower business. They are rapidly learning the tricks of the trade. The situation is gradually improving. Question: how can we as a sector better inform our supermarket partners?

### **Prioritisation:**

Prioritising the bottlenecks lead to the following Top-10 of the 'Wish list for improvements':

11. Matching phytosanitary inspections with 24/7 requirements. (14x)
12. Knowledge & awareness: importance of cold chain requirements. (11x)
13. Quality of box vs. cost price of box. (8x)
14. Government export and import services. (7x)
15. Documentation: some information is filled in up to 3 or 4 times. (7x)
16. Create and conform to standards (handlers) + certification for handlers. (5x)
17. Boxes used in Kenya appear acceptable. (4x)
18. Safety, security, compliance. (3x)
19. Bouquet making - VAT discussion. (3x)
20. Cooling capacity at the airport. (3x)

Priority issues were found among all six main challenges.

## **5 Conclusion**

The platform meeting validated the necessity of this study on the horticultural supply chain and the initiative to create a lasting platform for continued improvement. All stakeholders present acknowledged the need for improvements and showed openness to interaction and close communication. The meeting was characterised by a positive and open atmosphere.

The workshop identified and prioritised the following issues:

5. Matching phytosanitary (and other government) services with 24/7 requirements.
6. Knowledge and awareness of cold chain requirements.
7. Packaging inefficiencies.
8. Electronic information and documentation.
9. Creating standards/protocols and importance of compliance.