

Sustainability in floriculture

Are there any differences between sustainable measures applied to Dutch and Kenyan floriculture and what are the effects of these measures on costs?

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By

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31 December 2012,

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Executive Summary

This literature study compares sustainable measures in Kenyan and Dutch floriculture. It includes the effect on costs. The research presents also an idea for business people to decide whether to move to developing countries for rose production or not.

To this aim, sustainability is analysed, with emphasis on the supply chain of roses. The green consumer is an essential issue. The green consumer is becoming environmentally conscious. Extensive research concludes what the consumer wants, providing opportunities for companies in the supply chain. Increasingly environmentally conscious consumers ultimately have an effect on companies. The rose is not a climate friendly flower and has some impact on the environment, because it constantly needs water, light and heat during the growth. The rose industry is also labour intensive, and therefore relies heavily on employees. Rose production in the Netherlands and Kenya in these countries is different due to socio-economic and technological divides. Kenya is an underdeveloped country, while the Netherlands is not. The floriculture in both countries is analysed.

The flower industry is growing in Kenya, but in the Netherlands the flower industry is decreasing. Kenya has a better climate, because it is warm and sunny; although the depletion of water sources is relevant there. The climate in the Netherlands is not ideal for growing roses. It has mainly cool summers and mild winters, but not enough sunlight available. This climate leads to high emissions of carbon dioxide, because of the higher demand of energy (heat/light). Labour conditions are better in the Netherlands compared to Kenya. Labour costs, energy costs, land and greenhouse constructions are expensive in the Netherlands, but transport costs are lower compared with Kenya because the market is closer. The impacts on labour, water footprint and the carbon dioxide emissions are discussed in further detail for both countries.

This study indicates that sustainability is a criterion for the consumer and that it is important for companies nowadays. It is important to bring the organization's capacity to bear to decrease the impacts on people and planet. Measures are taken for reducing the impact on the people and planet. This leads to better quality for the environment and better living conditions, better living conditions is important especially in Kenya. In the Netherlands is image more important for the impact on people and productivity increased by means of mechanization.

Consumers are becoming more environmentally aware. Expenditures are made based on consumer demand. Consumer demand is an important issue for producers because it determines how much they sell and at what price. Environmentally awareness of customers has led to new markets. This study assumes that measures entail cost reduction in the long term. Measures have indirect effect on the costs. When the cost price goes down, the selling price of the roses can be lowered. So, sustainable companies have competitive advantage. There are several measures used to create a detailed overview of how the sectors are sustainably developed in both countries. As consumers become more environmentally aware, this creates a bigger market share for sustainable companies. The revenue will constantly rise, so measures have indirect an effect on costs, which ultimately determines the cost price. So, sustainability leads to cost reduction. Due to the competition of both countries, it is important that the grower keeps the costs as low as possible.

This study revealed that the cost aspect outweighs the sustainability aspect. However, it is not possible to conclude completely if it is wise for business people to move to developing countries for rose production or not.

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1. Introduction

The Netherlands is characterized by high population density, high percentage of agricultural land use and an intensive agricultural sector dominated by horticulture and livestock production. There is a diversity of Dutch horticulture. This is defined as the cultivation of flowers, fruits, vegetables and ornamental plants. The floricultural sector is a globally dynamic sector in the Netherlands. It has an extremely wide assortment of products, and is the largest flower and plant producer in the EU. The flowers and plants are primarily produced for export (Rikken; 2010). The flower industry in the Netherlands is highly mechanised and specialised. It is heavily dependent on fossil fuels, borrowed capital, chemical fertilizers and pesticides (Reganold et. al.; 1990). While the Netherlands remains the largest producer of cut flowers worldwide, developing countries such as Kenya have become strong players in global markets (Dolan, et. al.; 2002). Floriculture in the Horn of Africa has developed since the 1990s. The flower industry is fairly mature and stable in Kenya (Lans, van der; et al., 2011). 70 per cent of flower farms are located around Lake Naivasha; in nearby Nairobi flowers are grown mainly in greenhouses (Awuor; 2012). Almost all flowers (roses) are exported, to Europe. Floriculture is a booming business in Kenya and they produce at lower costs, even adding transportation costs to the Dutch auctions (Lans, van der; et al., 2011). The industry is not mechanised and specialised; most of the work is done by hand. Dutch growers feel the competition from African producers (Rikken; 2010).

In the flower industry, the soil productivity is declining and thereby deteriorating the environmental quality. Profitability is reduced and threats arise to human and animal health (Reganold et. al.; 1990). The impact of agriculture on natural resources is a major global concern, namely environmental change. Important issues of environmental change are the pollution of air and water, and climate change (Spiertz; 2009). Activities in floriculture have negative impact on natural resources. After recent food crisis's, the EHEC bacterium in the agricultural sector, the BSE crisis and classical swine fever, (Spiertz; 2009) sustainable farming becomes more important. This has also effect on the floriculture in which sustainable measures have taken place during the years. Agricultural land increasingly suffers from degradation. Water becomes scarcer and this is a key element in the agricultural sector a (Wognum, et. al.; 2011). The reduction of harmful substances in products and the reduction of carbon dioxide are issues in the agenda of the business-to-business buyer (Hoeksema, et. al.; 2009).

Sustainable floriculture production is an issue nowadays for growers, but most do not have a clear understanding of sustainability. The consumer is responsible for what happens because they buy the flowers. Companies can no longer afford to do nothing with sustainability. This means floricultural companies must integrate economic, ecological and social aspects (also called the triple bottom line) in the production chain for flowers (Hoeksema, et. al.; 2009).

It is a powerful way to grasp the floricultural industry and to measure its success in terms of economy, environment and the society. This study is focussed on the social and environmental aspects: labour, water footprint and the emission of carbon dioxide. Also the research will be focussed indirect on costs. So the research will focus on several different points:

- The current situation of the floriculture in Kenya and in the Netherlands;
- What measures are taken in the floriculture regarding sustainability (labour, water footprint and the emission of carbon dioxide);
- Impact on costs and competitive advantage.

1.1 Problem definition

This section provides a short description of the problem and gives motivation for choosing this topic.

The agricultural sector is very important in Kenya; it contributes 22 per cent of the Gross Domestic Product (GDP). In the Netherlands it contributes only 2.7 per cent (CIA; 2012). Floriculture belongs to the branch of horticulture which is a subcategory of the agricultural sector. Floriculture is a large business in Kenya and the Netherlands. Kenya is the largest flower producer in Africa, while the Netherlands is leading the market. The flower industry in Kenya counts 3,400 hectares, in the Netherlands 5,331 hectares. The flower industry in Kenya is booming compared to the Netherlands where the area decreases (Rikken; 2011). The Netherlands has a better-developed air and ground infrastructure compared to Kenya. Kenya has a better climate, warm and sunny, and 64 per cent of the work force work in the flower industry (Dolan et. al.; 2002). The main and famous production area of floriculture is situated around Lake Naivasha (KFC; 2012). The flower industry in the Netherlands has been concentrated traditionally in Westland and nearby Aalsmeer (Kargbo et. al.; 2010). The rose is the main production flower in Kenya; 87.7 per cent of flower production consists of roses; this is not the case in the Netherlands, one reason for this may be that the production costs are much higher in the Netherlands than in Kenya. The floricultural supply chain of 'roses' begins with the grower. In this study, only the rose production of the Netherlands and Kenya will be compared. Rose production in these countries is different due to socio-economic and technological divides. Kenya is an underdeveloped country, while the Netherlands is not.

The rose production is not environmentally friendly. Roses need constant water supply during their growth. For one rose, the water footprint is estimated at 7-13 litres (Mekonnen et.al.; 2011). This means that the water level is decreasing and this leads to serious water and food problems especially in Kenya where water is scarce; in the Netherlands water is better available. In the Netherlands the carbon dioxide emission is six times higher than in Kenya. This difference exists even when air transportation is included and this is due the lack of sunlight; heated greenhouse cultivation is essential what leads to high carbon dioxide emissions. The Kenyan rose industry plays an important role in the development of the local infrastructure, such as hospitals, hotels and schools. There are 440,000 jobs related to the cultivation of roses in Kenya (Steward Redqueen; 2011). In the Netherlands this figure is much lower because fewer roses are produced.

Underdeveloped countries typically have technical, economic and medical deprivation. They have no significant level of industrialization, poorly developed service sector, large agricultural sector, low standard of living and gross national product (expressed in money) (Wikipedia; 2012, World Bank; 2012). Sustainable development has become a major point in underdeveloped countries, especially for social and environmental impact. Developed countries use more of the world's natural resources, both renewable and non-renewable. Sustainable development is especially important for the environmental impact of these countries (Petitjean; 2008). In this study, their social and environmental differences will be discussed in more detail.

Via the wholesalers and distributors, the roses from both countries arrive at the retailer. Nowadays consumers have certain expectations about products with a good price-quality ratio. Sustainability is a criteria too (Spiertz; 2009). The population is increasing and will reach nine billion by 2050, according to predictions by the UK Government-sponsored Foresight Report (GO-Science; 2011). The demand for agricultural products will increase constantly. However, activities in agriculture have negative impact on natural resources harnessed for the production of vegetables, fruit, flowers and other products (Spiertz; 2009). This leads to rising pressure on natural resources (Spiertz; 2009). FAO concludes that over the next thirty years, many agriculture-related environmental problems will become serious if we continue at this rate (Rienkse et. al.; 2006). This means that it is very important that organizations deal with the resources of the planet now, so this study is focussed on sustainability. It is important to know what sustainability means for consumers. Retailers can meet these expectations, which are passed towards the earlier actors in the chain, like the grower,

wholesalers and distributors. Sustainable floriculture production is an important issue for growers. Labour, water footprint and the emission of carbon dioxide are the key issues of this literature study. They are the most important issues in floriculture according to two experts, one grower in Kenya: ING. B. Louwerse and a scientist of Wageningen UR: Dr. H. Boerrigter. Labour is important in this sector because it is very labour intensive. There is also a visibility awareness of their water stocks because the use of water for flower farming is inevitable (Visser; 2012). There is criticism with regard to the potential negative externalities of carbon dioxide (Leipold et. al.; 2011). Transport from Kenya to the market in 'Europe' is enormous compared with growers in the Netherlands. In this study, their social and environmental measures to decrease the impact on people and planet will be described in more detail. The research will be focussed also on the costs (profit). To present an idea for business people to decide whether to move to developing countries for rose production or not, with regard to the most important issues in floriculture selected by the two experts.

1.2 Research objective

This objective of this study is to increase the knowledge regarding sustainability in floriculture. Sustainability in this study is viewed in two dimensions; people and planet. The aim of this project is to find out what the different sustainable measures are between Kenya and the Netherlands with regard to labour, water footprint and the emission of carbon dioxide. Those measures are taken to reduce the impact on people and planet. The next aim is to examine the effect of sustainable measures on the costs. *"Does sustainability lead to cost reduction?"* And to present an idea for business people to decide whether to move to developing countries for rose production or not.

Based on this research objective, the general research questions were formulated.

1.3 Research questions

1.3.1 Main question

Are there any differences between sustainable measures applied to Dutch and Kenyan floriculture and what are the effects of these measures on costs?

1.3.2 Sub-questions

- I. What means sustainability in the literature?

This sub-question will result in a definition and this definition will be used in this research. In this paragraph the focus is also on the supply chain.

- II. What does floriculture look like in Kenya and the Netherlands? What kind of impact does this sector have on the people and planet issues?

The second question shows an overview of what the floriculture looks like in Kenya and the Netherlands and what kind of impact it has on the social and environmental issues. These issues are related to labour, water footprint and the emission of carbon dioxide.

- III. What sustainable measures are defined in the floriculture of Kenya and the Netherlands?

In the third question, what kind of sustainable measures have been created, specifically on the impact on the social and environmental issues? These issues are related to labour, water footprint and the emission of carbon dioxide.

- IV. What is the potential impact of sustainability on the production costs in these countries?

This question will help analyse if organizations should use sustainability explicitly for better competitive advantage or market growth because: "Does sustainability lead to cost reduction?" This question presents also an idea for business people to decide whether to move to developing countries for rose production or not.

1.4 Research Design

1.4.1 Scope and limitations

There are a couple limitations within this study.

This literature study is about sustainability in floriculture, so it requires an appropriate definition that will analyse the problem statement. This definition forms the basis of this literature study.

Sustainability is nowadays a criterion for the consumer and important for companies. This study is focussed on sustainability, and it is therefore important to know what it means for consumers. If the retailer can meet these expectations, they pass to the earlier actors in the supply chain, like the wholesaler, auction and grower. This study is focussed on the grower. This is the first limitation.

Secondly, this study focuses on the floriculture of “roses” because the rose is the main production flower in Kenya. During its growth it needs constantly water which makes it is not a very sustainable produced flower. The Netherlands produces also roses, although the area is decreasing due to the high production costs. The production of roses belongs to the category greenhouse horticulture in both countries. Next, focus is on floricultural areas. 70 per cent of the production of flowers is concentrated around Lake Naivasha in Kenya (Awuor; 2012). In the Netherlands, the flower industry is concentrated in Westland and nearby Aalsmeer (Kargbo; 2010), so this study focuses on these areas. The literature provides various environmental pollutions. This research is focussed on these pollutants caused by the flower industry in designated areas.

A conversation with two experts, one grower in Kenya: ING. B. Louwerse and a scientist of Wageningen UR: Dr. H. Boerrigter brought the focus primarily on labour, water footprints, and the emission of carbon dioxide. The ‘rose’ industry has the heaviest impact on these three elements. Omitted in total are economic aspects such as good jobs, fair wages, security, infrastructure, fair trade. Social aspects such as community and culture and other environmental aspects such as restoration are also omitted. This research examines the sustainable measures based on labour, water footprint and the emission of carbon dioxide. Those are the key issues of this literature study. The ‘rose’ industry is labour intensive, and therefore relies heavily on employees. The ‘rose’ industry uses a lot of water, which is nowadays scarce. Transportation is also an important issue because the emission of carbon dioxide causes the greenhouse effect. Due to lack of time, this report only analyses sustainable measures for these three aspects.

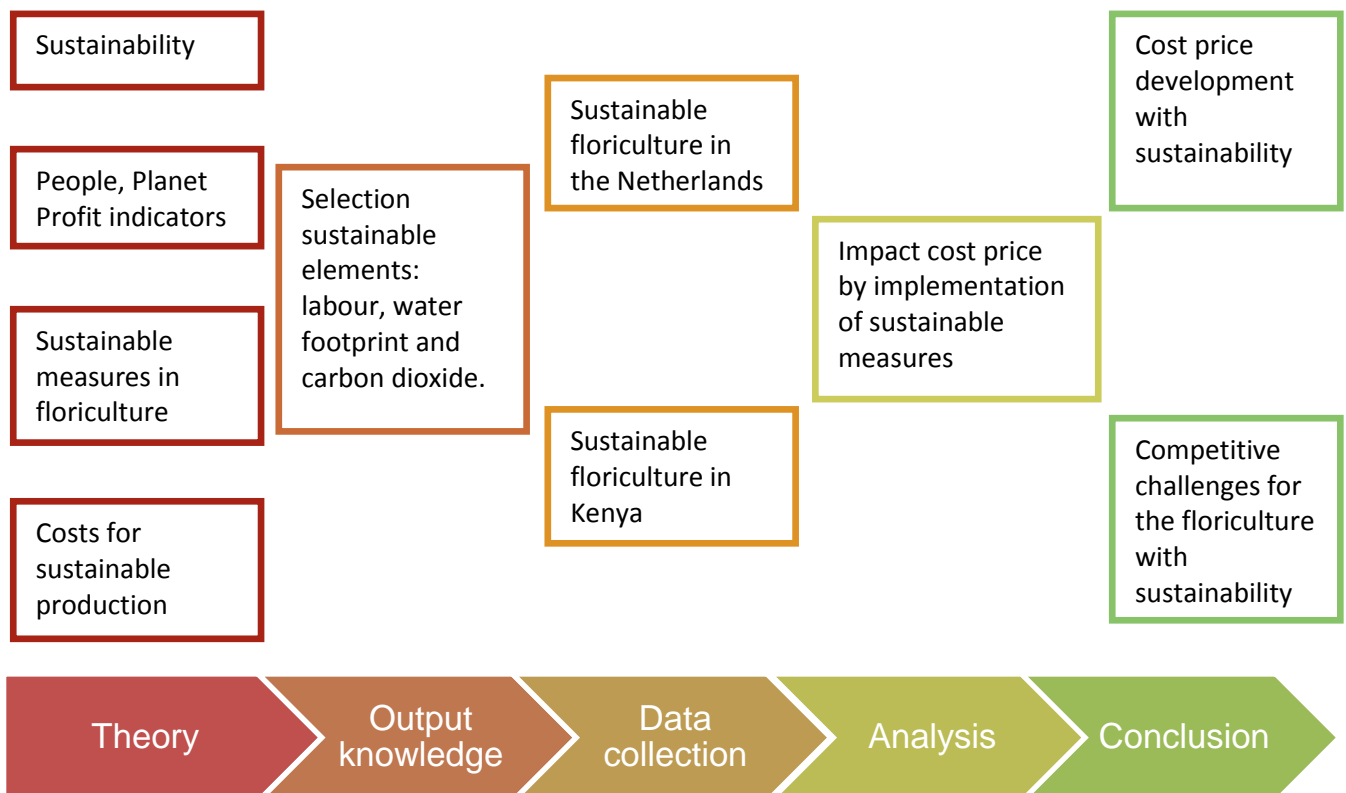
The last limitations are the sustainable measures in both Kenya and the Netherlands and what effect these measures have on costs. Focus should be especially on the cost price. The scientific findings will draw a conclusion. The conclusion will be characterized by: *“Does sustainability lead to cost reduction?”* and present an idea for business people to decide whether to move to developing countries for rose production or not.

1.4.2 Methodology

The objective of the research is to increase the knowledge regarding sustainability in the rose industry. To find out what the differences are between the sustainable measures applied to both countries and to find out what the effects are of these measures on costs. The research presents also an idea for business people to decide whether to move to developing countries for rose production or not. People and Planet, ‘two indicators of the triple bottom line’ will be used in this research as indicators for sustainability. The third indicator of the triple bottom line; profit will be used indirectly in this research as indicator for costs.

The literature study has been carried out with scientific journals and books gathered via the databases: Scopes, Web of Science and Google Scholar of Wageningen University. Also the databases of ‘Productschap Tuinbouw’, FAO and CIA have been used.

1.4.3 Research framework



1.4.4 Report set up

The literature study has eight chapters. The aforesaid objectives are addressed through the following chapters.

Chapter 2; highlights the general overview of the study area. In this chapter, brief information about sustainability of the study has been described.

Chapter 3; contains the brief description on existing literature review and general background information on the floriculture in Kenya. Floriculture impacts the triple bottom line and this chapter will focus on relevant issues for this study. It contains three categories; labour in Kenya, the water footprint and the emission of carbon dioxide.

Chapter 4; the structure is the same as chapter 3, but focuses on the Netherlands. The same categories are applied in this chapter; labour, the water footprint and the emission of carbon dioxide.

Chapter 5; is focussed on sustainability in practice. Various measures are appointed whereby the given issues will improve. The impact on people and the environment are described in the two previous chapters. These measures are taken to produce in a more sustainable way.

Chapter 6; is focussed on the cost price, specifically on cost reduction because this is the most common motivator in sustainability. It is important to know how the costs of the product arise and what effect measures have on the cost price.

Chapter 7; contains the conclusions in this study.

Chapter 8; discuss the results in this study and various points brought up for discussion for a possible follow-up study.

At the end of this report are the references and appendixes.

2. Sustainability and the supply chain

2.1 Sustainability

It is difficult to have an exact definition of sustainability. For the purpose of this paper, it is better to look at definitions of sustainability that will help analyse the problem statement. This section provides an overview of literature about sustainability and some key concepts in this area.

History

In 1980 at the World Conservation Strategy, the concept of “sustainable development” was produced by IUNC. “Sustainable development” sustains ecosystem services and biodiversity. In 1987, they shifted the meaning of sustainable development in the Brundtland Report. The meaning was at that moment: *“That development meets the needs of the present without compromising the ability of future generations to meet their own needs”*. This definition was used in 1992 at the UN Conference on Environment and Development held in Rio (UNCED). This conference resulted in sustainability splitting into three concepts; the social, environmental and economic issues (Sutton; 2004).

In 2005 the Kyoto protocol started. This protocol is part of the International Convention of United Nations Framework Convention on Climate Change (UNFCCC) in which the reduction of greenhouse gases is described, including carbon dioxide (Nations; 1998). A sustainable development was this protocol on global scale. The objective of the Kyoto protocol is to reduce emissions of the greenhouse gases by an average of 5 per cent from the year 1990. This treaty was negotiated in 1997 and signed by almost all countries ratified, including the Netherlands. Canada and the United States are the only two countries that have not signed the treaty (UNFCCC; 2012). This development indicates that countries are aware of the fact that the greenhouse effect entails negative consequences and why measures take place in the field of carbon dioxide.

Definition

There are hundreds of concepts and definitions for doing business in a more social, environmental and economic way. In the literature sustainable agriculture has similar synonyms; ‘organic farming’, ‘biological agriculture’, ‘ecological agriculture’, ‘regenerative agriculture’, ‘agro-ecology’, ‘permaculture’, ‘green agriculture’, ‘low-input agriculture’, ‘alternative agriculture’ and ‘biodynamic agriculture’ (Hansen; 1995, Gullino; 2006, Anderson et. al.; 2011)

There are many definitions for doing business in a sustainable way.

Johannesburg World Summit on Sustainable Development defined sustainability as:

“Enough – for all- forever” (Willard; 2012).

Paula and others (1999) defined sustainability as:

“Sustainability is the continuous process of obtaining the same or better living conditions, for a group of people and their successors in a given ecosystem” (Paula et. al.; 1999)

Petitjean (2008) defined sustainability as:

“Development meeting contemporary needs without jeopardizing those of future generations” (Petitjean; 2008).

Marrewijk (2003) defined sustainability as:

“The overall quality of life in the future, that we continuing access to natural resources, it avoid lasting environmental damage and we leave our children and grandchildren an intact ecological, social en economic system” (Marrewijk; 2003).

Gullino and others (2006) claim that the three P’s (people, planet, profit) are acute in the agricultural sector (Gullino et. al.; 2006).

Hansen (1995) interpreted ‘agricultural sustainability’ in four different ways (Figure 1) which have different meanings in agriculture (Table 1).

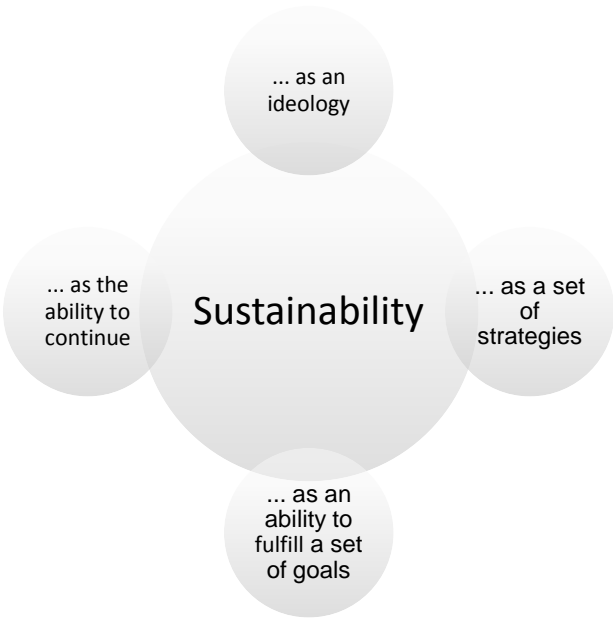


Figure 1: Categories of agricultural sustainability

Table 1: Interpretations of Agricultural Sustainability (Hansen, 1995)

<p><u><i>Sustainability as an ideology:</i></u></p> <p>‘Sustainable agriculture is a philosophy and system of farming. It has its roots in a set of values that reflect a state of empowerment, of awareness of ecological and social realities, and of one’s ability to take effective action.’(MacRae et. al.; 1990)</p> <p>‘... an approach or a philosophy... that integrates land stewardship with agriculture. Land stewardship is the philosophy that land is managed with respect for us by future generations.’ (Neher, 1992 in Hansen, 1995)</p> <p>‘... a philosophy based on human goals and on understanding the long-term impact of our activities on the environment and on other species. Use of this philosophy guides our supplication of prior experience and the latest scientific advances to create integrated resource-conserving, equitable farming systems.’ (Francis & Youngberg, 1990 in Hansen, 1995)</p> <p>‘... farming in the image of Nature and predicated on the spiritual and practical notions and ethical dimensions of responsible stewardship and sustainable production of wholesome food.’ (Bidwel, 1986)</p>
<p><u><i>Sustainability as a set of strategies:</i></u></p> <p>‘.... A management strategy which helps the producers to choose hybrids and varieties, a soil fertility package, a pest management approach, a tillage system, and a crop rotation to reduce costs of purchased inputs, minimize the impact of the system on the immediate and the off-farm environment, and provide a sustained level of production and profit from farming.’ (Francis, 1987 in Hansen, 1995)</p> <p>‘... a loosely defined term for a range of strategies to cope with several agriculturally related problems causing increased concern in the US and around the world.’(Lockeretz, 1988 in Hansen, 1995)</p>

Farming systems are sustainable if 'they minimize the use of external inputs and maximize the use of internal inputs already existing on the farm.'(Carter, 1989 in Hansen, 1995)

'... (a) the development of technology and practices that maintain and/or enhance the quality of land and water resources; and (b) the improvements in plants and animals and the advances in production practices that will facilitate the substitution of biological technology for chemical technology. (Ruttan, 1988)

Sustainability as an ability to fulfil a set of goals:

'A sustainable agriculture is one that, over the long term, enhances environmental quality and the resource base on which agriculture depends, provides for basic human food and fibre needs, is economically viable, and enhances the quality of life for farmers and society as a whole.'(American Society of Agronomy, 1990 in Hansen, 1995)

'... agricultural systems that are environmentally sound, profitable, and productive and that maintain the social fabric of the rural community.'(Keeney, 1989 in Hansen, 1995)

'... an agri-food sector that over the long term can simultaneously (1) maintain or enhance environmental quality, (2) provide adequate economic and social regards to all individuals and firms in the production system, and (3) produce a sufficient and accessible food supply.'(Brklacich et al., 1991)

'... an agriculture that can evolve indefinitely toward greater human utility, greater efficiency of resource use, and a balance with the environment that is favourable both to humans and the most other species.'(Harwood, 1990 in Hansen 1995)

Sustainability as the ability to continue:

'A system is sustainable over a defined period if outputs do not decrease when inputs are not increased.'(Monteith, 1990 in Hansen, 1995)

'Sustainability is the ability of a system to maintain productivity in spite of a major disturbance, such as is caused by intensive stress or a large perturbation.'(Conway, 1985)

'... the maintenance of the net benefits agriculture provides to society for present and future generations.'(Gray; 1991)

'Agriculture is sustainable when it remains the dominant land use over time and the resource base can optimally support production at levels needed for profitability (cash economy) or survival (subsistence economy).'(Hamblin, 1992 in Hansen, 1995)

According to the definitions above it can be observed that sustainability is discussed mostly in three concepts; people, planet, profit, also called the three P's or the triple bottom line.

In this study the focus is on the social and environmental aspects. Using the definition of Paula and others (1999): *"Sustainability is the continuous process of obtaining the same or better living conditions, for a group of people and their successors in a given ecosystem"* (Paula et. al.; 1999). In this research, other considerations are left out.

2.2 Triple bottom line

It is an important moment for businesses to create sustainability (Marrewijk; 2003, Pannell et. al.; 1999). Pannell and others claim that sustainability is useless if you don't create measurable definitions. He claims that the set of concepts (social, environmental and economic aspects) are fundamentally different in nature. This is why there is little success in identifying the definition of sustainability. He claims that making decision is important by focusing on the aspects of sustainability. According to him, the term "sustainable agriculture" is based on clear and measurable

definitions of its important constituent elements, as well as on other objectives (Pannell et. al.; 1999). Based on this, cost reduction asks “Does sustainability lead to cost reduction?”

Sustainability can be viewed in a social, environmental and economic dimension, the three P’s (Hindle; 2008). The social dimension involves poverty reduction and respect for labour rights. Examples are health and safety issues, community well-being, employment opportunities, charities, cultural sensitivities and requirements and organizational behaviour are attended in the social aspect. The environmental dimension involves factors relating to climate change, global warming, air, land and water pollution (or preservation) and ozone layer depletion (Hindle; 2008). This means according to Bedada (2011) wise use of natural resources, without deterioration of quality of life for future generations, and so water footprint and carbon dioxide belongs within this category. Adverse impacts on the environment arise from problems that are related to air and water pollution, soil erosion, water scarcity and deforestation (Bedada; 2011). The economic dimension involves the economic value created by the organization after deducting all the cost of all inputs, including the cost of capital (Hindle; 2008), see figure 2.

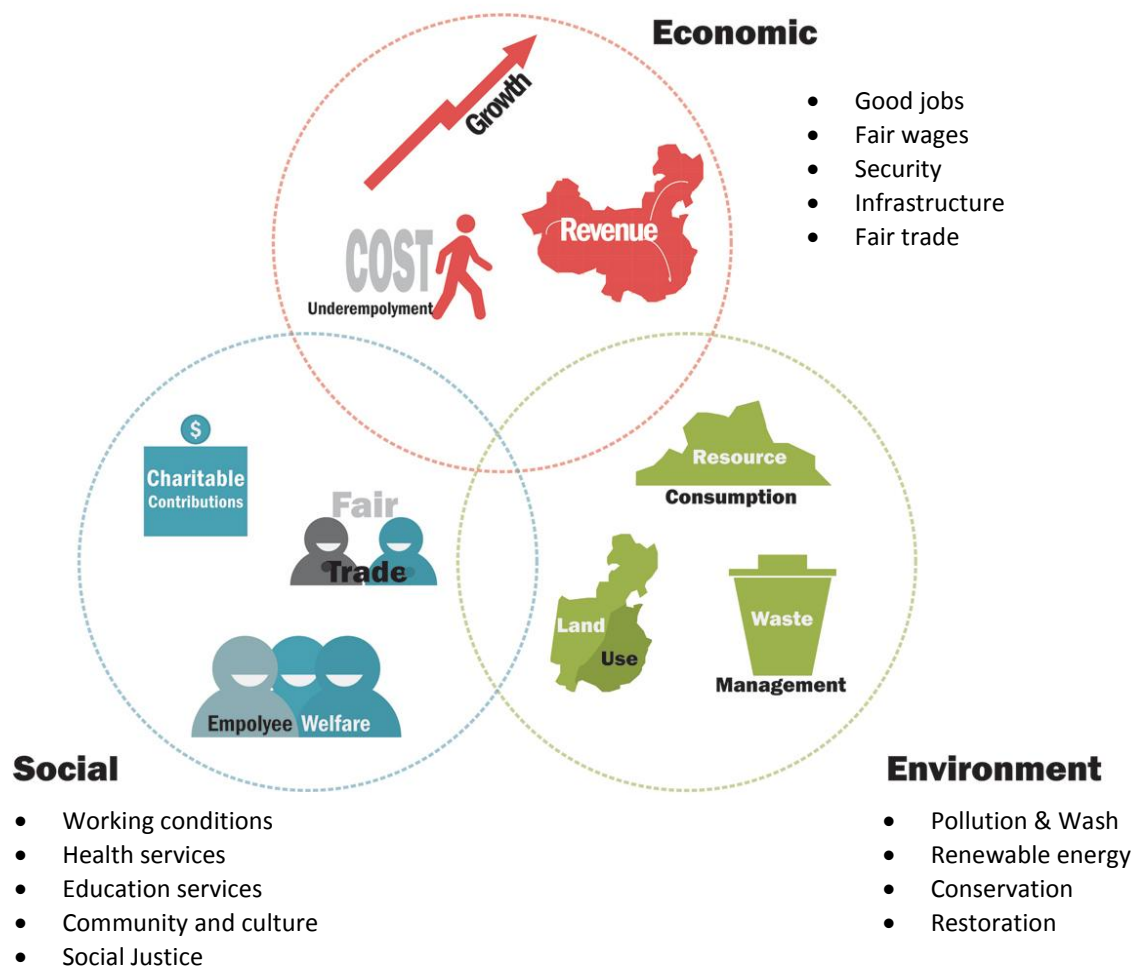


Figure 2: Graphic describing of the triple bottom line (Wikipedia; 2012, Willard; 2012)

The three P's are certain important statements according to Petitjean (2008):

- I. *"Natural resources are not inexhaustible; we have to change our development patterns and our behaviour to maintain the viability of our planet in the long term";*
- II. *"Environment conservation, economic development and social responsibility are not incompatible and can even generate innovation and productivity";*
- III. *"Our own development scheme is only viable if it takes into consideration the essential needs of the poorest"* (Petitjean; 2008).

Enhancing biodiversity and protecting the environment plays a significant role in agriculture. This occurs when agriculture is performed in a sustainable way which will take account of natural resources. Many sustainable measures have been taken place during the past years.

2.2.1 Triple Bottom Line and the relationship with CS and CSR

Corporate Sustainability' (CS) is the ultimate goal with 'Corporate Social Responsibility' (CSR) as an intermediate stage. This is where companies try to balance the Triple Bottom Line (TBL) according to Lassi Linnanen and Virgilio Panapanaan from Helsinki University of Technology (Marrewijk, 2003).

The three bottom lines represent the social, environmental and economic dimension, also called the three P's. These can be translated into the 'Corporate Social Responsibility' (CSR). Companies should prepare the different bottom lines to create sustainability, see figure 3. One is the bottom line of a company's "people account". This is a measure in some shape or form of how socially responsible an organization has been throughout its operations. The second bottom line is the company's "planet" account. This is a measure of its environmental responsibility. The third bottom line is also the traditional measure of corporate profit. This bottom line refers to profit making and attaining and sustaining competitive advantages. It aims to measure the financial, social and environmental performance of the corporation over a period of time. A company that produces a TBL is taking account of full cost involved doing business (Hindle; 2008, Wikipedia; 2012).

However CSR and CS have separate paths. Sustainability relates to the environment and CSR refers to social aspect, such as human rights. Now many researchers consider CS and CSR as synonyms (Marrewijk, 2003).

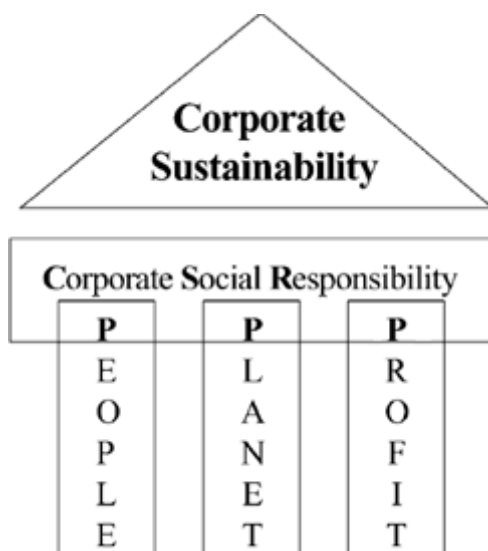


Figure 3: Relationship 3P framework, CS and CSR (Wempe and Kaptein 2002 in Marrewijk 2003)

2.3 Drivers of floriculture

The green conscience of consumers is more and more an issue in the supply chain (Hoeksema, et. al.; 2009). The consumer buying preferences influence the company's management towards sustainability. Stakeholders have some impact on sustainability, like the government or academic researchers. The government is a very important stakeholder because they have approve sustainable working practices, environmental organizations, financial institutions and supply chain actors (Wognum, et. al.; 2011). However Willard (2012) indicates that consumers and employees have the greatest impact on the way to manage sustainable expectations, because consumers could choose not to buy the product and employees may go on strike. Generally the corporate supply chain may be defined as the series of companies, including suppliers, customers, and logistics providers that work together to deliver goods and services to the end customer (Maloni, 2006). The traditional flower supply chain is depicted in figure 4.



Figure 4: Traditional Supply Chain

In the figure above the traditional supply chain is shown. Products come on the market through an import agent, and then go to the auction, wholesaler or an importing wholesaler. Another route can be; the flowers are bought by a wholesaler who them further processes and sells to domestic and foreign wholesalers and retailers (Rikken; 2010).

A conversation with two experts, one grower in Kenya and a scientist of Wageningen UR, brings focus on labour, water footprint and carbon dioxide emissions. Those are the sustainability aspects in floriculture. These are the main social and environmental aspect for both the Netherlands and Kenya.

2.3.1 The green consumer

A British economist; Paul Ekins, defines a consumerist society as one where *“the possession and use of an increasing number and variety of goods and services is the principal cultural aspiration and the surest perceived route to happiness, social status and national success”* (Paula et. al; 1999).

The products of ornamental horticulture need to meet consumer expectations (Joyce et. al.; 2007). Consumers become more unpredictable (Kargbo et. al.; 2010). Flowers are fashion items but it should constitute value for money and offer fitness for purpose (Joyce et. al.; 2007). In the research of Kargbo and others (2010) they do expect that the consumption per capita and production will increase worldwide because flowers influence the human feelings more than words and gifts (Kargbo et. al.; 2010). This means that there is a good market for flowers in the future.

It is important to know who buys what, when and why. The retailer knows what consumers want and they create some requirements. This means gardeners need to comply with these requirements (Kargbo et. al.; 2010), the so called pull effect. The UK is a pioneer in the sustainability market, all major UK retailers have their own codes; e.g. Tesco's 'Nature's choice' (Riisgaard; 2009). Retailers are the key actors in the whole supply chain. Their increasing demands create even more risks and uncertainties in an already unpredictable and complex environment. Examples of increasing demands are colour or packaging specifications (Hale et. al.; 2005). This means that products have high standards that offer diversity in colour, good texture, forms as well as better performance in the environment, long shelf life and sweet smell (Kargbo et. al.; 2010).

According to Energiek 2020 (2010), the PAS 2050 is currently one of the main international standards with the rules for the calculation of CO₂ of all products and services. Research has shown that consumers are becoming environmentally conscious and only reducing emissions is not enough.

Communication is important because consumers want to know how much CO₂ is realized during the production of roses. In an English supermarket (Tesco) the CO₂ footprint is already on the packaging. They have not started in the Netherlands, but no doubt it will in the future. According to Energiek 2020 (2010) a recent survey shows consumers like information on packaging, it results to a reduction of carbon dioxide because consumers buy less if they see it is more environmental friendly (Energiek 2020; 2010). This means that information is still important after the reduction of carbon dioxide.

Hines and others (1987), Petitjean (2008) and Rikken (2010) believe that people are more concerned about the environment all over the world. So, there is a growing awareness on the sustainable optimal design and planning of supply chains (Wognum, et. al.; 2011). Sustainable development has become a major point for people, especially people who live in developed countries. The stereotypical view of green consumers are young, female, well educated, liberal and wealthy (Hines et. al.; 1987). Recent studies have shown that:

- In France, sustainable development is considered by more than 90 per cent of the population as first, major challenge for the future. Besides, 83.4 per cent of the French consumers integrate sustainability as criterion into their purchasing pattern. 75 Per cent of the companies think that they should allocate more resources to designing eco-friendly products while 66 per cent of the companies do not trust the company communications and declarations that are based on “good Intentions” (Petitjean; 2008).
- In the USA, environmental awareness is increasing. 83 per cent of consumers choose the environmentally-friendly option. However, half of these people are willing to pay at least 5 per cent more for environmentally products. According to a recent study on American consumer behaviour (Petitjean; 2008).
- Social and environmental conditions concern a growing number of European consumers; previously consumers were only concerned about price, quality, and product safety. Producers supplying the European market are increasingly required to document their compliance with different social and environmental standards (Rikken; 2010).

These results mean that consumers are aware of the global pattern of labour rights, occupational safety and health and the last one the environmental abuses. These have pressed on sustainable measures in the flower industry. Nowadays, fair trade has become the yardstick to measuring the quality of flowers.

However, an increased awareness has not resulted in an increased market success of sustainable products. This is demonstrated by a recent study of Winter and others (2008). The purchasing behaviour is specified by many factors. CSR is one of them. When sustainable products and non-sustainable products are equal in price and quality, the share of consumers that choose for sustainable products will increase. Price and quality are the most important buying motives; a minority of consumers choose CSR as major buying motive. The SER notes also that the demand for sustainable products fell in 2003 (Winter, et. al.; 2008). Due to increased awareness of consumers, it results into voluntary codes, labels and regulatory standards. It gave some pressure on companies to account for the ethical impact or their operations (Dolan et. al.; 2002).

2.3.2 Social and environmental standards in Floriculture

To recognize sustainable products there are standards, also in the floriculture. In this study the social and environmental standards are covered. Those standards are also called process-standards. The process-standards are criteria for the way flowers and plants are produced. It is possible that those criteria influence the characteristics of end products. Product standards are specifications and criteria for the characteristics of products themselves (Riisgaard; 2009, Rikken; 2010). This study focuses on the process standards.

According to Rikken (2010) standards are “a documented set of rules, requirements of agreements, which must be met in order to achieve something like access to particular markets, the ability to sell to certain buyers or qualification to use a particular label” (Rikken; 2010)

A variety of standards and labels have emerged since the 1990s in the flower industry. The social and environmental standards differ significantly in origin, as well as in content, implementation and monitoring procedures. The early standards and labels were mainly set by producer groups or buyers. Later, NGOs and trade unions got involved in setting flower standards. This had more success because the first standards were relatively weak and relied mainly on internal monitoring. Subsequently a strong appeal arose for monitoring and certification (Riisgaard; 2009, Rikken; 2010,).

Labels are part of a global increase in non-governmental regulation. Dolan and others (2002) and Hale and others (2005) also claim that labels make reference to both Kenyan/Dutch labour and health and safety law, and the core conventions of the International Labour Organization (ILO) (Dolan et. al.; 2002, Hale et. al.; 2005). However, not all labels are materially identical. An overview is given in figure 5 about the social and environmental standards that currently is most relevant in the European flower and plant market. The list has 18 labels/standards, only the MPS-Florimark standard covers all three aspects: Social, environmental and quality. The list does not include unilateral retailer codes, for example codes from the UK supermarket.

MPS in general is an important code because the production is mainly for the export and the European buyers are increasingly going for sustainability. The relatively high percentage of certified companies is partly explained by the large size of the floriculture companies and the export orientation. Buyers from Europe exert increasing pressure on prices, and with this fierce arise of sustainable competition by Kenyan growers (Wijnands; 2003, Moosbrugger; 2007).

	Aspect covered		
	Social	Environ mental	Quality
Consumer labels			
EU Ecolabel / national ecolabels (Milieukeur)			
EKO			
Fair Flowers Fair Plants (FFP)			
Fairtrade Labelling Organization (FLO), Max Havelaar			
Flower Label Programme (FLP)			
Rainforest Alliance - Flowers and Ferns			
B2B standards			
Ethical Trade Initiative (ETI)			
GLOBALGAP			
ISO 14001			
MPS family: MPS-ABC			
MPS family: MPS-SQ			
MPS family: MPS-GAP			
MPS family: MPS-Florimark			
SA8000			
Developing country initiatives			
EHPEA Code of Practice			
FlorEcuador			
FlorVerde			
KFC Code of Practice			

Source: Rikken (2010)

Figure 5: Overview of social and environmental standards in the flower industry in Kenya and the Netherlands

Certification schemes are used as a management tool to professionalize their business; others have chosen to participate as a form for self-regulation. Another reason for growers is to profile their company as professional and sustainable. Growers expect better returns, for instance on the auction clock when the company name has a quality brand (Rikken; 2010). Some codes have been established through consortia of trade associations and producers in Kenya, those are sectoral codes. To introduce their own standards to promote ethical production, for example: Kenya Flower Council (KFC) and FPEAK, company codes are mainly in UK for the importer and supermarkets (Barrientos et. al.; 2003). Market segments open up when companies have a certificate, otherwise the companies would not be able to supply. Most growers participate in one or more certification schemes to comply with buyer requirements (Fidh; 2008). If exporting countries have no labels/standards they have a low level of export growth (Wijnands; 2005). In Kenya this is not the case, they have more labels because they are dealing with many direct sales channels (Fidh; 2008). Collinsen (2001) even claims that Kenya has one of the most codified flower industries in the world (Collinsen; 2001).

Table 2 shows the basic features of standards aiming to advance social and environmental conditions in the production of cut flowers. I made a selection with most social and environmental standards in the cut flower industry for both the Netherlands and Kenya from the table of Riisgaard (2009). This list is selected on basis of a conversation with both a Dutch and Kenyan roses' growers: J. Rodewijk and ING. B. Louwerse. Note that more detailed information about these standards is given in appendix 1. The list contains 8 standards and this list does also not include unilateral retailer codes or codes that are not important for this study. Certification requirements available in Kenya or in the Netherlands are shown in table 3.

Table 2: Social and environmental standards in the cut flower industry

Standard	Origin and structure	Release	Characteristics and cooperation
GLOBALGAP	Coalition of several of the biggest retail chains in Europe	2003	It defines the elements of Good Agricultural Practices (GAP). Integrated Crop Management (ICM), Integrated Pest Control (IPC), Quality Management System (QMS), Hazard Analysis and Critical Control Points (HACCP), worker health, safety, welfare and environmental pollution and conservation management.
MPS-(A,B,C,GAP)	Dutch growers and auctions	1995	Environmental management (MPS A, B, C) with optional social qualification (MPS-SQ- based on the ICC code) and MPS-GAP (benchmarked to GLOBAL-GAP). MPS-A together with MPS-SQ has been benchmarked to FFP
Kenya Flower Council	Association of Kenyan flower exporters	1998	Environmental and social certification system benchmarked to GLOBALGAP and with a recognition agreement with Tesco's Nature's choice' from 2006. KFC is certified to ISO 65 guidelines

Fair trade (FLO)	Fair trade labeling organizations and fair-trade producer networks	2006	Principles of fair-trade including a minimum price and a fair-trade premium, Until 2006, fair-trade flowers were certified by Max Havelaar cooperating with FLP and MPS
Flower Label Program (FLP)	German importers and wholesalers, NGOs and trade unions	1996	Environmental and social certification system benchmarked to the ICC base code
Fair Flower Fair Plants (FFP)	Union Fleurs (the national and international Floricultural Trade Association), NGOs and unions	2005	Environmental and social labelling scheme based on both the ICC and MPS-A criteria.
International Code of Conduct for Cut Flowers (ICC)	Developed by a coalition of European NGOs and the International Union of food and Agricultural Workers (IUF)	1998	Base code with criteria on human rights, labour conditions and basic environmental criteria.
The Horticultural Ethical Business initiative (HEBI)	Kenyan flower growers and labour NGOs	2003	Base Code on Social Accountability for the Flower Industry based on the ETI

Source: Riisgaard (2009)

Table 3: Certification requirements

Standard	Kenya	The Netherlands
GLOBALGAP	X	X
MPS-(A,B,C,GAP)	X	X
Kenya Flower Council	X	
Fair trade (FLO)	X	
Flower Label Program (FLP)	X	
Fair Flower Fair Plants (FFP)	X	X
International Code of Conduct for Cut Flowers (ICC)		X
The Horticultural Ethical Business initiative (HEBI)	X	

Source: Dolan and others (2002), Rikken (2010)

2.3.3 Challenges for companies in the supply chain

There are challenges for agriculture both in highly industrialized countries as well in developed ones. Labels/ standards deal with sustainability, but it is important to create value in the supply chain. One of the challenges in general comes from Gullino and others (2006). He claims that markets are increasingly demand-driven. Consumers will orientate more before they buy a product. Provide openness through information provision to consumers is important for companies (Gullino et. al.; 2006). According by Arthur D. Little. In the survey of 1999, done by Arthur D. Little has shown that 55 per cent of senior executives regard product design as most important mechanism for their companies to deal with sustainability (Wognum, et. al.; 2011).

Next to that is it also important to optimize supply chains with respect to environmental principles. Green supply chains increase not only the efficiency and reduce the environmental influences, but these chains also enhance the competitiveness and economic performance of a company (Nikolopoulou, et. al.; 2012). An efficient manufacturing process uses less energy and materials produced per unit. For example there is less waste and there are fewer intermediate stocks present (Hoeksema, et. al.; 2009). An example of Joyce et. al.; 2007, a well-organized supply chain is critical because a rapid and unbroken cold chain is an important practical consideration for the overall floricultural supply chain. It is for the preservation of quality, and this result in a bigger demand. An inefficient supply chain results in reduced returns for the producer. It has an effect on the reputation of the company. Joyce and others (2007) defined an efficient supply chain as: *“An efficient supply chain is critical to effectively meeting consumer expectations of quality, including freshness, and ensuring profitability to all stakeholders along the chain”* (Joyce et. al.; 2007). This means it has potential for revenue/ growth and cost reduction. Close relationships in the supply chain are important to embed a greater degree of transparency, responsibility and trust between growers, processors and retailers. It brings benefits for growers because communication improves and streams covering wastage, efficiency, environment and resources. These benefits can be passed to consumers. When a product is produced sustainably, it can be promoted to consumers (Wognum, et. al.; 2011, Willard; 2012).

2.4 Sub-conclusion

Sustainability is important because people 'all over the world' are more concerned about the environment. Growing awareness has arisen on the sustainable optimal design and planning of supply chains. What is sustainability? Agricultural sustainability has similar meaning in the literature. Sustainability is most times discussed as three concepts; the social-, environmental - and economic dimension, also called the three P's of the bottom line. This study focuses on the social and environmental aspect, so within this study the definition of Paula and others (1999) applies: *"Sustainability is the continuous process of obtaining the same or better living conditions, for a group of people and their successors in a given ecosystem"*. It is important for businesses to create sustainability, but people need to be informed about the product. This is done on basis of labels. Labels are part of a global increase in non-governmental regulation. The most common standards in the cut flower industry for both countries are: GLOBALGAP, MPS-(A,B,C,GAP), Kenya Flower Council, Fair trade (FLO), Flower Label Program (FLP), Fair Flower Fair Plants (FFP), International Code of Conduct for Cut Flowers (ICC) and The Horticultural Ethical Business initiative (HEBI). Not only labels/ standards deal with sustainability. It is important to create sustainability in the supply chain. Challenges for companies in the supply chain are:

- Consumers will increasingly orientate before they buy a product. Providing openness through information provision is important for companies, so creating a label/ standard on packaging is a challenge.
- The product design is also an important mechanism for their companies to deal with sustainability.
- Optimize supply chains with respect to environmental principles

3. Floriculture in Kenya

3.1 Country facts of Kenya

The Republic of Kenya is located in East Africa. The capital of Kenya is Nairobi, bordering the Indian Ocean, between Somalia and Tanzania (figure 6). Kenya has a total area of 580,367 sq. km. It consists of 569,140 sq. km. land and 11,227 sq. Km. water (CIA; 2012).



Figure 6: Maps of Kenya

It has a coast line of 536 km. The GDP (gross domestic production) of Kenya is \$72.34 billion (2011) and the growth rate is 5 per cent (2011 est.). It is the largest economy in East Africa (CIA; 2012). Kenya belongs to the poorest countries (underdeveloped countries) of Africa and there is a structural food deficit present (KFC; 2012, World Bank; 2012). Fresh drinking water is scarce and this result in a high infection rate. Constantly is there a risk of an epidemic because a high percentage of people live in slumps. Incomes and the general education level are low in these areas. There is a lack of job opportunities and this leads to a high unemployment rate of 40 per cent. The population growth rate is much higher than the possible economic development and this is a main problem (Gulis, et. al.; 2004).

During the years most developments were focused in urban areas. This led to a large influx of migrants from the rural to urban areas. More people live below the poverty line in those areas because that influx goes together with political and economic instability (Gulis, et. al.; 2004).

Important key characteristics of Kenya are presented in table 4. More background information of Kenya, including size, population and some geographical and economic indicators can be found in appendix 2.1.

Table 4: Country description Kenya

Population	43,013,341 (July 2012 est.)
Population growth rate	2.444 per cent (2012 est.)
GDP (purchasing power parity)	\$72.34 billion (2011 est.)
GDP per capita	\$1,800 (2011 est.)

GDP growth	5 per cent (2011 est.)
Unemployment rate	40 per cent (2008 est.)
Area	Total: 580,367 sq. km Land: 569,140 sq. km Water: 11,227 sq. Km
Environment current issues	Water pollution from urban and industrial wastes; degradation of water quality from increased use of pesticides and fertilizers; water hyacinth infestation in Lake Victoria; deforestation; soil erosion; desertification; poaching.

Source: CIA, 2012

3.2 Kenyan flower industry

The agricultural sector is very important in Kenya; it contributes 22 per cent of the Gross Domestic Product (GDP). 3 Per cent of the national GDP is from the horticulture sub-sector while 0.2 per cent is from the flower industry (KFC; 2012). This means that the floricultural industry has yielded beneficial effects on the economy of Kenya. It is one of the most profitable agricultural undertakings in Kenya (Fidh; 2008). The flower industry have also created other businesses in surrounding villages, such as shops, hotels, restaurants, this has changed the local area (CIA; 2012).

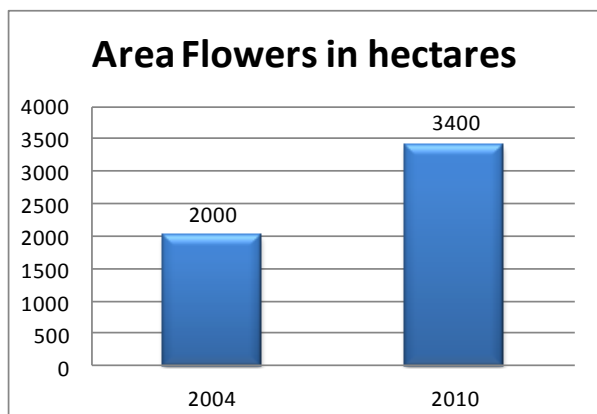
Agricultural products have a high ordering in the rank of industries. The rank ordering of industries is starting with the largest by value of annual output: Small-scale consumer goods (plastic, furniture, batteries, textiles, clothing, soap, cigarettes, flour) agricultural products, horticulture, oil refining; aluminium, steel, lead; cement, commercial ship repair, tourism (CIA; 2012). This means that the horticultural industry stands in third place.

The flower industry in Kenya is one of the oldest and most successful industries in Africa (Dolan et. al.; 2002). The result is Kenyan employees have a good experience in floriculture nowadays (Rikken; 2011). It began in the 1950s/1960s with a small scale trade (Dolan et. al.; 2002). In the last three decades, the floriculture developed to a relatively stable sector. In the 80's companies from abroad came to Kenya to start a floricultural business because transport by air was present and there was a good business climate. There was also a warm climate with enough sunlight (Dolan et. al.; 2002). Labour and energy costs are low compared to other countries, and Kenyans still don't pay import duty when they exporting their products to Europe (Rikken; 2011). This industry is developed to one of the most important "off-season" suppliers of cut flowers in the world (Dolan et. al.; 2002).

In the 90's there was been an explosive growth in the sector because the industry was mainly supported by its liberal macroeconomic policy environment and government encouragement of foreign investment and international trade (Fidh; 2008). At this moment there are 140 cut flower nurseries established, with an area of 2,100 hectares greenhouses and 400 hectares open ground cultivation (KFC, 2012). The greenhouses are plastic tunnel greenhouses. In the beginning, the area of roses grew extreme. In 1996, Kenya had 425 hectares roses, but that grew to 585 hectares in 1997. See table 5 on page 26.

In 2010, KFC had over 2,500 hectare for the floriculture, but the research of Rikken (2011) speaks of 3,400 hectares in 2010. This means that the registration of companies and the number of hectares are not sufficiently maintained. Explosive growth concludes there was about 2,000 hectares cultivation in 2000 (Rikken; 2011) see graph 1. No other detailed information was found about the

area roses in Kenya later. The rose is the main production flower in Kenya. They produce 87.7 per cent roses, 7.4 per cent Carnations and 1.8 per cent Alstromeria. Other flowers are for instance: Gypsophilla, lilies Eryngiums, arabicum, hypericum etcetera (KFC; 2012).



Source: Rikken (2011)

Graph 1: Kenya production area

The main and famous production area of floriculture is situated around Lake Naivasha, where 70 per cent of the flower farms are located. Most companies are owned by foreign, mainly Dutch companies (KFC; 2012). The lake is situated around 100 km northwest of Nairobi in the Great Rift Valley at an altitude of between 1,800 – 2,000m above sea level (Awuor; 2012). Lake Naivasha is the second-largest freshwater lake in Kenya (Mpusia; 2006, Awuor; 2012, KFC; 2012). The overall climate around Lake Naivasha is semi-arid (Mpusia; 2006). Different factors explain why most floricultural companies are located in this area. The key factors are:

- The Jomo Kenyatta International Airport (JKIA) is located nearby Lake Naivasha. It is a one hour drive from the city centre. Nairobi is a major hub in the East African region and served by major airlines, therefore there is an easy access into Europe and other parts of the world (Awuor, 2012);
- There is availability of fresh water resources for irrigation but besides this lake, there are lots of underground water resources available which the farms drill to use for irrigation (Awuor; 2012);
- The temperature and the annual rainfall range are good around Lake Naivasha. The annual rainfall ranges from 156.0 mm/month to 1134.0 mm/month. In April and May, there are long rains and October/November there are short rains (Awuor; 2012). This means 156 litres to 1134 litres precipitation on every m². This is relatively arid even though they have similar average rainfall to other continents (Pimentel et. al.; 1997), so “Kenya is a water scarce country” (Government of Kenya; 2007). The reason for this is the climate; Kenya has a warm climate. The temperature range in this region is between 7.3 – 22.7 degrees Celsius. This means that the climate is favourable for cut flower production. The climate ensures that 80 per cent of the water evaporates before it is ready for use (Pimentel et. al.; 1997).
- There were large, inhabited tracts of land with suitable soils for flower production available. The large tracts of land around Lake Naivasha were owned by white settlers. They leased out the fallow land to the large scale commercial flower growers. There is a clear trend towards scaling observed. This comes due the rising costs and the falling produce prices for Kenyan cut flowers (Awuor; 2012).

Not only around Lake Naivasha is floriculture situated, also around Kinangop, Nakuru, Mount Elgon, Kitale, Eldoret Kericho, Limuru, Kiambu, Athi Plains, Thika and the region of Mount Kenya. They are important areas for floriculture because the land is fertile around Victoria Nyanza and the volcano Mount Elgon (KFC; 2012).

The floricultural sector is the fastest growing part of Kenyan agriculture (Fidh; 2008). Kenya has had an annual growth rate of 13 per cent in flower production and 15 per cent in production value during a period of over 20 years (Wijnands; 2005). This is due to the great improvement in logistics and infrastructure in this sector so grown (Kargbo et. al.; 2010).

All mature flowers go towards the export. In 2003, Kenya exported almost 61,000 tons of flowers; the volumes have been more than doubled since 1995. It has increased to more than 117,000 (2011) (KFC; 2012). The export volume and the value in Kshs are summarised in table 5. Not everything increased in the prices for cut flowers; especially roses have been declining over the last decade. A significant percentage has not been ranked in top-quality categories (Hale et. al.; 2005).

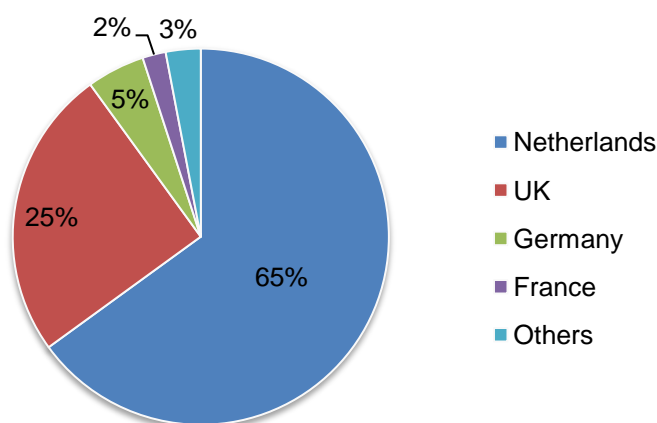
Table 5: Market data Kenya

Year	Volume In metric tonnes	Areal Roses (hectares)	Values in in Billion Kshs (1 Kshs = ± €0.01)
1995	29,374	-	3.64
1996	35,212	425	4.37
1997	35,853	585	4.90
2000	38,757	-	8.35
2001	41,396	-	10.63
2002	52,107	-	14.79
2003	60,983	-	16.51
2004	70,666	-	18.72
2005	81,215	-	22.90
2006	86,480	-	23.56
2007	91,193	-	29.74
2008	93,639	-	39.77
2009	117,713	-	36.70
2010	120,221	-	35.50
2011	121,891	-	44.51

Source: KFC (2012), Groot (1998)

Roses make up 74 per cent of Kenya's flower export. The Netherlands has the biggest market share of 65 per cent (Embassy of the Republic of Kenya in Japan; 2012). Since 2001, the Netherlands import more roses than it exports (CBS; 2010). Figure 7 shows the main destination for Kenya flowers. The UK has a market share of 25 per cent, Germany has a market share of 5 per cent, France of 2 per cent and other markets have a market share of 3 per cent (Embassy of the Republic of Kenya in Japan; 2012).

Flower export destination



Source: Embassy of the Republic of Kenya in Japan; 2012

Figure 7: Main destination for Kenya flowers

3.3 Social Impacts on the triple bottom line

3.3.1 Labour on cut flower farms

75 Per cent of the labour force works in the agricultural sector (CIA; 2012), mainly women. They comprise 64 per cent of the flower industry (Dolan et. al.; 2002) the research of Moosbrugger (2007) says over 75 per cent of the estimated 3.8 million Kenyans in total are directly employed in farm, livestock production and fishing (IMF; 2010). The flower industry has created other businesses, and this has led also to employment.

People, who work in the flower industry, get low salaries. Their wages do not match the costs of living. Due to the high temperatures, and exposure to chemicals in greenhouses, working conditions are harsh. The employees get some targets from the manager; if the employees not achieve their targets they get a warning. The worker is dismissed by two warnings. Serious sexual harassment and discrimination, and high proportions of casual workers occur in this sector. There are many labour rights issues on Kenyan farms, the following ones emerged during the literature study: Low pay, unfair dismissal, lack of adequate housing, excessive overtime, health and safety issues, deductions from pay, sexual harassment, lack of freedom of association, lack of severance pay, lack of contracts, short-term contracts, social security payment not met, lack of maternity leave and abusive supervisors (Dolan et. al.; 2002, Moosbrugger; 2007, Loukes; 2008, Fidh; 2008, Leipold et. al.; 2011).

Here is a selection of the most common phenomena in the field of labour condition, which this study is based on. These points are in the following articles always mentioned; Dolan and others (2002), Hale and others (2005), Loukes (2008), Fidh (2008) and Leipold and others (2011). The main common phenomena in the field of labour are:

- The high proportion of casual workers;
- Wages are too low for living a decent life;
- Inadequate working conditions;
- Serious sexual harassment and discrimination.

Workforce

The flower industry is a year round business (Smith et. al.; 2004). The study of Dolan and others (2002) show that the Kenya flower industry mostly depends on young, migrant, female labour. Woman comprise 64 per cent in the flower industry (Dolan et. al.; 2002) the research of Moosbrugger (2007) speaks over 75 per cent.

Young, migrant woman are better suited for quick, labour, intensive work. Based on the research of Catherine Dolan and others (2002) is concluded that 38 per cent of the employees are between 25-29 years old. More than the half of the female employees are aged between 20 through 29 years old; it has a total rate of 41 per cent, male employees have a total rate of 22 per cent see table 6. This high percentage can be explained by young workers are more flexible (Dolan et. al.; 2002). Table 6 summarized the gender by age. As you can see; women have played a major role in the floricultural sector in Kenya.

Table 6: Gender by age 2002

Age Group	Female employees (%)	Male Employees (%)	(per cent) Total
<20	2	-	2
20-24	19	6	25
25-29	22	16	38
30-34	10	12	22
35-39	9	1	10
40-44	2	1	3
Total	64	36	100

Source: Dolan et al. (2002)

The study of Smith and others (2004) show that 65 per cent of the workforce is temporary, seasonal or casual in the Kenyan flower industry. This percentage is high; it means that 65 people of the 100 have no fixed contract. An explanation for this can be the annual peaks of production. Those are around Christmas, Valentine's Day, Easter and Mother's Day. However, in those times is overtime generally compulsory and is particularly common. Normally, according to Kenyan law, regular working hours are 46 hours of work per week, but at those times they work 58 hours a week. This means that they work 12 hours overtime a week (Dolan et. al; 2002).

Women are concentrated in the segments of the production process, this process are most labour intensive. These include picking; packing and value added processing activities. Men are primarily engaged in spraying, irrigation, construction, packing in the cold store and maintenance. The activities involve risks. The activities for woman are intense and they require long periods of standing and bending, the activities for man can carry significant physical risk (Dolan et. al.; 2002)

Wages

In Kenya there is widespread poverty, because there is a high rate of unemployment, inequality in development and income distribution, however in the Poverty Reduction Strategy Paper (IMF; 2010) states that income poverty declined from 56.8 per cent in 2000 to 46 per cent in 2006. Around Naivasha poverty is between 30-40 per cent, at national level it is above 50 per cent (Moosbrugger; 2007). The data suggest that the floricultural sector contribute to poverty reduction in Kenya, but the research of Dolan and others (2002) claimed that 85 per cent of the respondents their wages not meet their basic needs, the wages are too low. Although wages in the flower-industry are low, they are better than the government minimum wage (Dolan et. al.; 2002). The low wages has impact on both men and women for example; women with children cannot afford to pay someone to look after their children while they are at work (Dolan, et. al.; 2002).

The study of Catherine Dolan and others (2002) confirmed this again with an example. The daily rate for a starting level general worker varies between Kshs 80 (€0.71) and Kshs 127 (€1.13) per day (Dolan et. al.; 2002). Besides that wages are low, also is there a little variation in wages between permanent, seasonal and casual employees. General workers are more expensive than seasonal workers, casual workers are less expensive. The study of Fidh (2008) confirmed this with an example. The monthly remuneration for general workers is Kshs 5291 (€47.13), seasonal workers Kshs 4791 (€42.68), a casual workers Kshs 4171 (€37.15) (Fidh; 2008). This study concludes directly that wages are raised compared with 2002; the daily rate varies between Kshs 139 (€1.24) and Kshs 176 (€1.57).

The research of Dolan and others shows also that the wages of male workers are slightly higher than those for women, because the working conditions as seen as “difficult discussions”, men standing for long hours without break and performing repetitive tasks.

Working conditions

The flower industry uses chemicals, fertilizers, insecticides, fungicides, nematocides. Some of them have potential to cause serious harm to the ecosystem and human health (Awuor; 2012). However, there are no studies or statistics found about pesticides use and over health effects in the flower industry in Kenya.

Due the high temperatures in the greenhouses and exposure to chemicals create harsh working conditions. The study from Smith and others (2004) showed that a few employees ‘from the 269 workers who are randomly selected for participation for this research’ had no knowledge of codes, despite the fact that some companies had been implementing them for several years. 22 Per cent of the employees (59 employees) have heard that codes are involved only for technical specifications. 7 per cent (19 employees) ‘a very small number’ are aware that the codes related to the rights of workers; see table 7 (Smith et al; 2004). This study concludes therefore that there is a lack of communication between the employees and the managers on this subject.

Table 7: Percentage of workers aware of codes and what codes are

	% aware of 'codes' (Including EUREPGAP, HACCP and other technical codes)	% aware codes relate to workers' rights
Kenyan flowers	22%	7%

Source: Smith and others (2004)

Furthermore the investigation of Smith and others (2004) showed that the security of employment is minimal. Many permanent and seasonal workers have written contracts, although in some cases the contents were limited to basic details of employment. For instance wages, duration of contract and number of leave days, and so the contract provides little legal advantage to workers. In addition, 57 per cent of the employees receive no copy of the contract, see table 8. The contract was often not written in their language. In total 10 per cent had no signed written contract. These results are shocking because working conditions are ensured on basis of the contract.

Table 8: Percentage of workers with written contract & copies of contracts in Kenya

	Written contract signed		Worker had copy	
	Permanent	Non-Permanent	Permanent	Non-Permanent
Kenyan flowers	59%	31%	24%	19%

Source: Smith and others (2004)

Sexual harassment and discrimination

Sexual harassment and discrimination occurs in the floricultural industry. Catherine Dolan and others showed this in their study (2002). It even appears that abuse by a supervisor is a common problem facing both male and female workers. This problem manifest in several ways including job harassment and verbal use, corruption and favouritism, dismissal without just cause, and sexual harassment of female workers by male supervisors. The research of Hale and others (2005) described how supervisors ask female workers for sexual favours in exchange for employment, time off, promotions or bonuses.

Sexual harassment occurs on all farms according to the research of Dolan and others (2002). The employees feel that they cannot complain because there is no suitable channel, without informing the management of the company (Dolan et. al.; 2002).

As noted earlier, there is also a clear gender division in labour and this is a socio-cultural tradition. Women work as harvesters, graders and packers, whereas men are working as spray men, irrigators, scouts, maintenance workers, security men, and greenhouse workers. In Kenya, women tend to respect male leaders more than female leaders (Dolan et. al.; 2002).

3.4 Environmental impacts on the triple bottom line

The Central Intelligence Agency (CIA; 2012) has summarized the most pressing environmental problem in Kenya, those are; water pollution from urban and industrial wastes; degradation of water quality from increased use of pesticides and fertilizers; water hyacinth infestation in Lake Victoria; deforestation; soil erosion; desertification; poaching (CIA; 2012). However, CIA did not shown what impact the flower industry has in the field of water and carbon dioxide.

3.4.1 Water footprint conditions

Roses need constant water during their growth. A flower farm consumes a high amount of water. For one rose, the water footprint is estimated at 7-13 litres. It depends on the yield and weight of a 'rose' flower stem (Mekonnen et. al.; 2012), one hectare consumes over 900 cubic meter water per month (Bedada et. al.; 2011). So, in Kenya they use about 2 250 000 cubic meter water (900 cubic met water x 2500 hectares) per month this moment. The six big farms located around Lake Naivasha; Logonot Horticulture, Delamere, Oserian, Gordon-Miller, Marula Estate and Sher Agencies, account according to the research of Mekonnen and others 56 per cent of the total operational water footprint around Lake Naivasha (Mekonnen et. al.; 2012) is 1 260 000 cubic meters of water.

According to Bedada and others (2011) several studies have shown that about 90 per cent of flower is made up of water and this means when you export flowers, you export water (Bedada et. al.; 2011). About 95 per cent of Kenya's cut flowers export comes from the area around Lake Naivasha (Mekonnen et. al.; 2012)

Water is important for the flower industry, but it is also the first necessity of life. The flower industry attracts a lot of people to this region. People want to work in the flower industry (Fidh; 2008), but also people who work for other companies, for instance: hospitals, hotels, restaurants etcetera. This area serves an important role as national asset (Mekonnen et. al.; 2012).

The cause of the degradation of water quality from increased use of pesticides and fertilizers in the flower industry has been confirmed in several studies; Fidh (2008), Kargbo and others (2010) Bedada and others (2011), Awuor (2012) and Mekonnen and others (2012). This means that Lake Naivasha is polluted; another cause is the water level is decreasing. This is from irrigation.

In whole Kenya is the population growing with 2.444 per cent (2012 est.) (CIA; 2012) this means also that clean water resources per capita is declining. This leads to serious water and food problems. For instance; in summer 2011, in the Horn of Africa came many animals and people to death to a shortage of water, but about a few kilometres away, roses are grown (Steward redqueen; 2011).

The main impacts for the water aspect in the flower industry are:

- Water contamination;
- Salinization associated with irrigation;
- Water level is decreasing.

Water contamination

Two studies have demonstrated that there an application is of excessive inorganic chemicals in the flower industry. Chemicals contain a large amount of fertilizers and pesticides. This is a negative aspect of the floricultural industry on the biodiversity in Lake Naivasha and on human health (Bedada et. al.; 2011 and Kargbo et. al; 2010). Kenya imports around 95 per cent of these pesticides and they use 5 per cent of its foreign exchange earning to import this substance and the research of Kargbo and others (2010) shows that the pesticides are not registered by the Kenyan government (Kargbo et. al.; 2010).

Floriculture companies who cultivate on substrate make use of freshwater. They mix the freshwater with substrate and pollute it with chemicals. The wastewater is discharged into local ecosystem after use, it is rarely purified. The chemicals and the substrate pollute the local waters (Awuor; 2012). Companies who cultivate in open ground directly pollute the ecosystem.

Due to the increase in agriculture, nutrients inflow from the farms and acts as a buffer to trap sediments, causing eutrophication. Not only are the 'commercial' farms around the lake responsible for this aspect, but also farms from the upper catchment (Mekonnen et. al.; 2012). Mekonnen and others (2012) conclude that an increase in nutrients is probably the combined effect of the loss of riparian vegetation, which acts as a buffer to trap sediments (Mekonnen et. al.; 2012).

Salinization associated with irrigation

Roses get by the full ground production process, irrigation water. According to Sonneveld (2004), most irrigation water has a high salt concentration and this causes salinization, especially by open ground cultivation. This is not the case when roses are grown on substrate (Sonneveld; 2004). Research has shown that growers grow roses most often with a substrate cultivation system (van der Lans et. al.; 2011). There is still salinization caused in this industry, but it fades during the years.

Water level

The research of Becht and Harper (2002) was showing that the lake was 3.5 meters lower than the hydrological records in 1998. However, it is also a natural phenomenon that the lake level of Lake Naivasha is fluctuating; besides it is a necessity for the functioning of the ecosystem. The lake is dependent on the rainfall this suggest Becht and Harper (2002) and so fluctuating is not particularly, but Becht and others (2005) conclude that the change of land use in the area of Lake Naivasha has also impacts on Lake Naivasha (Becht et. al.; 2005).

Mekonnen and others (2012) suggests that it has something to do with the flower industry; *“although the decline in the lake level can be attributed mainly to the commercial farms around the lake”* (Mekonnen et. al.; 2012).

I assume that the floriculture has some impact on the water level. Lake Naivasha is the water source for irrigation for flowers grown in Kenya. Since 1940 Lake Naivasha has been used for irrigation. Besides Lake Naivasha, there are also underground water resources. Flowers are cultivating in this area and get both; rain- and irrigation water. When floriculture companies make use of irrigation they drill the water from the freshwater environment (Awuor; 2012). The effect is that the water level drops.

3.4.2 Emission of Carbon dioxide

Cut flowers have a vase life of a few days to a couple weeks and they are highly perishable. It is important that the supply chain is uninterrupted and cold. A cold supply chain from the grower (when the flowers are harvested) until they reach the vase of the consumer. Cargo forwarders have invested in such facilities at the moment. The floricultural industry is an international industry and this means that flowers go all over the world. The market for Kenyan flowers is strong in the Netherlands, UK, Germany and France. Airfreight is the most important transportation for Kenya. It is important that loading the airplane should be done without delay, to keep the quality as high as possible (Wijnands; 2005). Planes use fossil fuels during the process of delivering cut flowers from farms to customer. It emits a considerable amount of carbon dioxide (CO₂). CO₂ stands for certain amount of gaseous emissions that will result mainly in air pollution. The emissions of carbon dioxide cause the greenhouse effect.

According to Dr. Ammanual Awuor (2012) is the Kenyan flower production characterized as; *“Kenyan produce is grown under the sun”*. Despite the excellent climate and the sunshine, the fact remains that there is an emission of carbon dioxide. Air pollution is the main effect in this paragraph.

- Air pollution

Air pollution

In the research of Bedada and others (2011) carbon emissions are displayed from flowers. The carbon is estimated between 7.7 and 8.9 kg per kilogram sold flowers. The main part of emission is responsible by the transportation by plane (Bedada et. al.; 2011). 95 Per cent of Kenya's cut-flowers export comes from the area around Lake Naivasha (Mekonnen et. al.; 2012). This has everything to do with the nearest airport 'JKIA' one hour from the city centre where Nairobi is located (Awuor; 2012). The emission of carbon dioxide causes acid rain.

In the period 1996-2005, the average virtual water export from the Lake Naivasha Basin related to the export of cut flowers 16 Mm³/yr (Mekonnen et. al.; 2012). In 1996 was the export volume 35, 212 metric tonnes, in 2005 81,215 metric tonnes (KFC; 2012). The carbon dioxide emission increased by a higher amount of virtual water 'flowers' that companies export (Mekonnen et. al.; 2012).

Despite the emissions of carbon dioxide is showed from the study of Williams (2007) that the production of roses in Kenya is more environmental friendly than in the Netherlands. Roses in the Netherlands emit 5.8 times more carbon dioxide (CO₂) than roses in Kenya (Kargbo et. al.; 2010). The study of Williams (2007) suggests also that the production and delivery of 12,000 stems of roses can emit 2,200 kg CO₂. This means also that flowers in Kenya are more environmental friendly, despite the fact that they are grown on the other side of the world.

3.5 Sub-conclusion

Republic of Kenya is located in East Africa and it has the largest economy in East Africa. However, Kenya belongs to the poorest countries (underdeveloped countries). The agricultural sector is very important in Kenya; it contributes 22 per cent of the Gross Domestic Product (GDP). 3 Per cent of the national GDP is from the horticulture sub-sector while 0.2 per cent is from the flower industry (KFC; 2012). There is a favourable climate for cut flower production, because it is warm and sunny, also the soil is good.

In the 80's companies from abroad came to Kenya for starting a floricultural business because transport by air was present and there was a good business climate. In the 90's there has been an explosive growth in the sector because the industry was mainly supported by its liberal macroeconomic policy environment and government encouragement of foreign investment and international trade. Kenya produces for 87.7 per cent roses. The main and famous production area is situated around Lake Naivasha; 70 per cent of the flower farms are located in this area. This has everything to do with the freshwater lake and the Jomo Kenyatta International Airport (JKIA). The floricultural sector is the one of the fast growing industries in Kenya. Kenya has an annual growth rate of 13 per cent in flower production and 15 per cent in production value during a period of 20 years. All grown flowers go towards the export. In 2003 Kenya exported almost 61,000 tons of flowers; the volumes have been more than doubled since 1995. Nowadays it is increased to more than 117,000 (2011). The markets for Kenya are: The Netherlands, UK, Germany and France. 75 Per cent of the labour force works in the agricultural sector, mainly woman. The labour is characterised by heavy working conditions, high proportion of casual workers, low wages, inadequate working conditions and sexual harassment and discrimination.

The rose needs constantly water during its growth. The flower industry has an impact on water, water contamination, and salinization. The depletion of the water source is most relevant in Kenya. In the Horn of Africa, many animals and people die from a shortage of water. The flower industry caused water contamination, salinization and water level decreasing. Floriculture companies pollute the water with chemicals. Salinization is caused by irrigation. Carbon dioxide emissions are increasing because this has everything to do with the export. Export increased enormously over the years.

4. Floriculture in the Netherlands

4.1 Country facts of the Netherlands

The Netherlands is located in West Europe and belongs to the European Union. It is characterised as a developed country. The capital of the Netherlands is Amsterdam, bordering the North Sea, between Belgium and Germany, see figure 8. The Netherlands has a total area of 41,543 sq. km; it consists of 33,893 sq. km. land and 7,650 sq. km water. It has a coast line of 451 km.



Figure 8: Map of the Netherlands

The GDP of the Netherlands is \$713.1 billion (2011 est.). It is the value of all final goods and services produced within a nation in a given year (CIA; 2012).

The Netherlands is characterized by a high population density, high percentage of agricultural land use and a very intensive agricultural sector that is dominated by horticulture and livestock production. The floricultural sector is a global and dynamic sector in the Netherlands. There is a great diversity of Dutch horticulture. The Netherlands is the largest producer of cut flowers worldwide. The assortment is extremely wide and has the largest flower and plant assortment in the EU. Flowers and plants are primarily produced for exports (Rikken; 2010).

Important key characteristics of the Netherlands are presented in table 9. More background information of the Netherlands, including size, population and some geographical and economic indicators can be found in appendix 2.2.

Table 9: Country description The Netherlands

Population	16,730,632 (July 2012 est.)
Population growth rate	0.452 per cent (2012 est.)
GDP (purchasing power parity)	\$713.1 billion (2011 est.)
GDP per capita	\$42,700 (2011 est.)
GDP growth	1.3 per cent (2011 est.)

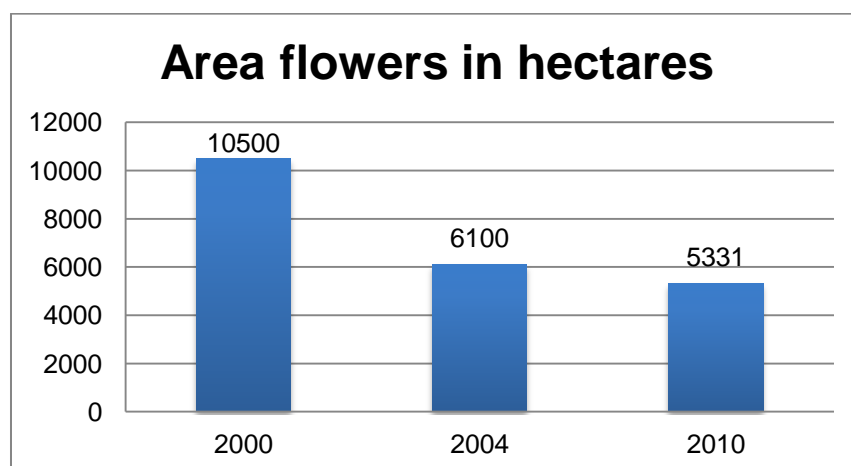
Unemployment rate	4.4 per cent (2011 est.)
Area	Total: 41,543 sq. km Land: 33,893 sq. km Water: 7,650 sq. km
Environment current issues	Water pollution in the form of heavy metals, organic compounds, and nutrients such as nitrates and phosphates; air pollution from vehicles and refining activities; acid rain.

Source: CIA (2012)

4.2 Dutch flower industry

Dutch floriculture is a dynamic industry at international level. It is an industry without subsidies. The Dutch industry has innovative marketing mechanism, advanced methods of production and distribution system; for instance the auctions. The Netherlands has a well-developed infrastructure by air and ground. It has been found from the literature that all the above aspects are related to the success of the flower-industry (Boone et. al.; 2007, Kargbo et al; 2010). The sector distinguishes itself with these points compared to other countries and is known on these points worldwide (Wijnands; 2003). However not everything support growing flowers because costs for labour, energy, land and greenhouse construction are high and government regulation is relatively strong (Rikken; 2011). Besides, the impact of the economic crisis was felt in the Netherlands and this has an impact on the demand.

The flower industry area was in 2000; 10,500 hectares (Boone et. al.; 2007) in 2004 was the area 6,100 hectares and in 2010 was it again decreased to 5,331 hectares (Rikken; 2011), see graph 2.



Source: Boone and others (2007), Rikken (2011)

Graph 2: Production area in the Netherlands

The number of greenhouses decreased by 28 per cent in the period of 2000-2006. That does not mean 28 per cent of floricultural greenhouses are lost. This is the total sector of glasshouse vegetables, cut flowers and potted plants. The number of greenhouses in the cut flower sector decreased from 2003 by 11 per cent. In 2006 decreased the number of greenhouses by 7 per cent. The average decreases come to 5.4 per cent a year. The average size increases since 2000 (Boone et. al.; 2007). Difficulty to achieve business succession could be the reason. In addition, the number of young people with an agricultural degree decreased considerably in recent years, this is due to the negative image of the flower industry.

It is expected that the declining will continue in the coming years. In 2015, the numbers of companies will be 4,200, concludes the study of Boone and others (2007). However, in the period 1990-2005, the production value of the Dutch flower industry increased. This means that a decrease of the total areal of cut flowers (inclusive areal of roses) leads to an increase in the production value. It can be concluded that growers utilize space more effectively than before. This is possible because growers are supported by services in terms of research and development (Rikken; 2011). This applies also in the production of roses (see table 10).

In 2009 there were 265 rose companies located in the Netherlands, 45 companies fewer than the year before. In period 2000-2009, the amount of companies that produced roses greatly reduced, from 765 to 265. The reason for this development is competition with other countries is fierce. The productions costs are much higher than, for instance in Kenya. The total area also declined. In 2000, the total areal roses were 930 to 532 in 2009 (Boone; 2007), see table 10. The area per rose farmer increased from 1.2 to 2.0 acres (CBS; 2010).

Table 10: Market data The Netherlands

Year	Total areal of cut flowers (in hectares)	Areal Roses (hectares) a)	Production value cut flowers million euro
1990		890	1 480
1995		920	1 614
2000	10 500	930	2 085
2004	6 100	850	2 137
2005		780	2 198
2006		750	2 270 a)
2009		532	

a) Provisional figures

Source: Boone (2007), CBS (2010)

The agricultural sector in total contributes 2.7 per cent of the gross domestic product (GDP). 2 Per cent of the labour force works in the agricultural sector (CIA; 2012). The flower industry in the Netherlands has been concentrated traditionally in Westland and nearby Aalsmeer. It has different factors, which is why most floricultural companies are located in this area. The key factors are defined according to Boone and others (2007), Kargbo and others (2010) and Rikken (2010):

- There are also flower auctions in these areas (Naaldwijk and Aalsmeer), which have an important role in international trade. These auctions are the largest flower markets in the world (Kargbo et. al.; 2010). The flower auctions in Naaldwijk and Aalsmeer are the most important auctions, because producers from abroad bring their horticultural products to these flower auctions (Boone et. al.; 2007). They make use of a clock system to determine the price of flower products (Kargbo et. al.; 2010). The auctions in Eelde and Venlo also attract foreign suppliers. This due, among other soil properties, climatic factors and the proximity to the markets (cities) (Boone et. al.; 2007).

- Both regions and Venlo were designated as Greenport for greenhouse farming in 2004. In 2006, floriculture is still in those regions. This policy involves a strengthening of competitiveness in the long term (Boone et. al.; 2007). Within this study, the Venlo area is not included because this area is relatively new. Therefore not much known about the impact of the triple bottom line.
- Close to large population concentrations (Rikken; 2010).

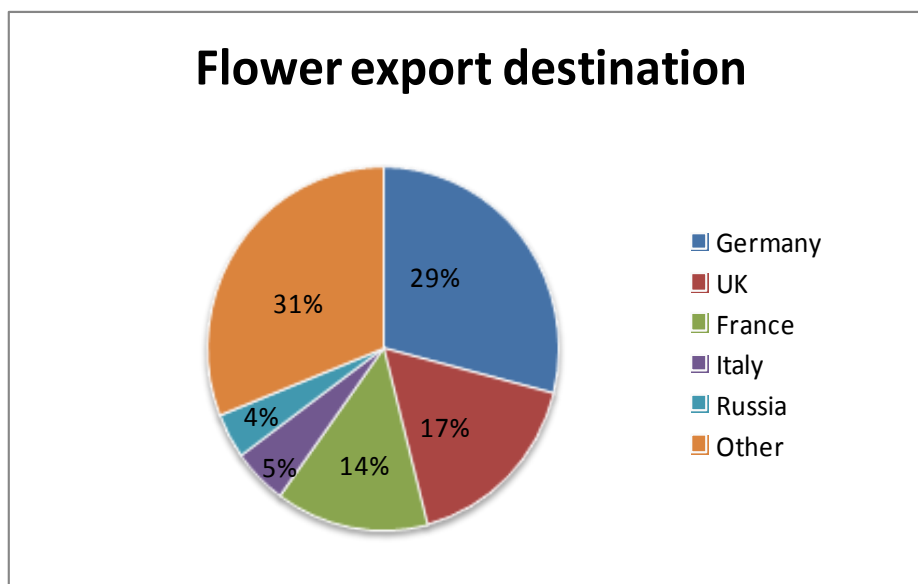
According to Market News Services (2008) the Netherlands produces only 10 per cent of world's production. The export volume counts 60 per cent of world export (Market News Services; 2008). In 2004 was the export volume amounted on 608,000 metric tonnes with a value of 3,000 million euro, the volume was increased to 639,000 in 2010 with a value of 3,151 million euro, see table 11 (Rikken; 2011).

Table 11: Export data The Netherlands

Year	Export volume In metric tonnes	Value in Million euro
2004	608 000	3 000
2010	639 000	3 151

Source: Rikken (2011)

The most important producing and consuming countries are close by; Germany, United Kingdom, France, Italy and Russia, see figure 9. The main destinations for Dutch planting materials are Kenya and China, these exports increased to 17.2 per cent in 2007 to 36.6 per cent in 2008 (Kargbo et. al.; 2010) this indicates that the flower industry is booming in Kenya.



Source: Rikken (2011)

Figure 9: Main destination for Dutch flowers

4.3 Social impacts in the Netherlands

4.3.1 Labour

People who work in the floricultural industry have low salaries compared with other sectors, but the salary is high for Kenya. Rose production is labour intensive, it counts 40 per cent of the production costs under Dutch glasshouse conditions (Berg; 1995). However, the working conditions are heavier compared to other sectors. In the literature, this is the main impact on labour.

In this sector are both permanent and temporary workers on work. Permanent contract give workers and employers security, but temporary contracts are more flexible because it is easier to dismiss (Boone et. al.; 2007). This has no adverse effect for the employees.

The study of Zeijts and others (2007) shows that the absenteeism of workers in agriculture and horticulture is lowest in the Netherlands; 2.6 per cent in 2006, against a national average sick leave of 4 per cent (2005). Farms are relatively small-scale in the agricultural sector compared with other sectors and well organize, leading to less absenteeism. Absenteeism in the agricultural sector decreased from 4.5 per cent in 2001 to 2.6 per cent in 2006. This comes due an effective absenteeism control by the agricultural sector (Zeijts et. al.; 2007).

Within Dutch floriculture there are no remarkable working conditions, beyond that working conditions are heavy. However the literature reflects other problems, in the field of the social dimension. It is difficult to achieve business success, and the number of young people with an agricultural degree decreased considerably in recent years (Boone and others; 2007, Zeijts and others; 2007, Berg; 1995, Kargbo and others; 2010). The main impacts in the social dimension are:

- Heavy working conditions;
- Difficulty to achieve business succession;
- Decreased number of young people with an agricultural degree.

Working conditions

The study of Zeijts and others (2007) shows the average farmer makes long days and performs physically demanding work in heavy working conditions in terms of odor, dust, noise and security. Agricultural labor scores relatively poorly in terms of occupational risk and the number of accidents (Zeijts et al; 2007).

The study of Zeijts and others (2007) indicates that it is difficult to fill vacancies. Workers from Eastern Europe come to the Netherlands to work in this sector. However, the amount of labour went down the last few years (Zeijts et. al.; 2007) because machines were used more frequently.

The entrepreneur and his family constitute 70 per cent of the number of persons employed in agriculture in 2005. The number of regular workers employed decreased by 40,000 to over 235,000 in agriculture between 1995 and 2005. Especially the number of family members who cooperate in the holding decreased sharply (Zeijts et. al.; 2007). The number of employees in the cut flower sector decreased by 25,575 in 1996 to 24,653 in 2004, see table 12. In 2000, the number of employees was enormous; 33.918. The reason for this amount is unknown (Boone; 2007).

Table 12: Amount of employees in the cut flower sector in the Netherlands

Year	Amount of employees in the cut flower sector
1996	25,575
2000	33,918
2004	24,653

Source: Boone (2007)

Business succession

Working on a farm is not easy because work is relatively heavy. It has low earnings and the sector has image problems. In recent years, the shareholder of 50 years or older is increased in floriculture. Also, the share increased of companies without succession (Zeijs, et. al.; 2007).

Business succession indicates how many farms are indicated in the future. The study of Zeijts and others (2007) indicates that this has general negative impact when there is little enthusiasm for the farms for the economic sustainability of farming. It can also yield a positive contribution, on this moment land prices are high, but when there is less business succession land prices decrease, so existing businesses can expand (Zeijs, et. al.; 2007).

Agricultural degree

The study of Zeijts and others (2007) indicates that the number of young people with an agricultural degree decreased considerably in recent years, mainly in husbandry and plant cultivation. Both in secondary vocational and in higher vocational, there were in 2006 fewer pupils than in 2001. This is not the case in science education. The number of students has increased by 16 per cent, but this comes mainly from an increase in the number of foreign students. Otherwise the number of students would also decrease. According to Zeijts and others (2007), well-educated young people are required to work and to undertake transactions in business succession (Zeijs, et. al.; 2007).

4.4 Environmental impacts on the triple bottom line

4.4.1 Water footprint conditions

Several studies indicate that the Netherlands is a country of water (Pimental et. al.; 1997, Boone et. al.; 2007, LTO Nederland; 2007, Gerbens-Leenes et. al.; 2008, Steward redqueen; 2012). Water is a renewable resource. The water availability is dependent on several factors; rainfall, temperature, evaporation, and runoff. An average of about 800 mm of precipitation (mainly rain and show) falls. This means 800 litres precipitation on every m² (KNMI; 2011), but the Netherlands experiences water shortages at certain times of the year. The population is growing with 0,452 per cent (2012 est.) (CIA; 2012) leading to problems in the long term. The growing population has effect on the water level, because water demands increase. This aspect is not as big as in Kenya because of the climate. It is not necessary to go into it more deeply.

Several studies indicate that the agricultural sector has a wide interface with the use of water with the (primary) production. On one hand, water is an essential 'for production' (crop growth) and water is used as transport and cleaning medium. Materials are discharged by water from the businesses, both directly and indirectly via wastewater, air emissions, and soil. The use of water occurs in the first step of the production chain, for growing crops (Pimental et. al.; 1997, Boone et. al.; 2007, Gerbens-Leenes et. al.; 2008, Steward redqueen; 2012). The grower in the greenhouses involves water from four different sources: tap water, groundwater, surface water and rainwater. Companies can use these four methods for production (Zeijs et. al.; 2007).

Conditions such as water contamination are caused by floricultural activity (Pimentel et. al.; 1997, LTO Nederland; 2007). Salinization associated with irrigation is not applicable in the Dutch rose cultivation, because all roses are grown on substrate in greenhouses. It was different when rose production was on open ground cultivation. Most irrigation waters have a too high salt concentration and caused salinization. Irrigation waters are too high, so soil erosion is not applicable in Westland and nearby Aalsmeer. This occurs especially by the Maas and in Limburg (Greenfarming; 2012). The main impact for the water footprint is:

- Water contamination.

Water Contamination

Chemical pesticides are still used in floriculture, because there are not alternatives for pests or diseases (Beuze; 2005). The use of pesticides causes water contamination in the Netherlands. The environment has an impact on pesticides, but it depends on the amount. Not only the amount, but the type of products and the method of application.

At present there are still found traces of pesticides in groundwater and surface water. Pesticides enter the surface waters in several ways. They may end up in ditches and rivers via rainfall. The surface waters can be contaminated by sprays either intentionally, for instance in order to control water weeds, or unintentionally, when the grower sprays their crops near ditches or via runoff and leaching from agricultural fields (Vijver et. al.; 2008).

4.4.2 Emission of Carbon dioxide

It is almost certain that the carbon dioxide emission is caused by humans (Energiek 2020; 2010). Carbon dioxide is one of the greenhouse gases and mainly from the combustion of fossil fuels in greenhouses. The emissions of carbon dioxide contributes 25 per cent from greenhouse horticulture (Zeijs et. al.; 2007) and this emission causes climate change (Energiek 2020; 2010).

Steward Redqueen (2011) claimed that due the lack of sunlight, heated greenhouse cultivation is essential leads to high carbon dioxide emission. Carbon dioxide emission is six times higher in the Netherlands than in Kenya, including air transportation (Steward Redqueen; 2011). The study of Zeijs and others (2007) indicates that greenhouses consume over 85 per cent of all energy in agriculture and horticulture. This consumption fluctuates and is dependent on weather conditions (Zeijs et. al.; 2007).

According to the literature, air pollution is the main impact for carbon dioxide emissions in the flower industry in the Netherlands (Zeijs et. al.; 2007, Energiek 2020; 2010, Steward Redqueen; 2011.)

This aspect applies also in Kenya, because this problem is transboundary.

4.5 Sub-conclusion

The Netherlands is located in West Europe and belongs to the European Union. It is characterised as developed country. The agricultural sector in total contributes 2.7 per cent of the gross domestic product (GDP). 2 Per cent of the labour force works in the agricultural sector. Dutch floriculture is a dynamic industry at international level. It is widely known as the leading industry in the world. The Dutch industry has innovative marketing mechanisms and advanced methods of production, the distribution system; for instance the auctions. The Netherlands has a well-developed infrastructure for air and ground. Those aspects are related to the success of the sector. However not everything supports growers, because costs for labour, energy, land and greenhouse construction are high and government regulation is relatively strong. The flower industry in the Netherlands has been concentrated traditionally in Westland and nearby Aalsmeer. See appendix 2.3 for a strengths and weaknesses table from the Dutch flower industry. The most important producing and consuming countries are close by; Germany, United Kingdom, France, Italy and Russia.

The areal flower industry decreased in the period 2000-2010, consistent with the number of greenhouses. However, the production value of the Dutch flower industry increased in 1990-2005.

Working conditions in the flower industry are heavy with low salaries compared with other sectors. The absenteeism of workers in agriculture and horticulture is lowest in the Netherlands; 2.6 per cent in 2006, against a national average sick leave of 4 per cent (2005). Within Dutch floriculture, there are no remarkable working conditions. The literature reflects other problems, in the field of the social dimension. It is difficult to achieve business succession and the number of young people with an agricultural degree decreased considerably in recent years.

According to the water footprint, contamination is caused by the floricultural activity. The carbon dioxide emission is caused by humans, and this leads to climate change. Air pollution is the main cause of carbon dioxide emissions; however the markets are close by. This means that transportation is not the main cause. It will mainly cause by greenhouses, because the climate for growing roses is not optimal in the Netherlands.

5. Measures for sustainability

5.1 Kenyan Floriculture industry

The Republic of Kenya made in 2007 a statement reading: *“A globally competitive and prosperous nation with a high quality of life by 2030”* (Republic of Kenya, 2007). Their vision includes the building of a just and cohesive society, enjoying equitable social development in a clean and secure environment.

This means that sustainable measures are performed to achieve this vision. This chapter gives some measures for the impacts on the triple bottom line, described in chapter 3.3, 3.4.

5.1.1 Measures for employment conditions

This study shows that the flower industry in Kenya has some positive results for the workforce, but there are some consequences. For some of those shortcomings, measures are taken.

Over the years, there were sustainable measures taken for labour conditions. There are eight key social sectors: education and training; health; water and sanitation; the environment; housing and urbanisation; as well as in gender, youth sports and culture, equity and poverty reduction (Government of Kenya; 2007).

Since the mid-1990s, the industry ethical trading principalities adopted social codes of practices. Multiple industry codes and overseas buyer codes are currently in use. In the floricultural industry of Kenya, codes of conduct were adopted to address the working conditions (Dolan, et. al.; 2002, Moosbrugger; 2007).

Kenya has also a range of national legislation and international conventions relevant to workers in the floricultural sector, enclosed in appendix 3. There are some improvements that can be deduced from the literature of Dolan and others (2002), Moosbrugger (2007), Fidh (2008), Van der Lans and others (2011). This is from conventions and taken measures. The improvements are:

- Introductions of written contracts detailing terms and condition information;
- An increase in permanent workers;
- A reduction in the use of long-term casual workers;
- There are pro-rata benefits to seasonal and temporary workers;
- The duration of maternity leave is increased from 8 to 12 weeks;
- A provision of maternity leave to seasonal workers;
- Most companies implemented training and/or performance related pay.

Companies play a dominant role in several aspects of the life of their worker: the income of both parents, the education of the children, and their leisure time. The company provides nearly all services that States usually provide their citizens (Fidh; 2008). Companies are obligated to provide their employees and their families with medical care and housing (Lans, Van der et. al.; 2011). There is also regular health and safety training (H&S). Those H&S facilities are improved during the years. The sanitation is also improved, including the provision of drinking water, separate toilets and showers available for men and women. However the houses are small and measure at 3 x 3 meters. Some of these houses are shared by 2 or 3 families. Due to the crowded conditions, most people in the houses (the residents of Naivasha) refer to the housing facilities as “Sher camps”. They have access to water and electricity, but the utilization of electricity limited and impossible to use for cooking. The company has some expectations to enforce this (Fidh; 2008). The housing conditions are not perfect, but it is better than nothing. This means the workforce is depends on the company (Fidh; 2008).

Van der Lans and others (2011) and Dolan and others (2002) report that biological control fits poorly in many international production standards, generally higher for human health. Chemicals cause serious problems. During the years, one third of the companies switch to biological control. Codes of conduct are also successful in ensuring the payment of the national minimum wage (Moosbrugger; 2007).

With regards to discrimination, Dolan et al. (2002) indicate that there are laws to protect women against discrimination in the workplace. In 1997, there was a specific prohibition of discrimination on basis of gender. Constitutions give equal protection of rights and freedoms of men and women. Personal protection equipment (PPE) is increasingly used. To overcome discrimination, training is given within companies (Dolan et. al.; 2002).

5.1.2 Measures for water footprint

The drying up of Lake Naivasha and pollution is an issue. Measures are taken to reduce this problem.

The production of roses takes place mainly in greenhouses, made of plastic tunnels (KFC, 2012; Rikken; 2011). Mpusia (2006) highlighted from an earlier research of Mears (1999) that the water demand drops when growers produce flowers in greenhouses. It has an effect on the water requirements of the crops, reducing the evaporation. It is reduced by 60 per cent to 85 per cent compared with the open ground cultivation. This means that there is a clear reduction in water demand, and the agricultural greenhouse provides a way of increasing water use efficiency in the flower industry (Mpusia; 2006).

The research of Van der Lans and others (2011) indicates that growers often made use of a substrate cultivation system instead of open-ground cultivation. The majority of companies meet the MPS standards. This means that European buyers contributed to enabling the environment to protect it (Wijnands; 2003). Growers with MPS switched to the substrate cultivation system (Lans, Van der et. al.; 2011). The substrate cultivation system protects the environment because it has effect on the water demand. The water circulates through the substrate, in this way they save water. The chemicals don't infect the soil, because there is no irrigation in open field cultivation. This means that there is also less pollution (Lans, Van der et. al.; 2011). This is also important in the water area of Lake Naivasha, the flow of sediments and agricultural nutrients to the lake Naivasha need to be reduced. This applies to the farmers who are located around Lake Naivasha, and the subsistence farmers who are located in the upper catchment. The research by Mekonnen and others (2012) showed that the sedimentation problem is exacerbated by the loss of riparian vegetation. Riparian vegetation could be used as a buffer for capturing sediments and increasing infiltration. This destruction occurs mainly through overgrazing and cultivation. The study indicated also that an urgent and coordinated action is needed. A ban on the cultivation in the riparian areas is effective (Mekonnen et. al.; 2012).

The research of Moosbrugger (2007) and Van der Lans and others (2011) mentions that the various codes of practice adopted by growers are having also a positive impact on the pollution criteria. Most of these codes regulate the use of water and agrochemicals on the flower farms (Moosbrugger; 2007, Lans, Van der et. al.; 2011). It is a rough estimate, but Reinder (2009) indicates that one third of the companies produce roses in a biological way nowadays (Reinder; 2009). There are two companies for biological control located in Kenya: Real IPM Company and Dudutech. They produce natural enemies. Real IPM produces and develops bio-pesticides. The company supplies at this moment natural enemies for 450 ha floriculture. Through the local availability of natural enemies, demand for biological control agents is larger than before (Lans, Van der et. al.; 2011).

Green Farming and the KFC (Kenya Flower Council) hold regular workshops which to inform participants in Kenya on new innovative techniques for climate change and the energy management. Important issues as: sustainable production methods such as recycling water, tissue culture technology, the use of solar energy and the need for integrated pest management methods are the issues for these workshops (Greenfarming; 2012).

This paragraph shows that Kenya is continually under development, there are projects and workshops to inform the growers / and projects with the aim to protect the environment. Recently; Saturday, 15th September 2012 Greenfarmings is started with a Green Farming Water Management Demo Project to reduce the water demand, this is an example from a project. This is an important project of water management in the area of Lake Naivasha. This project allows a saving of 40-60% of irrigation water, and it project also provides a saving of fertilizers. Ultimately, the yield will increase by 10 per cent according to researchers (Greenfarming; 2012). According to Sonneveld (2004) most irrigation waters have too high of salt concentration and this causes salinization. This project has an effect on the salinization (Sonneveld; 2004). Whether the project is substantially effective is not known.

5.1.3 Measures for carbon dioxide

The Kenyan growers are actively seeking cleaner technologies (Awuor; 2012) to reduce the air pollution. The private sector and the public sector support continuously the research on new varieties and products (KFC; 2012).

It is necessary to examine the extent to which measures reduce the carbon dioxide emission of Kenyan growers (Awuor; 2012). Studies show that Kenya has relatively low carbon footprints, estimated at 1 ton per capita. Carbon footprints in the developed world are up to 40 tons per capita (KFC; 2012). Using solar techniques for power generation or geothermic are two alternative sources of heating during cold nights. These techniques reduce the carbon dioxide footprint (Awuor; 2012).

In Kenya it is important that they reduce the freight costs. Besides air transport, it is now also possible to opt for sea transport. The transport duration is longer with this option, but the carbon dioxide emission is less. This is apparent from the study of Eppink and others (2009). In order to reduce the carbon dioxide emission it is also important to use a more efficient packaging. This way more flowers can be transported with less weight. This led also to a reduction of carbon dioxide (KFC; 2012).

5.2 Dutch Floriculture industry

This chapter gives some measures for the impacts on the triple bottom line, described in chapter 4.3, 4.4. However, the company is decisive what measures they want to use for sustainability.

5.2.1 Measures for employment conditions

Many people consider labour in nurseries as being heavy, dirty and dull and nothing for a well-educated person. This image puts the horticultural industry in a negative position (Berg; 1995). Due to the poor image there are concerns; difficulty to achieve business succession and the number of young people with an agricultural degree decreasing. Measures should be taken to improve the image. Communication is important, people are then informed. It is also good to use gardeners as ambassadors. Those have experience with the sector, this will contribute to an improvement in image (Zeijs et. al.; 2007).

It is also important to secure qualified labour supply. Nowadays, labour conditions are increasing to a level comparable to the industry. In this way labour is more attractive. According to Berg (2005) unpleasant working conditions must be changed or replaced by machines. Labour conditions in the nursery must be improved and meet a central working condition. "Optimal working conditions are the key to success" according to Berg (1995). It has some consequences for the company. The nursery must be split up into a production area and a work area. In the production area, plants are cultivated and in the work area the work is done. Currently employees go to the crop in the glasshouse, with the plan of Berg (1995) it is the opposite. The crop goes to the employees in the working station. This is done by an internal transport system (Berg; 1995). For instance, the crops grow in a production area and are then taken out to working stations where employees can process them.

5.2.2 Measures water footprint

The soil is the bearer of farming in floriculture. Moreover, the soil and groundwater are important for both the floriculture and the society. It must be prevented that the soil and groundwater grow further contaminated. The measures for sustainable production in relation to water are designed to reduce water contamination and to decrease the water footprint, because water is scarce.

This requires policies and legislation (Law Soil protection Discharge Decree, covenants, Environmental Protection Act, Groundwater law). The studies of Horen and others (2000) shows that policies and legislation have led companies to produce in a sustainable way (Horen et. al.; 2000).

The use of pesticides between 1997/1998 and 2004/2005 decreased by 13 per cent (Zeijs et. al.; 2007). It was partly reached by a long-term agreement between the national government and the horticultural sector in the early nineteen nineties. It stipulates a 50 per cent reduction of pesticide use by the sector. It is the result of emission reduction measures that growers applied, for example; changing by crop rotations, by introduction of pest and disease-resistant crop varieties, cultivation-free zones along watercourses spray equipment with less drift, but it is also a result of the use of less polluting pesticides (Zeijs et. al.; 2007). To prevent emissions of pesticides and minerals to the open air, ground and surface water, 'Closed' and 'Circulation' greenhouse systems were introduced.

Prevention is very important and so another measure is integrated into pest management. Integrated pest management reduces the emission to the environment; the soil, water and air, the ecological damage and the risks for the user (Beuze; 2005). The government allows pesticides in principle, only if they are not hazardous to humans and the environment (Didde; 2012). Beuze (2005) indicates that integrated pest management finds place only when a disease of pest is recognized. They tried to combat it on a non-chemical way, by the use of natural enemies, mechanical or physical (weed) control or pesticides of natural origin (GNO's). However, these alternatives are depending on the cultivation and circumstances. More information about these alternatives is in the report by Beuze (2005). Only as a last resort of the integrated pest management are chemical pesticides

applied. Based on efficacy and selectivity, these chemical pesticides might not be harmful against natural enemies and are chosen for environmental impact (Beuze; 2005). This means that the sector has ambitions to optimize continual use of fertilizers and pesticides (Zeijs et. al.; 2007). The sector wants to bisect the use of pesticides for 2015. To prevent the discharge of nutrients to zero in surface water in 2027 is another goal (Didde; 2012).

Water reduction is also important. In recent years, greenhouses are becoming increasingly important in the water cycle. An example for water efficiency is the substrate cultivation system. In 1990, about 50 per cent of the roses grown in the 900 hectare glasshouses are grown on substrate. At the moment almost all roses are grown on substrate. The substrate system prevents that the water is contaminated and it decrease the water demand; this is described earlier this study, paragraph 5.1.2.

5.2.3 Measures for carbon dioxide

Dutch growers are actively seeking cleaner technologies (Auwor; 2012), to reduce the air pollution. The goal for 2020 is: *"No longer use of fossil fuels in the floricultural sector."* There was even talk of 'greenhouse as green power' with vegetables and flowers as by-products (Zeijs et. al.; 2007). The Dutch greenhouse sector has a high consumption of greenhouse gases. Among others, the Kyoto Protocol has led to measures in the field of carbon dioxide. The government has relatively strong regulations. Cheaper alternatives are welcome in the Netherlands to compete with other countries (Zeijs et. al.; 2007). There are energy subsidies available for innovative energy systems that reduce carbon dioxide emissions. The subsidy amounts approximately 40 per cent of the subsidy costs (AgriHolland; 2012). The higher gas prices stokes ambitions for energy efficiency; this leads to lower emissions (Zeijs et. al.; 2007).

According to the research of Diederer and others, they show that measures to reduce the carbon dioxide emission was already applied from 1993. An agreement was made (1993) with the Dutch greenhouse horticultural sector and the Dutch government. The agreement was that the industry accepted the obligation to improve the energy efficiency. In the year 2000, it was expected that the energy efficiency has been improved by 50 per cent compared to the level of 1980 (Diederer et. al.; 2003). In 1997, the target was to improve the energy efficiency index (EE-index) by 65 per cent compared to the level of 1980, as stipulated in Covenant Horticulture and Environment (1997). These targets are monitored each year to keep an eye on the current state of affairs. An improvement of the EE-index can therefore achieve a decrease in the primary fuel consumption and / or an increase in the physical production (Knijff et. al.; 2006).

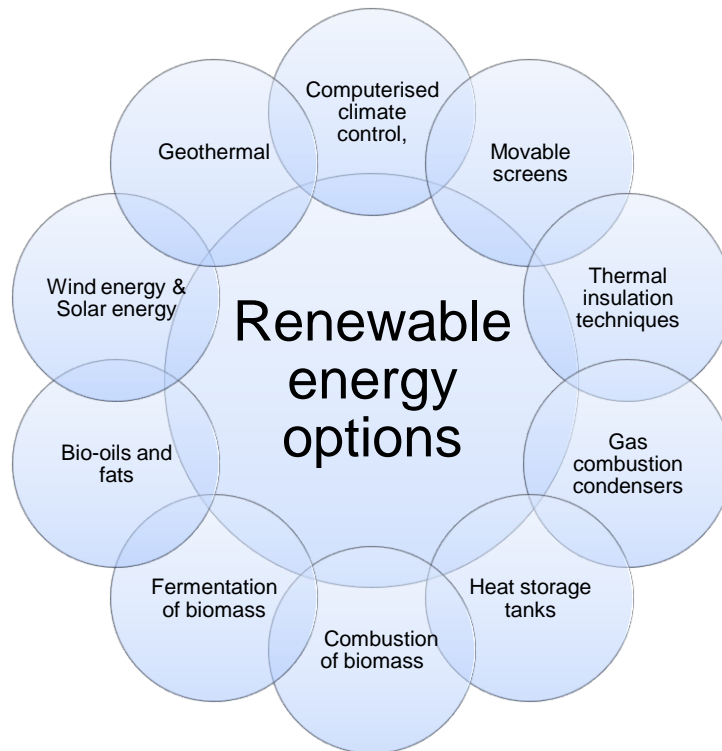
Research of Boone and others (2007) shows that 10 per cent of the Dutch companies can be counted among the 'innovators'. This means that these companies have a new product or new process as first introduced. 5 Per cent of the companies can be characterized as early followers (Boone et. al.; 2007). The research of Zeijs and others (2007) indicates that the ambition for greenhouses is about the use of fossil fuels.

The energy monitor (2005) has shown that in 2003 a small number of glasshouses had a sustainable energy option present, for instance assimilation light (consume less energy). According to the research of Berg (2005), more than 60 per cent of the about 900 hectares glasshouse roses assimilation light (Berg; 1995). Nienhuis and others (2005) indicate that 40-70 per cent of the glasshouses have a sustainable energy option present. The use of green electricity is not included in this research (Nienhuis et. al.; 2005).

In the research of Nienhuis and others (2005), it is mentioned that heat and storage tanks are the most common renewable energy options in practice. In total 17 greenhouses had a heat and storage tank; next to this technology is the most used wind energy. Four of the ten companies with wind generated electricity use this electricity on the farm. The other companies (six of the ten companies) supplied the electricity into the public grid (Nienhuis et. al.; 2005).

This means that the sector focuses on minimal input of non-renewable resources, minimum output of unwanted emissions and an efficient and high-quality production. The greenhouse sector is innovative!

There are various technologies exploited; figure 10 shows a summary of renewable energy options in the greenhouse industry.



Source: Diederer and others (2003), Nienhuis and others (2005), Knijff and others (2006).

Figure 10: Summary of renewable energy options in the Greenhouse industry.

5.3 Sub-conclusion

Sustainable measures are performed to achieve the goals for both countries. This research shows that the flower industry has some positive consequences for employees, but it has still some shortcomings in Kenya. The Netherlands suffers with other problems.

The floricultural industry caused many impacts for labour, water footprint and the carbon dioxide emission. A summary is displayed in table 13.

Table 13: Impacts on the social and environmental dimension

	Kenya	The Netherlands
<u>People</u>		
<u>Labour</u>		
Heavy working conditions	X	X
Difficult to achieve business succession		X
Decreased number of young people with an agricultural degree		X
Wages are too low for living a decent life	X	
Inadequate working conditions	X	
The high proportion of casual workers	X	
Serious sexual harassment and discrimination	X	
<u>Planet</u>		
<u>Water footprint</u>		
Water contamination	X	X
Water level decreasing	X	X
Salinization associated with irrigation	X	
<u>Emission of carbon dioxide</u>		
Air pollution	X	X

Over the years there were sustainable measures taken for employment conditions in Kenya. Codes of conduct were adopted to address the working conditions and labour rights. Companies play a dominate role in several aspects of the life of their workers, because companies provide nearly all services that States usually provide their citizens. There are laws to protect the workforce against discrimination in the workplace and labour rights. For the Netherlands it is important that the labour conditions are increasing to a level comparable to the industry, to better their image. In this way

labour is more attractive. Another example; working conditions that are unpleasant must be changed or replaced by machines; also the labour conditions in the nursery must be improved. It is important that employee turnover be increased in both countries.

Measures for the reduction of the water footprint are also completed. Kenyan growers produce flowers in greenhouses to decrease the water demand. The substrate system prevents water that is contaminated and it also decreases the water demand. This system is used in both countries; however Kenya still makes use of open ground cultivation. This cultivation method is no longer used in the Netherlands. It is important to reduce the contamination in water, especially in the area of Lake Naivasha. The various codes of practice have positive impact on the pollution criteria by growers. Most of these codes regulate the use of water and agrochemicals on the flower farms; this applies for both; Kenya and the Netherlands.

Countries are aware of the fact that the greenhouse effect entails negative consequences and this is one of the reasons why measures take place in the field of carbon dioxide. Kenya has relatively low carbon footprints compared with the Netherlands, estimated at 1 ton per capita. Carbon footprints in the developed world are up to 40 tons per capita.

Both Kenyan growers and Dutch growers are actively seeking cleaner technologies, so innovation is important for both. Solar energy or geothermal are alternative sources of heating during cold nights. These are techniques to reduce the carbon dioxide footprint and this leads reductions in energy expenses. Both alternatives are available in both countries. The market of Kenya is far, so it is important to reduce the freight costs. Examples are: using a more efficient packaging and making further use of sea freight.

6. Cost price

This chapter is focussed on the costs which are divided among the profit dimension what also part is of the triple bottom line/ 3 P's. Companies operate in the world of dynamic competition. It is important to know what the costs are in the flower industry from both countries. Competitors, customers and regulators create pressure to find constantly innovative solutions (Porter et. al.; 1995). This study indicates that sustainability is a criterion for the consumer and it is important for companies nowadays. Social and environmental 'sustainable' measures cost money, as described earlier this research. The research of Moosbrugger (2007) indicates that sustainable measures (described in chapter 5) have an effect on costs and this means that measures have indirect effect on the profit. In this chapter, the cost aspect (profit) will be discussed in more detail. This chapter presents also an idea for business people to decide whether to move to developing countries for rose production or not.

6.1 Indicators in the floricultural sector

6.1.1 Kenya

The Kenyan flower industry has a natural advantage based on a favourable climate; it is a warm climate with a lot of sunlight. The soil and greenhouse structures are relatively inexpensive; one square meter greenhouse costs 25 Euro per year around Lake Naivasha (Abraham; 2008). The low costs are also applied to labour (Rikken; 2011). Next, today's exchange rate is low and this is good for Kenya. The sector has competitive advantages with those factors (Moosbrugger; 2007), and this leads to a higher profit.

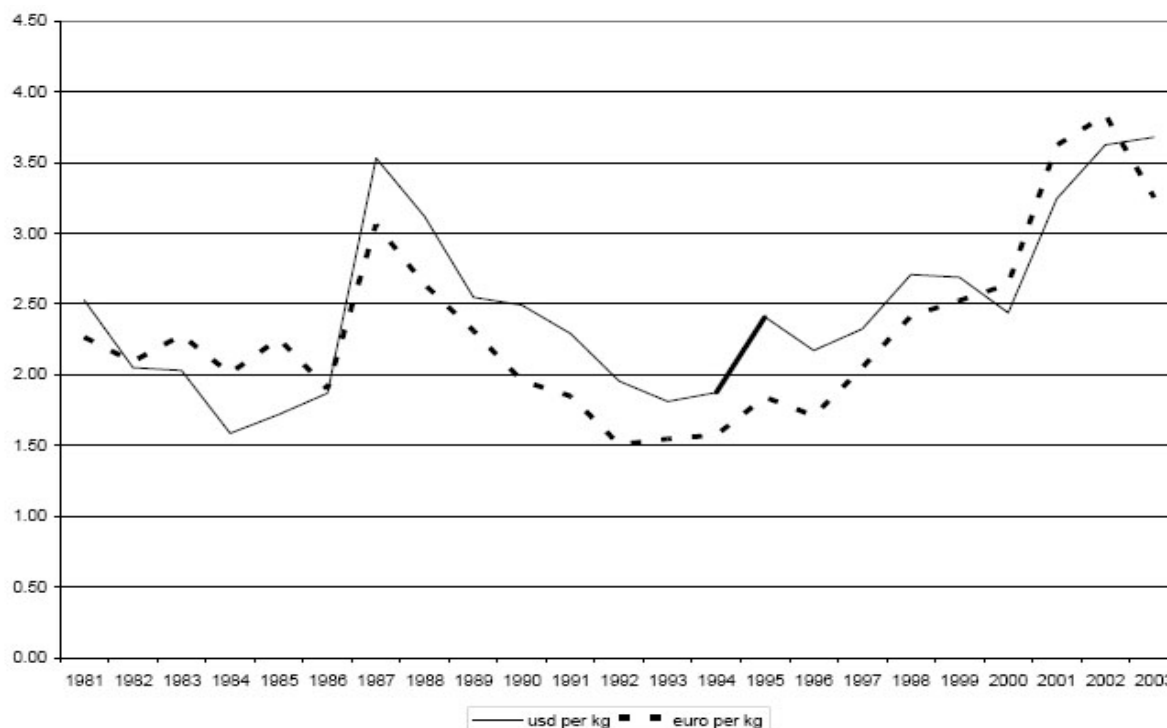
Labour is cheap in Kenya (Rikken; 2011), but besides the direct labour costs, companies provide also housing and medical care for their employees and their families (Wijnands; 2003*). The research of Moosbrugger (2007) indicates that labour costs accounts for 50-60 per cent of the total farm costs. Studies are beginning to show that sustainability offer health and wellbeing of staff results in a low absentee rate and increased productivity. Sustainable measures for labour are described in paragraph 5.1.1. The research of Hatch and others (2004) shows the learning experience is high in Kenya. This confers competitive advantage as long as what is learnt remains proprietary. This led ultimately to economic growth, a positive effect on the salaries but a negative effect on the cost price.

The main factor raises the cost price for Kenyan glass roses are oil related concludes Rikken (2011). After his experience, he concludes that the flower-industry is dependent on the oil prices. The price of an oil barrel increased to US\$ 150 in 2008. The growers were confronted with exploding costs, because 70 per cent are oil related. The costs for transportation, chemicals and packaging were rising. However, oil plunged below US\$ 50 in the spring of 2009 and the situation was completely changed (Rikken; 2011), and the cost price directly dropped. The market for Kenya is not close, and transportation costs are important for Kenya. So, increased fuel prices have a negative effect on the costs in Kenya. It has thus become more unfavourable to transport the flower to the market.

The research of Moosbrugger (2007) suggests that environmental protection has its costs. It concludes that Kenyan producers lose their competitive price advantage if they start investing heavily in environmental protection, but biological is cheaper than the 'regular' cultivation (make use of chemicals) (Lans, Van der; 2010). It is also better for human health (Reinder; 2009). It is cheaper because of the local availability of natural enemies and this saves transportation costs. Chemicals must be flown in from the Netherlands (Lans, Van der et. al.; 2011).

The international price for cut flowers is since the early 1990s is on an upward trend, which is illustrated in figure 11. According to Moosbrugger (2007) this price is better than most other agricultural export commodities. Further growth in the global production capacity for cut flowers in developing countries, could have a depressing effect on the world price for cut flowers in the future.

Exact details on how the cost price has arisen for Kenyan glasshouse roses were not found in the literature.



Source: Moosbrugger (2007) based on data from HCDA

Figure 11: Price of cut flowers per kg from 1981 to 2003

6.1.2 The Netherlands

The research of Berg (1995) shows the main factors which make the cost price for Dutch glasshouse roses; those are shown in table 14.

The Dutch flower industry has an advantage based on transportation costs because the markets are close by, so this leads to low transportation costs. However other costs are high.

Labour costs are huge per day, the research of Wijnands (2003*) speaks about €160.00 a day. However the research shows also that the share of labour cost in the cost price is not significantly larger in the Netherlands compared with Kenya. He indicates that it counts 29 per cent of the cost price in the Netherlands and 20 per cent in Kenya (Wijnands; 2003*), but the research of Berg (2005) speaks over an amount of 40 per cent, see table 14. Why the shares are not comparable to each other is not explainable within the literature; an explanation may be that wages have been raised sharply. From this, it is concluded that the labour costs are high, but compared with other sectors in the Netherlands the labour costs are low. Labour costs can be decreased by mechanization and automation of the production process.

Table 14: Main factors which make the cost price for Dutch glasshouse roses.

Cost factor	About
Labour costs	40%
Energy costs (heat and light)	23%
Investment costs	18%
Auction and levy costs	7%
Planting material	5%
Rest	7%
Total	100%

Source: Berg (2005)

The climate in the Netherlands is not ideal for growing roses; cool summers and mild winters; this means that sunlight is not readily available. This lead to high demands of energy (heat/light) and energy costs are high. This counts 23 per cent of the cost price according to the study of Berg (2005). To decrease the carbon dioxide emissions, companies can take measures, but those measures cost money. There are energy subsidies available for innovative energy systems that reduce carbon dioxide emission. The subsidy amounts approximately 40 per cent of the costs (AgriHolland; 2012). Investments costs counts 7 per cent of the cost price, this includes also sustainable investments. The costs for greenhouse structures and land are also high. One square meter of greenhouses costs around 100 euro's per year in the Netherlands (Abraham; 2008).

6.1.3 Position of the countries

The research of Wijnands (2003*) shows a few indicators of the rose industry in both countries (table 15). It is difficult to pass a judgement on the position of the countries. Most studies indicate that the Netherlands has higher costs on labour, greenhouse structures, land and energy compared with Kenya. The costs are higher in the Netherlands than in Kenya, except the transportation costs. So, the Dutch flower industry has only an advantage based on transportation costs.

The position of both countries is indicated in table 15. The indicators are about the mini rose production (Wijnands; 2003*).

The table indicates that the costs (€0.19) are higher than the auction price (€0.16) in the Netherlands. This mean that the rose industry loss money according to Wijnands (2003*). The competitive position deteriorates, because the costs are much higher than in Kenya (Rikken; 2011). Kenya makes profit because the costs (€0.11) are lower than the auction price (€0.12). The export volume in the Netherlands is much higher than in Kenya.

Due to the competition, it is important that the grower keep the cost as low as possible in the Netherlands. They will constantly seek exclusivity and quality with high production by m² (Rikken; 2011). There is no explanation why growers still produce their roses in the Netherlands, perhaps they think if oil prices increase the situation is directly different.

Table 15: A few indicators of the floriculture in both countries

Indicator	Kenya	The Netherlands
Areal flowers (ha)	2.180	3.815
Number of growers	140	3.419
Export volume in tonnes	41.400	575.600
Export share in roses (%)	73	25
Export share in cuttings (%)	3	2
Share of exports to the Netherlands (%)	65	-
Labour costs by day	\$2	€160
Labour share in cost price (%)	20	29
Delivery share, inclusive (air) freight (%)	35	7
Cost price from mini roses in eurocents	11	19
Auction price in eurocents	12	16

Source: Wijnands, 2003*

6.2 Measures and the effects

Consumers are becoming more environmentally aware and this lead to new markets. Companies take measures to produce sustainably. The sustainability objective is to create value for the whole society. To create sustainable value, it can be split up in three categories; people, planet and profit (Willard; 2012). These categories are also indicated as the triple bottom line aspects (3P's); people, planet and profit aspects. Chapter 3.3 and 3.4 described the social and environmental impacts on the triple bottom line in Kenya, for the Netherlands it can be found in chapter 4.3 and 4.4.

The pursuit of sustainability costs plays an important role. Researchers and organizations state; it can be observed that sustainability leads to cost reduction. The statements are:

- Taking measures costs money for growers, while it is unclear whether it will deliver something in the future. Moreover, international competitiveness is at stake for both countries. Despite these critiques, many authors believe that sustainable measures cost money in the short-term, but makes money in the long term (LTO; 2007).
- Michael E. Porter and Claas van der Linde (1995) believe that cost reduction occurs by sustainable measures. They define it as follows: *“Properly designed environmental standards can trigger innovations that lower the total cost of a product or improve its value. Such innovations allow companies to use a range of inputs more productively - from raw materials to energy to labour, so offsetting the costs of improving environmental impact and ending the statement”* (Porter et. al.; 1995).
- In November 2012, Mr. Boerrigter (a researcher of Wageningen) argued that sustainability is only successful when cost reduction occurs. This means that sustainable measures have also effect on profit.

Based on the above statements of the researchers, there should be a direct connection with sustainable measures and profit improvements, but it is not yet scientifically supported. This study assumes that measures entail cost reduction in the long term.

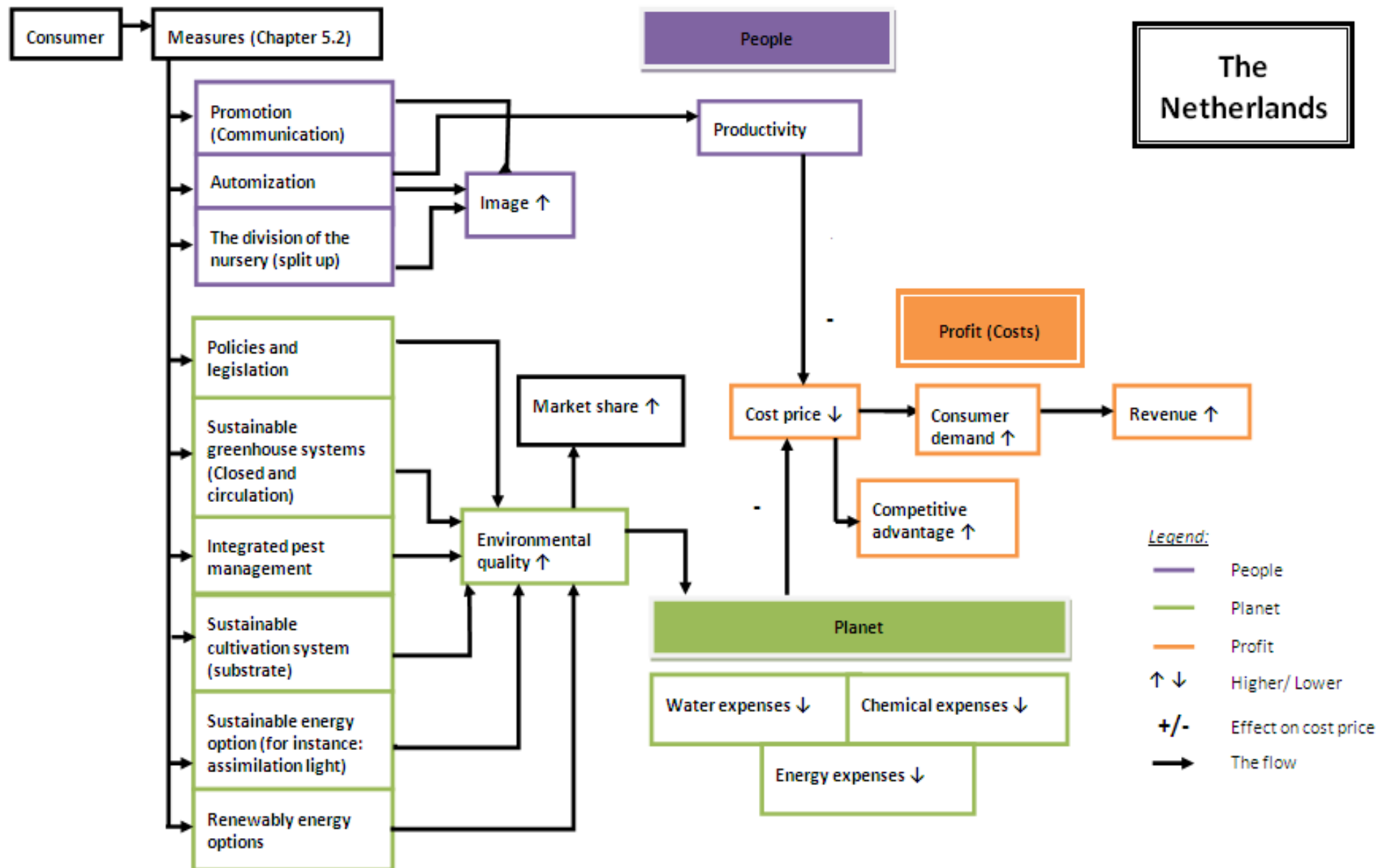
Based on this study, two models (model 1 and model 2) can be created, one for Kenya and one for the Netherlands with relevant social, environmental and capital factors, placed on page 55 and 56. Both models indicate that the measures directly or indirectly affect the cost price. Purple indicates the people effects, green the environmental effects and orange indicates the profit effect. As you can see, the social and environmental measures have an indirect effect on the profit aspect.

Both models indicate that expenditures are made based on consumer demand. It is important to bring the organization's capacity to bear to decrease the impacts on people and planet. Both countries took some measures to solve most impacts for the social and environmental aspects. Those measures are described in chapter 5. For example, both countries were actively using new cultivation systems (substrate) specifically aimed at ameliorating some of the environmental problems in both countries. Social problems occurring especially among the poor people in Kenya, there were some measures taken for creating better living conditions such as codes of conduct. Indirect, both models shows that the measures have indirect effect on the costs, because the revenue increases.

The social measures (people) lead to better living conditions in Kenya, as described in chapter 5.1, hereby will increase the employee productivity and the market share. When the market share rises, the GDP will rise as well. This leads to higher wages and will raise the cost price, so this is a negative effect for the cost price (indicated with +, because the cost price increase). However, employee productivity will rise in proportion to the employee wages and cost price will decrease. This is in case of Kenya. In the Netherlands, no measures have been taken place to improve the living conditions. It is more important to increase the image with measures, described in chapter 5.2. In this study is there no link between the social measures and an increased market share. However automation leads to a higher productivity and this has a positive effect on the cost price since it will decrease. For both countries, it is applicable that environmental measures increase the environmental quality and lead to a higher market share. The water-, chemical, energy expenses will decrease and have a positive effect for the cost price (indicated with -). No measures have been taken in the Netherlands to decrease the carbon dioxide emission for transportation; this is compared with Kenya where they make use of two measures; sustainable packaging and sustainable transportation. This is a bigger item in Kenya because the markets are far. When the cost price goes down, the selling price of the roses can be lowered. Then sustainable companies have competitive advantages. The consumer demand increases and this leads ultimately to higher revenue for the company.

This is confirmed by the study of Eccles and others (2012). The study showed that high sustainable companies outperformed the low sustainable companies. These companies have a stronger brand with a large amount of natural resources they can use.

So, from these models (model 1 and 2) it can be concluded that sustainability leads to cost reduction which leads ultimately to a higher revenue. This study revealed that the cost aspect outweighs the sustainability aspect. However, it is not possible to conclude completely if it is wise for business people to move to developing countries for rose production or not. Business people need to wonder what the reason is why they want to move to developing countries. What are important issues for them? It is important that the grower keeps the costs as low as possible, for creating a competitive advantage. But growers can also decide to go to Kenya, because there are sufficient work forces available or a better climate what may lead to a lower emission of carbon dioxide. Further research is required to specifically say which country is better for the production of roses, because this study shows no overall picture what measures cost and what these measures yield.



Model: 2

6.3 Sub-conclusion

Cost reduction/savings is one of four drivers of sustainability strategies. This study focuses on the cost price. Cost reduction is thereby important, because it has an effect on the market share. However environmental protection also has its costs and can lead to losing a competitive price advantage.

There is dynamic competition in the world. The Kenyan flower industry has a natural advantage based on a favourable climate. The soil and greenhouse structures are relatively inexpensive, this also applies for labour. The main factors which make the cost price for Kenyan glass roses is oil related. The Kenyan flower industry has those advantages and they have final impact on the revenue.

In the Netherlands, there are the costs for labour, greenhouse structures, energy, and land prices. However, the market is close by and the transportation costs are less than in Kenya. Subsequently, the competitive position deteriorates compared with Kenya, because the costs are much higher in the Netherlands. It is important that Dutch growers keep their costs as low as possible. This means that Dutch growers seek exclusivity and quality combined with high production by m² (Rikken; 2011).

The sustainability objective is to create value for the whole society. To create sustainable value, it can be split up in three categories; people, planet and profit (Willard; 2012). The social and environmental aspects were the focus in this study. Taking measures cost money in the short-term, while it is unclear whether it will deliver something in the future. But this study assumes that it makes money in the longer-term.

This study indicates that expenditures are made on the basis of consumer demand. Consumer demand is an important issue for producers because it determines how much they sell and at what price. Consumers are becoming more environmentally aware and this has led to new markets. Markets that have interest in sustainable products have more demand for sustainable production. The research indicates that measures are taken for reducing the impact on the planet. There is a reduction of energy expenses, chemical expenses and water expenses. Measures, specifically those aiming for people, lead to an increased employee productivity and employee expenses in Kenya. In the Netherlands image is more important and productivity increased by means of mechanization. This lead to better quality for the environment and better living conditions.

It is not scientifically supported that there is a direct connection with sustainable measures and profit improvements. From this research it is concluded that by high energy prices and labour costs, the climate for rose growers is unattractive in the Netherlands. However, the Netherlands has a prominent position in the market. The increased fuel prices have a negative effect on the costs in Kenya. It has thus become more unfavourable to transport the flower to the market. Also labour costs increase as the economy grows, this have negative effect on the costs.

As consumers become more environmentally aware, this creates a bigger market share for sustainable companies. The revenue will constantly rise. This means that the measures have indirect an effect on profit (costs), which ultimately determines the cost price, so sustainability leads to cost reduction.

Due to the competition, it is important that the grower keeps the costs as low as possible. Business people need to wonder what the reason is why they want to move to developing countries to produce roses or not. What are important issues for them?

7. Conclusion

Sustainable floriculture production is an issue for growers, because now the world population is approximately 6.4 billion and will be 9 billion by the year 2050. This has an impact on the triple bottom line, also; people are becoming more environmentally conscious. So, there is a growing awareness on the sustainable optimal design and planning of supply chains. Companies can no longer afford to do nothing with sustainability. For floricultural companies this means the integration of social, ecological and economic aspects. In this study, it is important that the definition of sustainability is acute for the agricultural sector. The most appropriate definition of sustainability according to Paula and others (1999) is: "Sustainability is the continuous process of obtaining the same or better living conditions, for a group of people and their successors in a given ecosystem."

There are many sustainability labels and interest groups present on the floricultural market. It is possible that these criteria influence the characteristics of end products. Every label is different, one label sets mainly requirements on the working conditions, but the other label has requirements for the water consumption, and another has requirements only on the emission on the carbon dioxide aspect. MPS-family is the only standard that looks to all the aspects. This code in general is an important code, because the production is mainly for the export. Labels are parts of a global increase in non-governmental regulation, but this has benefits for the European buyers who are increasingly going for sustainability. The labels/standards are used as a management tool to professionalize their business, or to participate as a form of self-regulation. Another reason for growers is to profile their company as professional and sustainable. Growers expect better returns, for instance on the auction clock when the company name has a quality brand.

The rose is not a climate friendly flower and has some impact on the environment, because it constantly needs water, light and heat during the growth. The 'rose' industry in the Netherlands is different compared with Kenya, because Kenya belongs to the underdeveloped countries and the Netherlands belongs to the developed countries. The flower industry in the Netherlands is highly mechanised and specialised as well as heavily dependent on fossil fuels, borrowed capital and chemical fertilizers and pesticides. The Netherlands has the biggest market share and the market is accessible and this is a competitive advantage. The Netherlands remains the largest producer of cut-flowers worldwide. Developing countries, such as Kenya have become strong players in global markets. An overview of the strengths and weaknesses for both countries are shown in appendix 2.3. The Kenyan rose industry plays an important role in the development of the local infrastructure, for instance schools, restaurants, shops, hospitals and hotels. This has changed the local area (CIA; 2012). In Kenya there are 440,000 jobs related to this sector. The flower industry in Kenya evolved into a fairly mature and stable one. However, the flower industry operates in a very weak domestic economy and in an increasingly competitive international market.

In Kenya, the floriculture is highly centralized around Lake Naivasha. 70 per cent of the flower farms are located in this area, because of the fresh water lake and the Jomo Kenyatta International Airport (JKIA) is close by. In the Netherlands, the flower industry is highly centralized in Westland and nearby Aalsmeer. The most important auctions are placed in this area as well. The Dutch flower production is struggling compared with the Kenyan flower industry, which has grown tremendously since 2000. In 2004, Kenya had 2000 hectares for the floricultural industry; it was increased by 1,400 to 3,400 hectares in 2010. Kenya grows mainly roses; they grow in the Netherlands a wider assortment of flowers. The production of roses is decreasing in the Netherlands. The total areal roses was in 1990 890 hectares and it was declined to 532 in 2009. Not only the area of roses decreased, but the entire industry dropped. The entire floriculture sector contains 6,100 hectares in 2004 but it reduced 768 hectares to 5,331 hectares in 2010.

Looking at the important issues in this study; labour, water footprint and the emission of carbon dioxide, both in Kenya and the Netherlands has its pros and cons for growing roses. This raises the question of what this development has for impact on the triple bottom line, both in Kenya and in the Netherlands.

In Kenya, the labour conditions are harsh. This is due to the high temperatures in the greenhouses and the exposure to chemicals. Most of the work is done by hand. The salaries are low and the wages do not match the costs of living. Serious sexual harassment and discrimination occurs and there are a high proportion of casual workers in this sector. In the Netherlands, there are other problems, which are not comparable with Kenya. The Netherlands has to deal with a poor image. The working conditions are high and the salaries are low compared with other sectors. These are the main reasons why it is difficult to achieve business succession and why the number of young people with an agricultural degree decreases. However, the absenteeism of workers in agriculture and horticulture is lowest in the Netherlands with 2.6 per cent in 2006. This percentage will be higher in Kenya despite the fact that the working conditions have been improved in recent years.

With regards to the water footprint, nurseries make use of irrigation from the freshwater environment. The farms mixed the freshwater with substrate and pollute it with chemicals. Next to that the population is growing, this means that clean water resources per capita is declining, also in the Netherlands. Water is once a renewable resource, but water is more readily available in the Netherlands than in Kenya. In Kenya it has already led to serious water and food problems in the past. The people in Kenya live in an area where water will be scarce. Remarkably, the Netherlands flies more than 95 per cent of the cultivated roses in from the region of Lake Naivasha, what the second-largest freshwater lake is in Kenya. This means that the Netherlands imports water. The water footprint estimated by 7-13 litres. In 1990 Kenya exported 14,000 kilogram of flowers, in 2005 was it 81,218 kilogram and in 2011 was it 121,891 kilogram. The volumes have grown explosively, but in the Netherlands the growth less sharp. In 2004, the Netherlands exported 608,000 kilograms and in 2010 was it 639,000 kilogram.

With regards to the carbon dioxide, attention is needed for the greenhouse sector. The greenhouse sector has a high consumption of greenhouse gases, especially in the Netherlands. Exact data is not available for the carbon footprint in the Netherlands, but in the developed world the carbon footprint goes up to 40 tons per capita. The carbon footprint contributes 1 ton per capita in Kenya, this is relative low. Another study concludes that the emission of carbon dioxide six times higher in the Netherlands than in Kenya, this comes mainly due to the lack of sunlight. This includes air transportation. The emissions of carbon dioxide depend strongly on the amount of export, and the export has increased significantly in Kenya.

Increasingly environmentally conscious consumers ultimately have an effect on the way businesses growing roses. There are several measures taken to map the three aspects in a sustainable way; labour, water footprint and carbon dioxide.

The floricultural industry in Kenya has taken some positive measures for workers. To address the working conditions, codes of conduct were adopted. These are successful, but they are still developing. Some companies switched to biological control during years in the cultivation, besides it is cheaper it is also better for human health. Next to this is their regular health and safety training. Companies are obligated to provide their employees and their families with medical care and with housing. There are laws to protect women against discrimination in the workplace and so, equal opportunities to be respected in the workplace. All these measures are in progress, but are still under developed by some companies. In the Netherlands, the labour conditions are much better than in Kenya, but they have contended with a poor reputation. Labour is heavy, dirty and dull and nothing for a well-educated person if you ask Dutch people, but compared with Kenya is this industry highly mechanised and specialised. The working conditions are less unpleasant. For creating optimal working conditions it is necessary to split up the areas into production and work areas in the future.

The environmental aspect is important, because the Millennium Ecosystem Assessment (2005) found that the world's ecosystems are continuously in decline, because of the unsustainable use of approximately 60 per cent. Water is important and used more and more efficient. It is important to reduce the pollution in the water, especially in Kenya where the 70 per cent of the flower companies are located around Lake Naivasha. Growers in Kenya made more use of substrate in the production process instead of open ground production. In the Netherlands, the open-ground method is no longer used. This is a positive development. Growers adapted the codes of practice, which have positive impact on the pollution criteria. Also in this criterion, the Netherlands is ambitious and they are optimizing the use of fertilizers and pesticides continuously. Biological farming is not only in Kenya an upcoming market, but also in Netherlands. The Dutch industry wants the use of pesticides to be halved. Already the use of pesticides decreased by 13 per cent between 1997/1998 and 2004/2005.

Regarding carbon dioxide, the private sector and the public sector are continuously supporting the research on new varieties and products. It is important that Kenya reduces freight costs. This is for the coming years an important development. In the Netherlands, it is important to reduce the heat and light costs, because of cool summers and mild winters and this is not optimal for the rose production. Kenya has a warm climate with a lot of sunlight. The Dutch floriculture is innovative and in 2003, there are a small number of glasshouses with sustainable energy options present, for instance heat and storage tanks. The sector is already focused on minimal input of non-renewable resources, minimum output of unwanted emissions and an efficient and high-quality production. Dutch floriculture has ambition for the greenhouses to no longer use fossil fuels in 2020.

From this research it is concluded that by high energy prices and labour costs, the climate for rose growers is unattractive in the Netherlands. However, the Netherlands has a prominent position in the market. In the Netherlands water is less rare in contrast with Africa. Already the Horn of Africa is a water-scarce region, and many people died by water shortage in summer 2011. In Kenya, costs price were relatively low, but the increased fuel prices have a negative effect on the costs. It has thus become more unfavourable to transport the flower to the market. Also labour costs increase as the economy grows, this have negative effect on the costs.

This study indicates that expenditures are made on the basis of consumer demand. Consumer demand is an important issue for producers because it determines how much they sell and at what price. Consumers are becoming more environmentally aware and this has led to new markets. Markets that have interest in sustainable products have more demand for sustainable production. The research indicates that measures are taken for reducing the impact on the planet. There is a reduction of energy expenses, chemical expenses and water expenses. Measures, specifically those aiming for people, lead to an increased employee productivity and employee expenses in Kenya. In the Netherlands image is more important and productivity increased by means of mechanization. This lead to better quality for the environment and better living conditions. As consumers become more environmentally aware, this creates a bigger market share for sustainable companies. The revenue will constantly rise. This means that the measures have indirect an effect on costs, which ultimately determines the cost price, so sustainability leads to cost reduction.

This study revealed that the cost aspect outweighs the sustainability aspect. However, it is not possible to conclude completely if it is wise for business people to move to developing countries for rose production or not. Business people need to wonder what the reason is why they want to move to developing countries. What are important issues for them? It is important that the grower keeps the costs as low as possible, for creating a competitive advantage. But growers can also decide to go to Kenya, because there are sufficient work forces available or a better climate what may lead to a lower emission of carbon dioxide. Further research is required.

8. Discussion

This study looks at the floricultural industry from both countries; Kenya and the Netherlands.

First described is the definition of sustainability, to develop a better understanding of what sustainability is and what aspects are important in this study. In this study are the three main aspects for sustainability: labour, water footprint and the carbon dioxide emission.

This study focuses on the social and environmental measures. In this study it was difficult to compare the measures between both countries. It is also not scientifically supported that sustainability leads to cost reduction. To create a representative conclusion, it is important to look to all the three dimensions from the triple bottom line. It is recommended that further research is needed.

The floricultural industry in both countries is described, for developing a better view about the flower industry and how it impacts the main aspects of sustainability. Dutch companies in contrast, do not pay a lot of attention to labour, but mainly environmental impacts. Within this research it is important to note the reduction of the social impact lead to a better image of Dutch floriculture, this lead to an increase of the number of companies in the sector. Kenya concentrates mainly on social issues, but there are big environmental problems available. It would be useful to have deeper insight into what measures are taken in both countries. Field research will help, for example to study a matched sample of 50 companies in both countries, 25 classified as highly sustainable companies and 25 classified as low sustainable companies in both countries. Highly sustainable companies adopt policies for a longer period, for instance 3 years guiding their impact on the society and the environment.

Sustainability gets a higher priority in the world. There is a indirect connection with sustainable measures and profit improvements, but it is not yet scientifically supported. It would be useful to have deeper insights into this connection. It would be also useful to establish a new standard to measure sustainability. In this study, it is not clear how much sustainable measures cost and what sustainable cultivation brings in. Moreover, quality aspects have not been taken into account in this study, while these might be a strong relation between sustainability measurements and product quality. Further research is needed.

From the models, created in chapter 6, it can be concluded that sustainability leads to cost reduction which leads ultimately to a higher revenue. This study revealed that the cost aspect outweighs the sustainability aspect. However, it is not possible to conclude completely if it is wise for business people to move to developing countries for rose production or not. Further research is required to specifically say which country is better for the production of roses. Now, business people need to wonder what the important issues for them are to move to developing countries, because this study shows no overall picture what measures cost and what these measures yield.

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1. CSR certification schemes and initiatives at the international and national level

GLOBAL GAP	This pre-farm-gate certification is to inform consumers about the environmental impact of farming, and bring about a responsible approach to worker health and safety as well as animal welfare. It was previously known as EurepGAP. It is a business-to-business label and this means that it is not directly visible for consumers. GLOBALGAP offers certification for many products; for instance fruit and vegetables but also flowers. The certificate covers the process of the certified product from farm inputs like seedlings and all the farming activities until the product leaves the farm. The issues around worker health and safety as well as environmental issues are important for the certification (Rikken; 2010).
MPS Social Chapter	MPS (Milieu Programma Sierteelt – Environmental Program Horticulture). MPS is by far the biggest in terms of number of certified producers in the floricultural industry (Rikken; 2010). This organization is based on offering products/services with regard to certification in the horticultural sector. It is an international organization and all the MPS activities aimed at promoting sustainable development in the international horticulture sector. MPS-SQ (MPS Socially Qualified) is a certificate. This certificate demonstrates their products are cultivated under good working conditions. It has requirements on health, safety and terms of employment and is based on universal human rights, the codes of conduct of local representative organizations, and International Labour Organization (ILO) agreements (MPS; 2012).
Kenya Flower Council	The Kenya Flower Council (KFC) is a producer and exporting organization in Kenya which exclusively focuses on the floriculture sector. The organization has played an important role in the establishment of the Horticulture Council for Southern, Eastern and Central Africa. The organization represented approximately 50 per cent to 60 per cent of the flower export (Lans, Van der et. al.;2011) and composed currently 60 members. They represent between 70 per cent and 80 per cent of the floricultural industry in Kenya (Rikken; 2010). The main goal of KFC is the institutionalization of CSR among its members. The KFC has developed a Code of Practice. This code detailing standards in environmental, social, accountability and good agricultural practices. The code embraces also the principles of the International Labour Organization (ILO) Convention, International Code of Conduct (ICC), Ethical Trade Initiatives (ETI) and the Horticulture Ethical Business Initiatives (KFC; 2012). The main purpose of the organization is self-regulation for safe work and production environment in accordance with local and international standards (Lans, Van der et. al.;2011). The Certification Scheme comprising the KFC CoP and Quality Management Systems. It is for the Kenyan Flower Industry essential to demonstrate to the global market that flowers are produced in ways that adhere to global environmental and social standard in Kenya (KFC; 2012).
FLO & FFP	Fair-trade Labelling Organizations International (FLO) is an organization what created fair trade certification based on Fair-trade Standards. Those

	standards are developed by various stakeholders. Those standards include social development standards, environmental standards, and labour right standards including freedom of association as stated in relevant ILO Conventions. Eighteen Kenyan growers and traders in the floriculture are certified by FLO (Fidh; 2008). At the beginning of 2008 the Netherlands has incorporated fair trade flowers in its auction sales. 700 Companies signed up to this model however Kenya has not signed up to the fair trade legislation. Flowers and plants can be bought under this Fair trade label (FFP) label (Kargbo et. al.; 2010).
FFP	FFP is a consumer label for production, trade and retail. This certification includes reports by the company and inspections of the company. FFP has an international standard at the level of environmental certification and social certification. Traceability is a must within this consumer label. Products produced according to FFP standards are also sold through FFP traders and retailers. The FFP label is added to the product and carries the entire chain with it (Rikken; 2010)
International Code of Conduct for Cut-Flower Producers (ICC)	The International Code of Conduct (ICC) was proposed in 1998 by the International Union of Food Workers and unions in Germany, Holland and Switzerland. Employers' have with this code respect for labour rights, such as freedom of association, collective bargaining, equal treatment, living wages, child labour, compliance with health and safety standards, environmental protection, and limited pesticide and chemical use (Fidh; 2008).
HEBI – Horticultural Ethical Business Initiative.	It was in 2003 an independent non-profit organization with the aim to promote ethical social behaviour in the horticulture and floriculture industry in Kenya. The HEBI board of directors is composed of various stakeholders, it include Human Rights NGOs, companies, the government and the Trade Unions. HEBI has developed a social base code, the code includes requirements. The requirements are: Child labour shall not be used; employment is freely chosen; working conditions are safe and hygienic; freedom of association and right to collective bargaining are respected; no discrimination is practiced; no harsh or inhumane treatment is allowed; working hours are not excessive; living wages are paid; regular employment is provided; protection of the environment; management systems are responsible. Besides the base code HEBI provides also training to social auditors (Dolan; 2002, Fidh;2008)

Source: Dolan (2002), Fidh (2008), Kargbo and others (2010), Rikken (2010), MPS (2010), Lans, van der and others (2011), KFC (2012), MPS (2012)

2. Country descriptions

2.1 Kenya

Population	43,013,341 (July 2012 est.)
Population growth rate	2.444 per cent (2012 est.)
GDP (purchasing power parity)	\$72.34 billion (2011 est.) \$68.9 billion (2010 est.) \$65.27 billion (2009 est.)
GDP per capita	\$1,800 (2011 est.) \$1,700 (2010 est.) \$1,700 (2009 est.)
GDP growth	5 per cent (2011 est.) 5.6 per cent (2010 est.) 2.6 per cent (2009 est.)
Unemployment rate	40 per cent (2008 est.) 40 per cent (2001 est.)
Population below poverty line	50 per cent (2000 est.)
Urbanization rate	4.2 per cent annual rate of change (2010-15 est.)
Location	Eastern Africa, bordering the Indian Ocean, between Somalia and Tanzania
Area	Total: 580,367 sq. km Land: 569,140 sq. km Water: 11,227 sq. km
Climate	Varies from tropical along coast to arid in interior
Environment current issues	Water pollution from urban and industrial wastes; degradation of water quality from increased use of pesticides and fertilizers; water hyacinth infestation in Lake Victoria; deforestation; soil erosion; desertification; poaching.

Source: CIA, 2012

2.2 The Netherlands

Population	16,730,632 (July 2012 est.)
Population growth rate	0.452 per cent (2012 est.)
GDP (purchasing power parity)	\$713.1 billion (2011 est.) \$704.1 billion (2010 est.) \$692.8 billion (2009 est.)
GDP per capita	\$42,700 (2011 est.) \$42,400 (2010 est.) \$41,900 (2009 est.)
GDP growth	1.3 per cent (2011 est.) 1.6 per cent (2010 est.) -3.5 per cent (2009 est.)
Unemployment rate	4.4 per cent (2011 est.) 4.5 per cent (2010 est.)
Population below poverty line	10.5 per cent (2005)
Urbanization rate	0.8 per cent annual rate of change (2010-15 est.)
Location	Western Europe, bordering the North Sea, between Belgium and Germany
Area	Total: 41,543 sq. km Land: 33,893 sq. km Water: 7,650 sq. km
Climate	Temperate; marine; cool summers and mild winters
Environment current issues	Water pollution in the form of heavy metals, organic compounds, and nutrients such as nitrates and phosphates; air pollution from vehicles and refining activities; acid rain.

Source: CIA; 2012

2.3 Strengths and weaknesses

The Netherlands		Kenya	
Strengths	Weaknesses	Strengths	Weaknesses
Favourable proximity to European markets (+)	Heated greenhouse cultivation essential (-)	Enough employments (+)	European market is not close by (-)
Low transport costs to the European markets (+)	Expensive land (-)	Low labour costs (+)	High transport costs (-)
Excellent infrastructure (roadway and airport network) (+)	Fertilizer and pesticide emissions to the soil, air and water meet increasingly stringent environmental standards (-)	Infrastructure is okay and there is an airport located (+)	No auction(s) (-)
Auctions what create coordinated logistics (+)	High labour costs (-)	Inexpensive land (+)	Fertilizers and pesticides are expensive (-)
Strong market position in the flower industry (+)	Scarcity of labour (-)	Strong market position in the flower industry, especially roses (+)	Flower industry is oil related (-)
Knowledge (+)	Scarcity of business succession (-)	Good climate and soil (+)	

3. National Legislation and International Conventions Relevant to workers in the Floriculture of Kenya

Kenya National Legislation

- The Employment Act Cap 226
- The Workmen's Compensation Act Cap 236
- The Regulation of Wages And Conditions of Employment Act Cap 229
- The Factories Act Cap 514
- The National Hospital Insurance Fund Cap 255
- The National Social Security Fund Cap 258
- The Trade unions Act Cap 233
- The Trade Disputes Act Cap 234

ILO Conventions

Core Conventions:

- ILO Conventions 29 and 195 & Recommendation 35 (Forced and Bonded labour)
- ILO Convention 87 (Freedom of Association)
- ILO Convention 98 (Right to Organize and Collective Bargaining)
- ILO Conventions 100 and 111 & Recommendations 90 and 111 (Equal remuneration for male and female workers for work of equal value; Discrimination in employment and occupation)
- ILO Convention 138 & Recommendation 146 (Minimum Age)
- ILO Convention 182 & Recommendation 190 (Worst forms of Child Labour)

Although not core ILO conventions, the following are relevant to cut flower workers:

- ILO Convention 81 (Labour Inspection)
- ILO Convention 110 (Plantations Convention)
- ILO Convention 122 (Employment Policy)
- ILO Convention 131 (Minimum Wage Fixing)
- ILO Convention 135 & Recommendation 143 (Workers' Representatives Convention)
- ILO Convention 155 & Recommendation 164 (Occupational Safety & Health)
- ILO Convention 154 (Collective Bargaining)
- ILO Convention 156 (Workers with Family Responsibilities)
- ILO Convention 159 & Recommendation 168 (Vocation Rehabilitation & Employment/Disabled Persons)
- ILO Convention 175 (Part time work)
- ILO Convention 177 & Recommendation 184 (Home Work)
- ILO Convention 183 (Maternity Protection)
- ILO Convention 190 & Recommendations (Safety and Health in Agriculture)

UN Conventions and Declarations

- Slavery Convention (1927); Supplementary Convention on the Abolition of Slavery, the Slave Trade and Institutions and Practices Similar to Slavery (1956)
- Universal Declaration of Human Rights (1948)
- Convention on the Suppression of the traffic in Persons and the Exploitation of the Prostitution of Others (1949)
- Convention on the Political Rights of Women (1952); Fourth World Conference on Women: Beijing Declaration and Platform for Action (1995)
- International Convention on the Elimination of All Forms of Racial Discrimination (1965)
- International Covenant on Economic, Social and Cultural Rights (1966)
- International Covenant on Civil and Political Rights (1966)
- Convention on the Elimination of All Forms of Discrimination against Women (1979)
- Convention on the Rights of the Child (1989)
- World Conference on Human Rights: Vienna Declaration and Programme of Action (1993)
- UN International Conference on Population and Development: Cairo Programme of Action (1994)
- International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (2003)
- Protocol Against the Smuggling of Migrants by Land, Sea or Air (not yet in force)

Source: Dolan et. al.; 2002