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The Dutch Flower Cluster

The world export market for flowers and flower-related products was almost \$30 billion in 2009, having grown more than five-fold since 1998. The Netherlands had been the dominant player in the global flower trade since pioneering the industry in the seventeenth century. By 1998, Holland had the largest and most sophisticated flower cluster in the world in terms of technology and international penetration.

Since 2003, competition had been increasing from developing countries in Latin America, Africa, and Asia while environmental concerns related to flower cultivation were growing. In 2010, industry leaders sought to chart a strategy to allow The Netherlands to sustain its position in the twenty-first century.

The Netherlands

The Netherlands was a small, densely populated northern European country, with 16.4 million inhabitants, located on the North Sea, bordered by Germany and Belgium. It had a land area of 16,485 square miles, just over twice the size of Massachusetts (see **Exhibit 1**). The government was a parliamentary system with a queen who served mostly ceremonial roles.

The Netherlands had a long tradition of international trade both within Europe and with the rest of the world. The Dutch United East-Indian Company (VOC in Dutch), established in the seventeenth century with investments from merchants, government authorities, and wealthy nobility, had at one point operated almost 2,000 ships throughout Asia. It helped the Netherlands become the logistics, trade, and financial center of Europe, where both northern and southern products could be stored, processed, sold, and distributed.^{1,2}

In 2008, The Netherlands was the 21st-largest economy in the world with the ninth-highest GDP per capita at \$40,850, well above the EU-15 average of \$34,010.³ Labor productivity of \$53 per employee per hour was comparable to the United Kingdom, and higher than that of other European neighbors such as Switzerland and Germany.⁴ Unemployment stood at 3.7%; however, many Dutch workers (11.2%) chose to work less than three days a week under flexible work arrangements.

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Additionally, a significant proportion of the population took advantage of generous disability programs, with 8.7% of the population between the ages of 20 and 65 receiving disability benefits in 2006, well above the 6.7% OECD average.⁵

The Netherlands had an extensive logistical network and had invested heavily in its transportation systems, allocating 6% of GDP in 2008 compared to the EU average of 4.1%.⁶ Amsterdam's Schiphol Airport handled 10.2% of Europe's passengers, and was the fourth-largest cargo airport in Europe and one of the world's most efficient. It offered service to 2,000 international destinations, with more than 200 direct flights to 82 countries. The port of Rotterdam was the largest in Europe. The Netherlands also had a dense network of railways, highways, and secondary roads which offered access to many international destinations. Canals and rivers, such as the Rhine, created an efficient distribution and transportation system to the heart of Europe. In the first decade of the twenty-first century, the Dutch made major infrastructure investments such as the widening of highways in 2001, a 20% expansion of Rotterdam's port in 2006, and the construction of a high-speed rail connection with Germany in 2008.

The Netherlands had a well-educated and sophisticated workforce, nearly 33% of whom had an advanced degree.⁷ There were 15 universities, with Utrecht and Leiden ranked among the top 100 in the world.⁸ The Dutch labor market was heavily regulated and inflexible relative to other countries. The Netherlands ranked 123rd out of 183 countries in employing workers (the difficulties that employers face in hiring and firing workers) in the World Bank's Ease of Doing Business rankings, ahead of only Germany (158) and France (155) in Europe.⁹

Overall, the Netherlands ranked 30th overall in ease of doing business in 2009, according to the World Bank's Doing Business Report. Starting a business required government fees three times higher than the OECD average, due mainly to stringent anti-fraud and compliance policies. It took longer to obtain construction licenses due to strict regulations on environmental impact and spatial planning.

The Amsterdam stock exchange was the oldest in the world, and Holland had been the site of the first options exchange in Europe and was a leader in equity options and equity index options. The Dutch had been among the principal founders of the first cross-border European stock exchange, Euronext.¹⁰

The corporate income tax rate of 25.5% for medium and large foreign firms was lower than the EU-25 (25.8%) and EU-15 (29.5%) averages, having been reduced in 2006. Dutch companies had some of the most developed corporate governance standards in the world.¹¹

Holland had no significant trade or investment barriers,¹² and the Dutch were strong proponents of free trade in international forums such as the World Trade Organization (WTO) and the Organization for Economic Cooperation and Development (OECD). The Netherlands had tax treaties with many nations to prevent double taxation on income and capital.

The Netherlands had historically been relatively lax on cartels and monopolies. The Competition Act of 1998, and the establishment of the Nederlandse Mededingingsautoriteit (NMa) Competition Authority in 1999, had brought Dutch policies in line with the rest of the EU. The NMa was further strengthened by the 2007 Competition Act, which dramatically expanded its enforcement capabilities. The Consumer Authority (Consumentenautoriteit) was established in 2007 in order to ensure fair trade practices. However, the Dutch government was still considered to be one of the more permissible in Europe regarding M&A activity, and both the Consumer Authority and the Competition Authority relied heavily on industry self-regulation.¹³

The Netherlands had one of the most generous development aid programs in the world, ranking fifth among OECD countries in Development Aid as a percent of Gross National Income (GNI) in 2008, behind only Sweden, Norway, Luxembourg, and Denmark. Its GNI of 0.82% was over four times higher than the United States, with almost one third of aid going to Africa.¹⁴

Services accounted for 73% of GDP, and included major positions in transportation, distribution, logistics, business services, banking, and insurance. Manufacturing represented 24% of GDP, led by metalworking (32% of manufacturing contribution), petrochemicals (including oil refining) (24%), and food processing (19%).

Oil and gas accounted for 9.4% of Dutch export revenues in 2008. The Netherlands was the third-largest producer and the second-largest net exporter of natural gas in Europe. Rotterdam had become one of the world's major centers for crude oil trading, refining, and petrochemical production. The Netherlands Gas Exploitation Company (NAM in Dutch) had been under government control since 1963, and the government owned the gas transportation network and participated in energy trading. Domestic gas resources were expected to be depleted by 2030, however, and The Netherlands was cultivating relationships with alternate suppliers such as Algeria, Kazakhstan, Libya, Qatar, and Russia. For example, government-owned Gasunie held a 9% stake in Gazprom's Nord Stream pipeline, which transported gas from Russia to Germany under the Baltic Sea.

The maritime cluster, centered around the port of Rotterdam,¹⁵ was comprised of 11,500 companies and 133,000 employees, and contributed 2.6% of GDP with exports of \$20.8 billion.¹⁶ The Dutch were leaders in dredging technologies, controlling at least 15% of the market in each of the three major equipment types¹⁷ and shipbuilding where they had a 2.6% world export share¹⁸. The cluster had an extensive network of specialized suppliers and service providers that operated internationally.

Agriculture, an important traditional Dutch activity, accounted for 2% of GDP and 3% of employment,¹⁹ but 17% of total Dutch exports in 2008 (see **Exhibit 2**). Major product areas included floriculture (35% of agricultural exports), livestock and meat (26%), and dairy products (20%). Dutch agriculture was known for large farming cooperatives including *Campina Melkunie* in dairy, *Vion* in meat, and *The Greenery* in vegetables. About 50% of agricultural products were processed in The Netherlands before export.

Cut flowers represented 27% of agricultural production in The Netherlands in 2008²⁰ and half a million full-time direct and indirect jobs.²¹ Floricultural products (cut flowers, potted plants, and propagation material) were a major Dutch export category with sales of over \$16.7 billion (including re-exports) in 2008.²²

Floriculture

Cut flowers were "parts of plants, characteristically including the blooms or 'inflorescences' and some attached plant materials, but not including roots and soil."²³ Highly perishable, a cut flower typically lasted a maximum of 5-8 days without the use of preservatives. Potted plants were more durable products that shared some of the same supply chain characteristics but were often produced by separate breeding and growing companies and sold through specialized market channels.

The principal traded flowers were roses, carnations, and chrysanthemums. Other leading flower types included tulips, lilacs, gerberas, cymbidium, freesia, anthurium, and hippeastrum (See **Exhibit 3**). There was a huge and growing range of flower types and varieties. For example, there were at

least 100 species and thousands of varieties of roses which came in all colors except for blue and black.²⁴ Chrysanthemums could be bred into different shapes and textures and even artificially colored, making them a preferred flower for bouquets.

Flower cultivation began with breeding, which improved the characteristics of flowers over generations by repeated reproduction. Flower varieties were modified to meet producer need and target specialized consumer segments.²⁵ Growers, for example, sought lower requirements for pesticides, energy, fertilizer, and water, as well as achieve better germination power, yield, sowability, health, and uniformity of young plants. Stronger textures reduced damage to product during handling. Consumers valued more intense color, longer stem length, and larger head size. Creating successful new varieties of flowers had been a lengthy, difficult, and expensive process, but DNA technology had revolutionized breeding techniques by allowing breeders to insert, delete, or modify individual genes, creating new varieties with beneficial traits without having to sacrifice desirable characteristics. In general, breeding new bulbs was a much more complex and time-intensive process than breeding new seeds.

The productive life of a flowering plant was estimated at around three years. Each plant had a different yield and different production requirements. For instance, standard chrysanthemums had one flower per stem, but the pompon variety had four to six much larger flowers per stem.²⁶

Growth time and productivity varied significantly by flower. Roses, for example, took up to eight months to mature from a seed into a full flower, while tulips maturing from bulbs only needed four months. Adequate sunlight, water, and fertilizer were all components of plant development. Temperature control was important as well, and many growers utilized greenhouses with complex irrigation systems in order to optimize environmental conditions. Frequent pruning was also necessary for many flowers to remove dead leaves that might rot and harm the rest of the plant.

Harvesting, grading, and packing were usually done by hand. Grading included factors such as stem straightness, stem strength, flower size, vase life, freedom from defects, maturity, uniformity, and foliage quality, all important elements for the consumer.²⁷ Once cut, flowers were extremely perishable. Refrigeration and various chemical solutions were employed after harvest to maintain the quality of the flowers, such as silver nitrate and sugar to prevent leaf yellowing.²⁸ Labor and inputs for the growing and harvesting process could constitute 60%–80% of the total growing costs, with energy costs to power greenhouses accounting for the remainder.

Boxes protected flowers during transportation. There were multiple sizes of long boxes with telescoping designs and with varying levels of durability. Box designs and the way flowers were secured within boxes sought to enable cooling and minimize damage during transport. Frequently, flower heads were individually protected by paper or other cushioning material such as shredded wood and paper wool, with delicate flowers such as roses needing more packing than hardier flowers such as carnations. Some varieties, such as the gladioli, were packed in special hampers to prevent curvature.

Temperature control was extremely important during the postharvest supply chain. Upon harvesting and packing, most flowers needed to be held at 0–2 degrees centigrade with the exception of cold-sensitive flowers such as anthurium, bird-of-paradise, and tropical orchids which were maintained at temperatures above 10 degrees. Cooling normally utilized forced air through box end holes, but newer technologies such as cooling packs were also being utilized. Transport costs for flowers shipped overseas ranged from 60%–90% of the total cost to produce a flower, though they varied significantly based on transportation distance and how carefully flowers needed to be packed.

Cut flowers travelled through a sophisticated and complex distribution system, involving auction houses, wholesalers, and then retail florists, boutiques, or supermarkets that sometimes assembled them into bouquets before selling them to end consumers. Cut-flower retailers considered quality, longevity, and price as the three most important product characteristics. In some countries, growers sold some flowers directly to florists, large retailers, and sometimes consumers.

Consumers bought flowers for gifts, special occasions such as weddings and funerals, and to enhance the aesthetics of homes and public places. Cut flower consumers could be divided into “impulse” and “occasion” (e.g., Valentine’s Day) buyers. The European market was characterized as an occasion market, though Netherlands and the United Kingdom had strong impulse purchases. In the United States, most flowers were sold as gifts (74%), with Valentine’s Day and Mother’s Day accounting for 18% of total consumption. Consumer preferences varied over time, with different colors, sizes, and types of flowers popular from season to season.

Flower prices varied substantially based on rarity, quality, and season. Prices were at their lowest during the summer months when production in the “northern” countries reached its peak, and highest in November and December. Average price levels had remained virtually flat over the decade of the 2000s in nominal dollar terms. Since consumers had difficulty judging quality at purchase, retailer reputation was important.

The wealthiest countries tended to have the highest per capita cut flower consumption, though there was high variation. In 2008, the average Dutch citizen bought \$80 worth of flowers per year, while the average American spent \$33. In Germany, the percentage of households that bought flowers was 76% versus 63% in Great Britain, 60% in France, and 28% in the United States. Per capita consumption in China was estimated at less than \$1.²⁹

Per capita consumption of cut flowers in The Netherlands was the third-highest in the world, after Switzerland and Norway, in 2008. With larger assortments, higher quality, and better service, about 50% of Dutch flower sales were through florists. However, there was rising competition from other retail channels such as supermarkets. Although the Internet accounted for less than 1% of total sales, its share was expected to increase significantly in the future. Direct sales between growers and retailers were becoming more important.

Major cut flower producing countries included The Netherlands, Colombia, and the United States, while the leading exporters were The Netherlands, Colombia, Ecuador, and Kenya (**Exhibit 5**). The European market was supplied mainly by The Netherlands, Israel, and Kenya; Colombia and Ecuador primarily sold to the North American market; and the Asian market was supplied by China, Taiwan, New Zealand, and The Netherlands.

Germany was the largest importer of cut flowers in the world, followed by the United Kingdom, the United States, The Netherlands, and France. The Dutch imported large quantities of flowers for auction which were then re-exported to European Union (EU) and other countries. For example, repackaged exotic flowers from the Middle East, South America, and East Africa constituted 30% of Dutch flower exports.

History of the Dutch Flower Cluster

The tulip, the origin of Dutch flower cultivation, came from Turkey and was first imported to The Netherlands around 1570. In 1593, French-born Carolus Clusius planted the first tulip bulb for academic research at the University of Leiden. Thefts from his garden started the spread of tulip

growing locally. The sandy coastal grounds in The Netherlands proved fertile for flower cultivation, and the popularity of tulips rose.³⁰ The first exports of tulip bulbs took place at the beginning of the seventeenth century.

Between 1610 and 1637, tulip bulbs touched off an unprecedented speculative bubble. At its height, tulip bulbs became a form of currency and the bulbs of the “Semper Augustus” variety traded at an equivalent of three times the cost of a prime Amsterdam residence.

As social conditions in Europe improved, flowers became accessible to more parts of society. Commercial flower cultivation was first concentrated around Haarlem and gradually expanded southward towards Leiden, an area that came to be known as the Bulb Region. The use of greenhouses for flower cultivation began around 1850. During the nineteenth and twentieth centuries, cultivation spread to new areas of the country (see **Exhibit 6**).

By the turn of the twentieth century, greenhouses had evolved into structures constructed entirely of glass and heated with natural gas, boosting yields. The constant and regulated environment made year-round cultivation of flowers possible. From the beginning of the twentieth century, there was continuous innovation in flower yields, product quality, and the development of new varieties.

The early markets for Dutch flowers were Germany, France, the United Kingdom, Russia, and the Scandinavian countries. The first flower trade organization, the Dutch Horticultural Council (Nederlandse Tuinbouwraad, or NTR), was founded in 1908. Two auctions (Bloemenlust and Centrale Aalsmeerse Veiling) were established in 1912 by cooperatives of growers to counter the growing power of middlemen in the industry. Auction houses were located near waterways, allowing flowers to be delivered locally by boat and bicycle and serving as gathering points for the production of surrounding growers. Railways provided efficient transportation between the auctions and the Amsterdam transportation hub.

In 1923, the association of bulb growers and trade associations, De Narcis,³¹ established the Flowerbulb Inspection Service (BKD), a voluntary service that inspected daffodils shipped to the United States that were experiencing phytosanitary problems. Inspection came to be regulated by law and BKD was charged with testing for all known viruses in 1980. Since 1998, BKD had been designated by the Dutch government as an independent administrative body, conducting field inspection of all flower cultivation with trained inspectors examining the stock in the field for diseases and abnormalities.

Through the 1960s, the two Dutch auctions were serviced by a cooperative transport company (Bloemenexpresse) that distributed Dutch flowers to the European market by truck. Although high-speed passenger trains ran between most major European cities, transport of both cargo and passengers on the same train was prohibited. Starting in the 1960s, Amsterdam’s Schiphol Airport started to play a significant role in flower shipments to New York and Tokyo. Major European exporters began establishing permanent bases near the Dutch auction sites, and KLM Royal Dutch Airlines established a dispatch facility at Aalsmeer.³² By 2009, KLM was shipping 10,000 pounds of flowers to the United States every day.³³ In May 2009, a new variety of tulip was developed and named the KLM in honor of the airline’s 90th birthday.

Starting in the late 1950s, the Dutch cluster began developing linkages with other flower-growing countries around the world. Dutch suppliers began serving foreign locations, and there was dissemination of production technology, information on best practices, and product innovations. Dutch companies invested in foreign production, logistics, and supplier subsidiaries.

The Dutch pioneered numerous innovations in flower production such as specialized systems to manage the logistics process (1972), artificial lighting (1978), climate-controlled greenhouses (1983), and new mechanized growing and harvesting techniques allowing for year-round production (1985). The Milieu Project Sierteelt (MPS) in the Westland province was introduced in 1993, an environmental sustainability certification program which had attracted 1,000 growers by the end of 1994. In February 2005, the program became the certification authority for all of the Dutch auction houses, together with LTO, the Dutch Organization for Agriculture and Horticulture. MPS quickly became the international standard for reducing the environmental impact of floriculture.

A string of auction house mergers beginning in 1973 resulted in four remaining Auctions by 2002: Aalsmeer Flower Auction (VBA), by far the largest; Westland-based FloraHolland Flower Auction; Oost-Nederland Flower Auction; and Vleuten Flower Auction. To increase volume and reduce costs, the VBA allowed foreign growers to become full members in 2006. In January 2008 Oost-Nederland and Vleuten merged into Plantion, and at the same time the VBA and FloraHolland merged under the name FloraHolland, with \$6 billion in combined volume. FloraHolland operated from six major locations including the large Aalsmeer Auction (VBA), with 45% of all cut flower trading and 70% of exports in 2009. Though FloraHolland expected to eventually consolidate its locations, grower investments in the logistics, handling, and bouquet-making at the smaller sites had slowed the transition. The combined organization had 5,124 members, 22% of whom were foreign. In 2004, Aalsmeer had invested \$900 million on the expansion of auction facilities and improving ICT, including the use of robots to transport flowers within the auction house.

In the spring, when bulb fields were covered with flowers, the Dutch flower industry attracted many foreign tourists. The VBA auction alone attracted 125,000 tourists a year. The auctions had begun plans to create visitor centers. There were also flower exhibitions across The Netherlands, such as the *Keukenhof*, which attracted 856,000 visitors in 2009.³⁴

The Dutch Flower Cluster in 2009

Dutch flowers, including re-exports, accounted for 60% of global flower exports and 66% of flower exports into Europe in 2009. Over 90% of flower imports in Germany, France, Denmark, Finland, Hungary, Slovenia, and the Baltic states came from The Netherlands.³⁵ Exports to markets with substantial local production such as Spain and Italy were lower, with Dutch flowers representing 20% and 29% of the market, respectively.³⁶

Growers In 2007, there were 3,770 Dutch flower growers who competed on variety, product quality, and price. Growers had begun taking on additional value-added activities such as marketing, and grower cooperatives were employing their own salesmen.

Since The Netherlands had such marked seasons, greenhouses (called glasshouses) were used for growing flowers year round. Glasshouses also allowed complete control of growing conditions which could be modified for different varieties.

Workers involved in primary growing were mainly immigrants from Poland and other central European countries, and who commanded lower wages than comparably educated Dutch workers.

From 2003 to 2007 the production value of flowers had increased yearly by 10%, and had reached \$5.6 billion in 2007. However, the total production area of flowers grown under glass was declining at 3% annually (see **Exhibit 7**) with greenhouses smaller than two hectares disappearing. Production

was declining in basic products such as roses and dedranthema,³⁷ and shifting toward higher-priced types such as anthurium and gerberas.

LTO, the Dutch Organization for Agriculture and Horticulture, promoted the social and economic interests of farmers as well as sustainable agricultural and horticultural practices. LTO ran programs to improve management and marketing skills as well as to disseminate sustainable cultivation practices. It also supported grower relationships with foreign countries by facilitating study trips to African and South American countries.

Most growers were members of the Dutch Flower Council and the Association of Dutch Flower Grower's Research Groups.³⁸ Other organizations such as the Dutch Milieu Project Sierteelt (MPS) administered certification of environmental and labor practices. These and other cluster trade associations, as well as the auctions, provided specialized training and workshops for the employees of their members.

The Dutch government was seeking concrete agreements from growers to reduce their environmental impact, including spray-free zones along drainage ditches, spraying permits and inspections, keeping fertilizer records, the use of animal manure injected into the soil rather than spread on top, and the cultivation of organically grown bulbs.

Suppliers The Netherlands was the world leader in the development and supply of floriculture propagation material, and home to world-class plant breeding organizations that allowed the continued marketing of new varieties. Breeders and propagators carried out the task of multiplying seeds and cuttings and cultivating young plants for sale to growers. This was a labor-intensive process in which only a few tasks could be mechanized. To protect intellectual capital and the substantial investment required to develop new varieties, breeding companies registered and protected new varieties through organizations such as the Community Plant Variety Office (CPVO) of the EU.³⁹ Young plants were transferred to growing structures with steam-sterilized soil and controlled temperatures, and then raised to maturity in greenhouses or fields.

Twenty Dutch companies with estimated combined revenues of \$350 million were specialized builders of greenhouses. They held a 80% world market share, with greenhouses mainly used in the moderate climate zones of the U.S., Canada, Russia, and Europe.⁴⁰ New greenhouse technology was constantly being developed. The Dutch government provided research subsidies and tax credits via accelerated depreciation schedules or double capital deduction for builders.

In response to rising energy costs and efforts to improve sustainability, more energy efficient greenhouses were developed with the help of government subsidy. Dutch flower growers began operating greenhouses which could conserve surplus heat generated over the summer months for the winter or convert it into electricity. Greenhouses were linked to the Dutch electricity network to absorb power generated in summer months and provide power back in the winter. Another effort to lower energy costs was the use of biofuels to heat the greenhouses instead of natural gas.⁴¹ Other promising developments in 2009 included greenhouses that contributed to CO₂ reduction and greenhouses that floated on water. The energy association (AgroEnergy) was becoming an important player in industry (see **Exhibit 10**). Still, energy costs represented up to 30% of the final cost of a flower delivered to the auction (see **Exhibit 11**).

Dutch fertilization and irrigation companies produced critical inputs that strongly influenced the quality of flowers and their freshness once cut.

Growers employed capital-intensive harvesting technologies developed and manufactured in The Netherlands, such as automated machines that cut, defoliated, and bundled flower stems, ensuring consistency and labor savings. Investments in such machinery were financed mainly through Rabobank, a specialized agricultural cooperative bank.

Auctions Plantion and FloraHolland traded 20,000 different varieties, with between 1,200 and 1,500 new varieties brought to the market every year. The volume of flowers sold at Dutch auctions had grown rapidly, leading to continued investment in auction infrastructure. By 2009, 44.8 million flowers were sold in 125,000 daily transactions. In 2009, the leading flowers passing through the FloraHolland auction were roses (\$604 million); chrysanthemums (\$359 million); tulips (\$294 million); and lilacs (\$213 million).

Flower auctions created a marketplace for growers and allowed wholesale and retail buyers to purchase flowers in bulk that were then repacked and resold to retailers or end-consumers. Auction customers included traders, wholesalers, and retailers. Traders operated in separate rooms where they could monitor the trading process at different auctions simultaneously on screens. More and more traders in the Dutch auctions were foreign companies from Russia, Lithuania, and Eastern Europe. Traders competed on price, access to markets, distribution channels, and new product concepts, such as bouquets and packaging. The retailers and supermarkets captured the largest share of markup, up to 50% of the final consumer price.

Flowers were shipped to the auction in large packages where automated machines, many of which were operated by importers renting space from FloraHolland, repackaged the flowers to allow smaller lot sizes and better display for auction bidding. For certain flower varieties, other machines graded the flowers for quality based on the size of the flower's head. Randomized checks on flower quality were performed depending on a complex algorithm based on a grower's previous quality reliability.

At the auction, a clock would track prices starting at a high level and falling at a steady rate each second until a buyer stopped the clock to signify an acceptable price.⁴² The buyer specified the quantity to be purchased, and the clock resumed its path for the remaining flowers in the grower's lot. This process continued until the whole lot had been sold. This system resulted in sales prices that were generally higher than in conventional markets. The Dutch auction system allowed buyers to bid on only a portion of each lot of flowers offered. The average order size was below 200 euro. Once an order was placed, lots were transported automatically using special carts to the buyer's location. Often a single buyer represented multiple retailers, who would later assemble the flowers into bouquets at their shops. Flowers spent a maximum of 12 hours between physical intake at the auction site and sale.

Auctions tracked sales with advanced ICT and electronic data interchange (EDI), with the ability to track individual stems. Efforts were underway to improve electronic commerce facilities. FloraHolland allowed buyers to see the next day's auction supply and facilitated remote buying through a real-time virtual auction clock. The computerized system called *Flower Access* offered a way for individual florists and garden centers to buy directly from growers at fixed prices.

Auctions published up-to-the minute prices, supplied market information, and advised on industry trends to help growers make more informed decisions. Many growers from across Europe would visit an auction once or twice a week simply to gain market information on which colors and varieties were the most popular and which flowers were being used in bouquets. Auctions counseled growers on growing, packaging, and even provided some large buyers with premade bouquets. The

auctions also assumed payment risk, ensuring growers were paid immediately even if buyers defaulted. Auctions also took the lead in strategic planning for the industry as a whole.

Auctions took less than 0.1% margin on the flowers, relying on high volume and ancillary services for profits. Auctions allowed for more favorable terms than any individual grower could have obtained. Auction costs were 5%–10% of the final price for members, and about double this for non-members.⁴³ Investments in expansion and upgrading were determined by the auction members (growers) together with management.

An estimated 80% of the Dutch cut flower trade passed through the auctions,⁴⁴ and the Dutch auctions were involved in more than 60% of all international trade in flowers. The auctions sourced flowers from a large number of countries. Kenya (37%) was the leading supplier, along with Ecuador (13%), Israel (7.4%), Ethiopia (6.5%), Colombia (5%), Zimbabwe (3.8%), and Uganda (3.8%). Most flowers traded in The Netherlands were destined for consumption in Europe (80%). On average, imported products sold at lower prices than domestic products, due to lower variety and quality.

Some growers bypassed the auction and distributed their flowers directly through fixed-price contracts with importers or consignment sales to wholesalers. In consignment sales, wholesalers received a fixed percentage of the wholesale price. Wholesalers belonged to VGB, an organization that negotiated terms of trade and auction policies.

Auctions were owned by the growers through a cooperative structure. For instance, at FloraHolland a percentage of sales through the auction were kept as a “loan,” which determined how many votes each member had at the annual Member’s Meeting. Nine growers sat on the FloraHolland Cooperative Board, with three members replaced every four years. The Cooperative Board established the strategic priorities for FloraHolland and appointed the four non-grower members of the Management Board, which ran the auction’s day-to-day operations.

The Dutch Association of Flower Auctions (VBN) was an industry association that represented the two flower auctions. It provided a platform to exchange knowledge and improve supply chain cooperation and coordinated solutions to common issues including product quality, logistics, market information, lobbying, legal issues, and communication.⁴⁵

Logistics and distribution After sale, whether directly or through an auction, flowers took a number of routes to their destination. There were 693 flower exporting companies in The Netherlands in 2008, 41 of which handled propagation materials. The number of export companies with a turnover of more than \$60 million had increased from 21 in 2005 to 25 in 2008. In 2007, 152 Dutch companies were involved in importing flowers, selling to almost 900 local and foreign wholesalers.⁴⁶ It was estimated that 10% of all trucks on the road in the Netherlands were carrying flowers either to or from the auction. Transport costs to the auction represented about one-fifth of the total cost at auction.

Most flower exports destined for nearby markets were transported in refrigerated trucks over land, train and short sea shipping. Delivery to the wholesaler, supermarket, or florist usually took place by the following morning.

The remaining exports sold to distant destinations were transported by air and delivered the next day. These flowers moved from the grower or the auction to the airport in refrigerated trucks. Schiphol Airport had vacuum cooling facilities to bring down the temperature of flowers before loading onto the planes with refrigerated compartments. Since the air freight cost for flowers was

based on their volume rather than their weight, some producers over-packed boxes which reduced quality and shelf life.⁴⁷

Once at their destination, flowers were subject to inspection for the presence of harmful diseases, pests, or illegal substances. Extensive regulation and certification concerning plant health and environmental standards were strictly enforced, and distributors often performed their own quality inspections. Transport costs of cut flowers from the exporter were typically less than 1% of the total cost of flowers at auction. The Dutch transport and logistics industry association had a subgroup of cut flower transporters with about 60 certified member companies.

By 2009, retailers and supermarkets worldwide were increasingly unwilling to carry inventory and demanding custom-made, just-in-time products. Average order sizes had fallen.

Research organizations The Plant Research International center at the University of Wageningen was a renowned research institute specialized in many aspects of the cut flower system from herbicide use to biological markers for breeding.⁴⁸ Research projects included the effects of bees, the creation of optimal greenhouse horticulture combinations, and crop protection, as well as attempts to increase variety, improve farm and supply chain management, and augment flower-related quality control. The Flower Bulb Research Center, a private institute in Lisse founded in 1917, performed research in areas ranging from physiology to environmental impact, and had a diagnostic desk where diseased plant specimens could be brought in for analysis and possible advice. The botanical garden at Leiden University played a key role in the development, collection, and preservation of the biodiversity of flowers.

The Netherlands had six Agriculture Educational Institutes (AOCs) and seven regional educational centers. Of the 27,212 students attending these institutions, 3,000 specialized in floriculture. Many universities offering specialized degrees and training focused on the flower industry, such as the Bachelor of Science degree in Food & Flower Management offered by Fontys University of Applied Sciences.⁴⁹

Competitors

In 2009, there were 10 countries with annual cut flower exports of at least \$100 million (see **Exhibit 5**). Colombia, Ecuador, and Kenya had emerged as the three leading suppliers to the Western Hemisphere. China's consumption and production were growing and it was expected to become a significant competitor in the world market.

Colombia Colombia was the world's second largest flower producer after The Netherlands⁵⁰ with a global export market share of 13% in 2008.⁵¹ Worldwide, Colombia accounted for over 60% of carnations, 20% of pompons, 8% of chrysanthemums, and 4% of roses grown, 95% of which were exported abroad.⁵²

Colombia was the leading carnation exporter, and the leading exporter of cut flowers to the U.S. market. Colombian exporters supplied 5% of all flowers marketed at Dutch auctions in 2007, and 53% of all carnations. Exports of carnations to The Netherlands had grown at 5.3% annually between 2003 and 2007,⁵³ and new export markets had opened in Russia, the U.K. and Japan.

Commercial flowers were first planted in the Bogotá area in Colombia in 1962 for sale to European markets. The industry took off after a 1966 study revealed ideal growing conditions for carnations.⁵⁴ The country attracted local and foreign investment to establish farms, mostly from the United States.

The first exports to the U.S. market were carnations in the early 1970s, followed by pompons and chrysanthemums.

Colombia's location near the equator ensured ample sunlight conditions and a three-hour plane flight to the U.S. port of entry for flowers, Miami. Flower cultivation was geographically concentrated near the Eldorado International Airport in the Bogotá Savannah, which accounted for 90% of national production. By 2008, Colombia was producing more than 50 flower varieties on 7,870 hectares.⁵⁵ Growing costs were less than half of Dutch production costs (not including transportation).

The industry employed 80,000 workers directly in production, and more than 110,000 in shipping, packaging, and other services.⁵⁶ Flowers accounted for about 25% of Colombian female rural employment in 2007. Labor for growing and harvesting represented about 15% of a carnation's total cost before transport, while for roses it was almost half.

There were over 500 flower farms, with companies typically owning more than one farm. Production utilized various types of coverings such as polyethylene to protect plants from extreme temperatures and insects. Growing knowledge and technology were imported largely from The Netherlands by way of specialized suppliers. Most growing costs were on par with other countries that produced cut flowers, but the ability to grow flowers without greenhouses dramatically lowered energy costs. Due to its heavy focus on the U.S and Dutch markets, Colombia had been required to develop sound environmental and labor practices.

The Colombian cluster had developed a strong network of suppliers. A variety of Dutch companies with local subsidiaries provided everything from irrigation and cutting equipment to nutritional products, general tools, seeds, and young plants. Dutch companies were also heavily involved in logistics, particularly in handling, cold chain management, and sea shipments. FloraHolland had created a company in Bogotá in 2009, FH Services Colombia Ltda, to expand its position in Latin America. It also participated in the "Proflora" exhibition, the most important international cut flower trade fair in the Americas.

Colombia had limited logistics capabilities and much of the flower processing had to be completed when the flowers arrived in their destination. The cost of transporting the flowers was 70% to 85% of the flower's total delivery cost, depending on how delicate the flowers were. Shipping flowers to Europe was roughly twice as expensive as shipping them to the U.S., but FloraHolland had collaborated with companies such as Chiquita, Dole, and the Dutch firm Intergreen over 2-3 years to develop specialized sea freight containers that would allow flowers to withstand the 25-day journey. Shipping by sea could save as much as 40% of the logistics costs, but flowers had to be very high quality and carefully packed in order to survive the trip.

The association of Colombian flower exporters (Asocolflores) was established in 1973 as a non-profit organization to promote Colombian flower exports. In 1978, the association led a diversification policy to grow roses and other varieties of tropical flowers. Beginning in 1999, the association held a trade fair (Proflora), which was attended in 2009 by over 1,500 international buyers from more than 40 countries. In 2004, Asocolflores founded a research center (Ceniflores) financed by its affiliates to promote innovations to improve sustainability, pesticide substitution, and other environmentally sound practices.

Ecuador Between 1998 and 2008 Ecuadorian flower exports grew at an annual rate of 13%,⁵⁷ reaching a value of \$566 million. They were shipped mainly to three destinations: the U.S. (72%), Russia (10%), and The Netherlands (6.7%) in 2008. Ecuador was the leading rose exporter to the U.S and the third-largest overall world exporter with an 8% overall flower export share in 2008.⁵⁸

Ecuador served the U.S. boutique market while Colombian products were more directed towards the mass market.

The cut flower industry in Ecuador dated back to the early 1980s, but the Andean Trade Preference Act (ATPA), signed in 1991, accelerated its growth. ATPA was a U.S.-led initiative that granted market access with zero tariffs for selected products, including cut flowers, to provide compensation for Ecuador's participation in the fight against drugs. Ecuadorian, U.S. and Dutch investors developed the flower industry in the Cayambe region, near Quito.⁵⁹

Ecuador's excellent climatic conditions close to the equator with higher elevations maximized sunlight and allowed high quality production. This enabled the cultivation of 410 different varieties of roses (74% of the cultivated area) in Ecuador versus about 50 in Colombia, with an average stem length up to 30 cm longer. Labor costs were 80% of the cost of labor in Colombia.

Ecuador had about 700 farms with a total of 4,000 hectares under cultivation in 2009.⁶⁰ Four of the largest farms were Dutch-owned. More than 50,000 workers were employed in direct production operations, 70% of whom were women. Dutch companies had established subsidiaries in Ecuador that supplied seeds and young plants using local production. Most agrochemicals were imported from Colombia. Financing was scarce for new ventures.

The majority of the farms were located near Quito close to Mariscal Sucre airport, which was served by more than 15 cargo airlines.⁶¹ Ecuador experienced higher air transportation costs than Colombia in absolute terms, but similar overall logistical costs as a percentage of the total cost (70% to 85% of the final cost of the flower). Dutch logistical companies consolidated product within the country and handled most of the transport for the cluster. In 2005, FloraHolland opened an office in Quito to provide information, trade facilitation, and logistics support to growers. FloraHolland invested in transport alternatives consolidating cargo by air and sea to position the Ecuadorian product in the European market. Ecuadorian farms could reach customers all over Europe. Dutch companies had also tested and deployed new technologies in Ecuador, such as the use of special containers and storage technology to transport flowers by sea between ports in Ecuador with Rotterdam.

Expoflores, the principal national association of producers and exporters of flowers founded in 1984, was the main industry organization. It had created FlorEcuador in 1998 to certify good environmental, social and legal practices. The program certified 97 farms in 2010.⁶²

Kenya In 2009, Kenya's cut flower industry was the country's third-largest foreign-currency earner, after tourism and tea. It was the leading exporter to the European market, and the fourth-largest global producer with a 6% share in 2008⁶³ with 2,180 hectares under cultivation in 2008.⁶⁴ The Kenyan cluster had enjoyed a compounded annual growth rate of 19% between 1998 and 2008.

The main Kenyan exports were roses and carnations, most heading to The Netherlands (65%), the U.K. (23%), Germany, France and Switzerland. Kenya produced 35% of the flowers sold in the European market, with most passing through The Netherlands. In 2009, economic crisis lowered European flower demand and FloraHolland helped Kenyan growers develop alternative markets in Japan and Russia. Efforts were underway to diversify into America and the Middle Eastern markets.⁶⁵

In 1980, the Kenyan government, the Dutch Ministry of Development Aid, and a group of Dutch growers had funded a study on the country's potential for a flower cluster, conducted by a Dutch consulting firm. Kenya could produce high-quality products on a year-round basis. In 1982, a group

of Dutch growers began rose and carnation production in Kenya using the abundance of water in the Kenyan Mountain area and taking advantage of year-round sunshine. Input costs were similar to those of Kenya's competitors, with the lack of need for greenhouses keeping energy costs low. By 1982, nearly 5,000 Kenyans were employed in the Dutch farms.

Early production in the 1980s was characterized by simple open field production with limited assortment. In the 1990s, Kenya attracted large new flows of FDI, especially from Dutch investors, to create large-scale farms close to Nairobi International Airport that were vertically integrated from plant stock to direct retailer distribution. Producers began shifting to intermediate and sweetheart rose varieties that required more elaborate post-harvest practices, and to package cut flowers in Kenya before export.⁶⁶ The Kenyan cluster had shifted to higher-value flowers grown in plastic greenhouses in the 1990s, and Israeli greenhouse companies that specialized in high-temperature regions became major suppliers as well as Dutch firms. However, most of the flower production was still in the open air, and the supply of flowers was highly variable from season to season depending on weather conditions.

As of 2008, 70% of Kenyan cut flower production was owned by Dutch growers, with the bulk sold to Europe via the Dutch Auctions. The other 30% was owned by Kenyan growers who mainly shipped roses and carnations directly to major U.K. retail stores like Tesco. The cluster employed 60,000 people directly.⁶⁷ Despite a relatively well-educated workforce in comparison with some of its competitors, labor productivity was low. In addition, weaknesses in basic infrastructure such as paved roads and electricity continued to be an impediment for cut flower exporters.⁶⁸

There were daily airfreight departures to key export destinations. The Dutch company Van Putter had established cooling facilities near the airport, co-owned by Dutch growers and the Dutch auctions. Transport costs were one-fifth lower than Colombia for carnations and one-third lower for roses. The local office of FloraHolland provided support in exporting, logistics, and the collection and dissemination of production and market data throughout the supply chain.

The Dutch Plantum NL industry association had a sales office in the country and provided advice to growers. This group focused on growing plant materials for all major existing commercial varieties around the world. Dutch seed companies and propagators had also set up local facilities and were developing special seeds for the Kenyan environment as early as 1988, allowing for higher-quality roses with traits such as longer stem lengths, lower water requirements, and greater durability to survive airfreight shipment.

Since 1994, the University of Wageningen, together with the Dutch and Kenyan Ministries of Agriculture, had established exchange programs for students. The Kenya Flower Council (KFC), an association founded in 1996, represented 60% of flower exports⁶⁹ and included 25 associate members including representatives of Dutch cut flower auctions and distributors in Europe. Associate members were involved in "mother" plant stock imports, farm supplies and related services. In 2007, the Dutch media had called attention to low wages, poor chemical protection, and low standards of living for Kenyan flower workers. This had caused Kenyan growers to adopt MPS standards, and the KFC adopted codes of conduct and compliance with environmental standards and labor certifications. According to Council chairman Rod Evans: "Our members understand that it is in our own interest to preserve the environment."⁷⁰

China In 2005 a Dutch company, Van den Berg Roses, had built a state-of-the-art greenhouse in Kunming on a 30-year land lease from the local government using Dutch government funding via PSOM (Programs for Stimulating Emerging Markets Business Development). Van den Bergh also became the local agent for a Dutch breeder firm and experimented with the breeding and

propagation of 70 different varieties of roses in the Kunming area. The company brought greenhouse construction expertise, fertilization techniques, water supply methodologies, energy and heating supply systems, computer and software skills, Dutch production and management standards, and hygiene requirements and measures to China. Other Dutch companies began to enter into joint ventures with Chinese companies to provide lily bulbs, anthuriums, carnations, cut flower food, cold storage, and logistics.⁷¹ Twenty-seven Dutch companies in total formed NABSO, The Netherlands Agribusiness Support Office Kunming.⁷²

Though producing less than 1% of world exports, the Chinese flower cluster was growing rapidly.⁷³ More than 90% of Chinese flower production went to China's major cities such as Shanghai and Beijing, driven by rising income and growing tourism. Japan was the main export destination of Chinese flowers in 2008 (60% share), followed by Thailand and Singapore (8% and 7%).⁷⁴ The top three types of flowers exported were roses, carnations and chrysanthemums.⁷⁵ China had an ambition to grow exports, and hoped to become second in the world after The Netherlands in 10-15 years.⁷⁶

In 2007, China reported the largest cultivated area for cut flowers of any country with 72,700 greenhouse hectares and 224,600 hectares of open flower crops.⁷⁷ Farms were located in the Yunnan, Shanghai, Zhejiang, and Beijing provinces. The area around Kunming in Southern China had become a major commercial and logistics center for the flower industry, though Kunming International Airport did not have direct flights to international flower trade centers. Transportation costs were up to 20% higher than Ecuador and almost double those for Kenya, so flowers were usually reserved for local consumption.

Most of the plant stock originally came from The Netherlands, but local production of planting materials was growing. China possessed a range of growing conditions similar to The Netherlands, Colombia, and Kenya,⁷⁸ allowing it to produce all known commercial cut flowers. Yet, major concerns existed about quality control as well as piracy of plant varieties. The Chinese government was taking steps on both fronts. In 1999, China became a member of the International Convention for Protection of New Varieties of Plants, and multiple government ministries had created offices to maintain the integrity of new plant varieties. In 2009, however, it was estimated that 80% of anthurium sold in China came from copies.⁷⁹

A flower auction was established in the Yunnan province in 1997 which mimicked many of the characteristics of the Dutch auction system. In 2002, FloraHolland took a 5% share in this auction and began providing training assistance, transfer of software and clock technologies, and assistance in developing inspection procedures. In 2008, FloraHolland's shares were sold back to local Chinese farmers.

In 1990, scientific cooperation between the Chinese Academy of Agricultural Sciences and Wageningen University in Holland was established. Yunnan Agricultural University in Kunming was also collaborating on cut flower production and general agricultural techniques.

Other Countries In the early 1990s, a group of Spanish growers had tried to develop a flower cluster specializing in carnations. Lack of infrastructure and knowledge resulted in lower-quality carnations that did not do well on the world market. Later, Spain tried again to grow and export roses, with similar results.

In small growing countries like Israel, Ethiopia, Zimbabwe, and Japan, Dutch companies had a local presence to consolidate shipments to The Netherlands in order to lower costs for the growers and improve product quality by reducing the number of times each flower was handled. Dutch

auction houses also provided technical assistance to other international auctions on trade and regulatory standards, including in Brazil and British Columbia (Canada). The establishment of a Dubai auction was also being considered.

Information and breeding and seed propagation expertise was being shared with universities in flower-producing countries, such as Koba University in Japan. Investments in cooled harbor facilities were made in Morocco.

The Dutch-Russian Grow2gether initiative had been founded in 2002 with more than 90 members across the Dutch cut flower cluster, supported by the Dutch government, as a public-private partnership initiative with heavy involvement from private consultants to provide structured solutions from the Netherlands and training programs in breeding and greenhouse technology. The Grow2gether initiative had been successful in enabling the establishment of consortia between Russian banks, growers, and investors, and Dutch greenhouse builders, breeders, and propagators.

Future Challenges

The Dutch flower cluster was experiencing rising costs and environmental challenges. Between 2006 and 2008, the price of natural gas, a key input, increased by more than 100%. Rising transportation costs meant that cluster participants were exploring alternative ways to move flowers efficiently. Environmental pressures were also growing. Growers also faced pressure to reduce their dependence on chemical agents, fertilizers, and carbon-based energy.

More auction clients wanted to use only parts of the auction system, such as logistical support, rather than the full set of auction services. Retail and wholesale companies outside of The Netherlands had started to trade with Dutch growers directly, bypassing or using only parts of the auction's logistical and financial infrastructure. An increasing number of transactions were taking place over the internet.

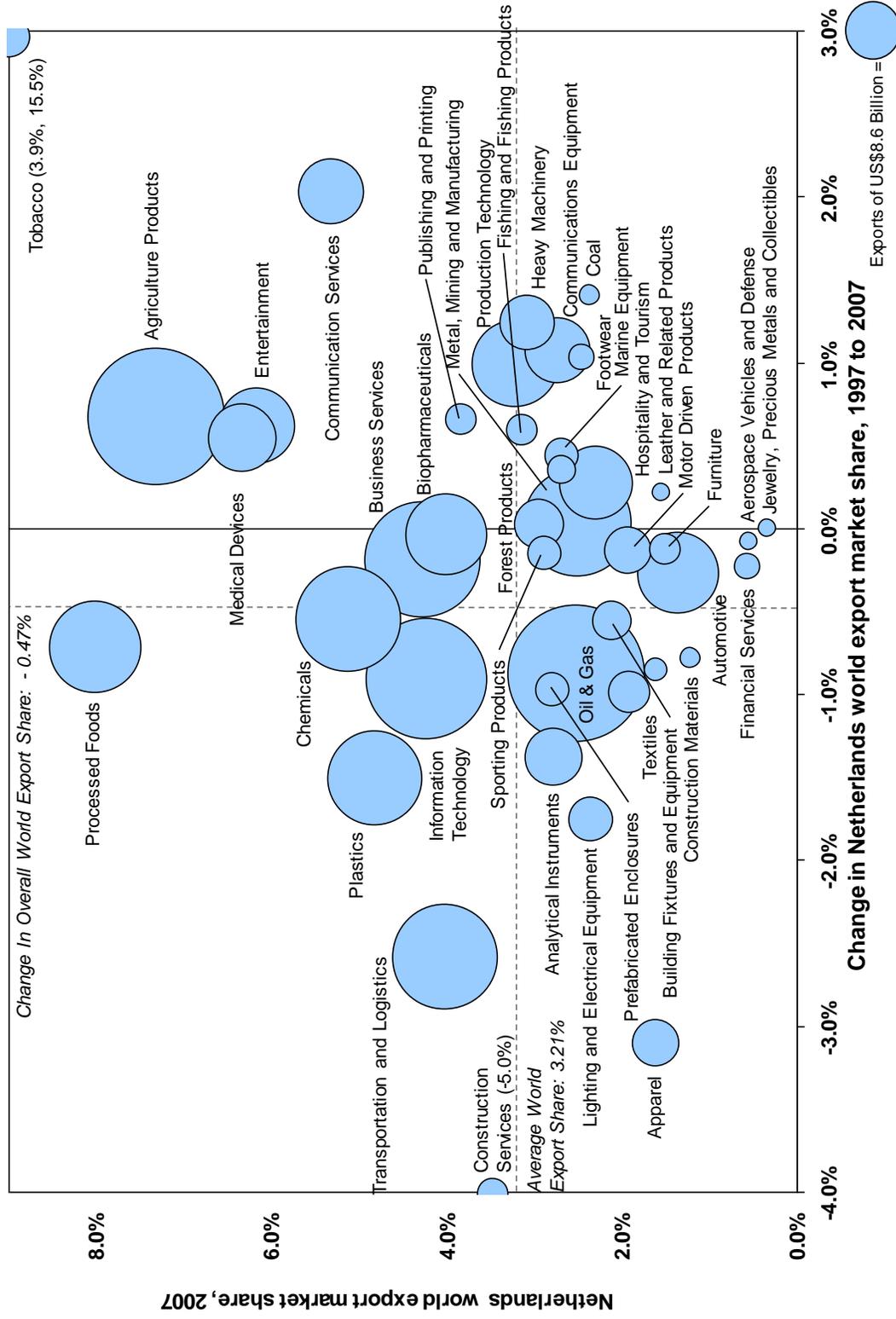
FloraHolland was at a crossroads. Should the Dutch, as many argued, stop growing flowers altogether and focus exclusively on higher value-added activities such as variety development and logistical support? Or did there need to be local production in order to stay competitive?

Exhibit 1 Map of the Netherlands



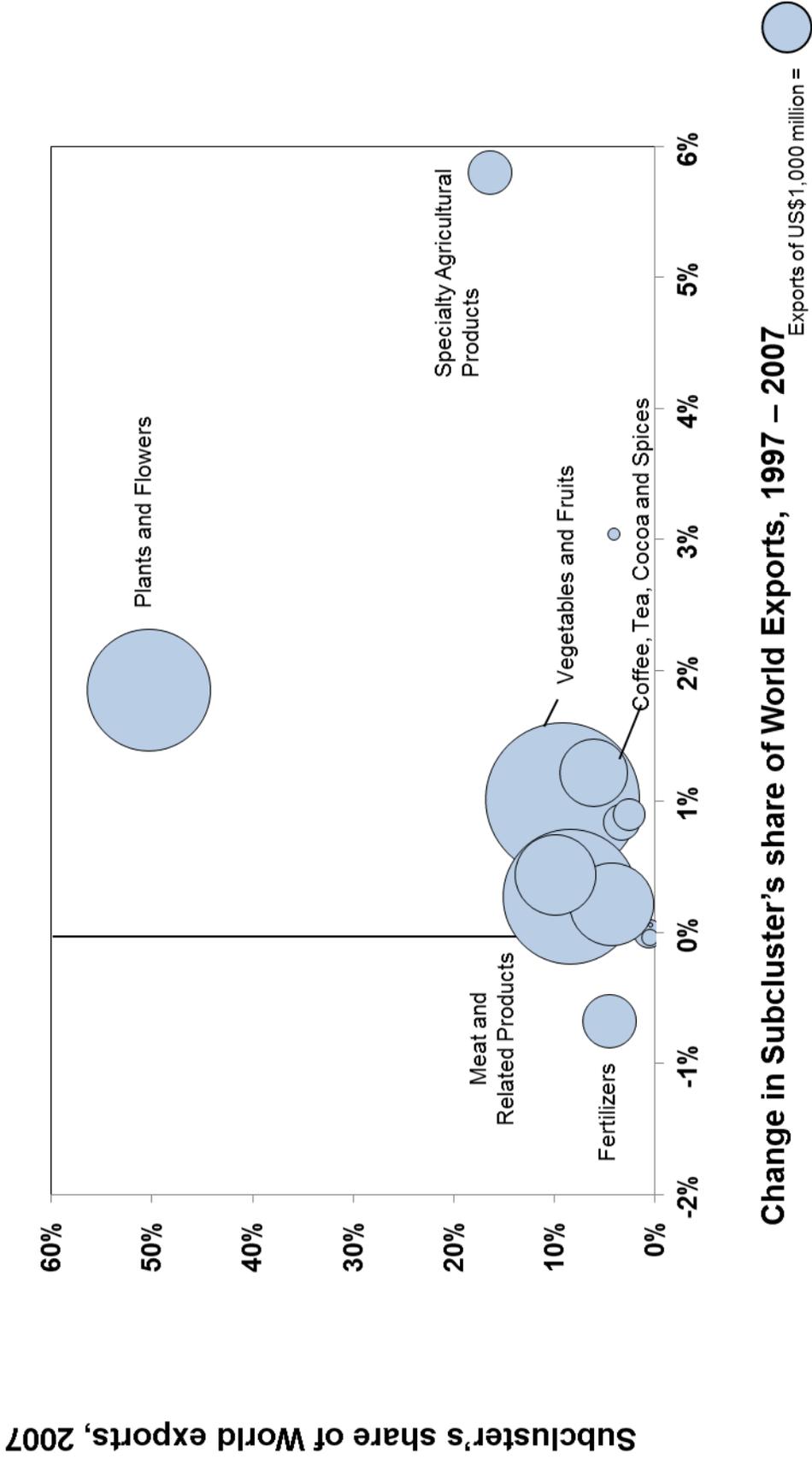
Source: Casewriters based on Nations Online map (2010).

Exhibit 2a Exports by Cluster, Netherlands, 1997-2007



Source: International Cluster Competitiveness Project, Institute for Strategy and Competitiveness, Harvard Business School; Richard Bryden, Project Director. Underlying data drawn from the UN Commodity Trade Statistics Database and the IMF BOD Statistics (2009).

Exhibit 2b Dutch Agriculture, Exports by Subcluster, 1997-2007



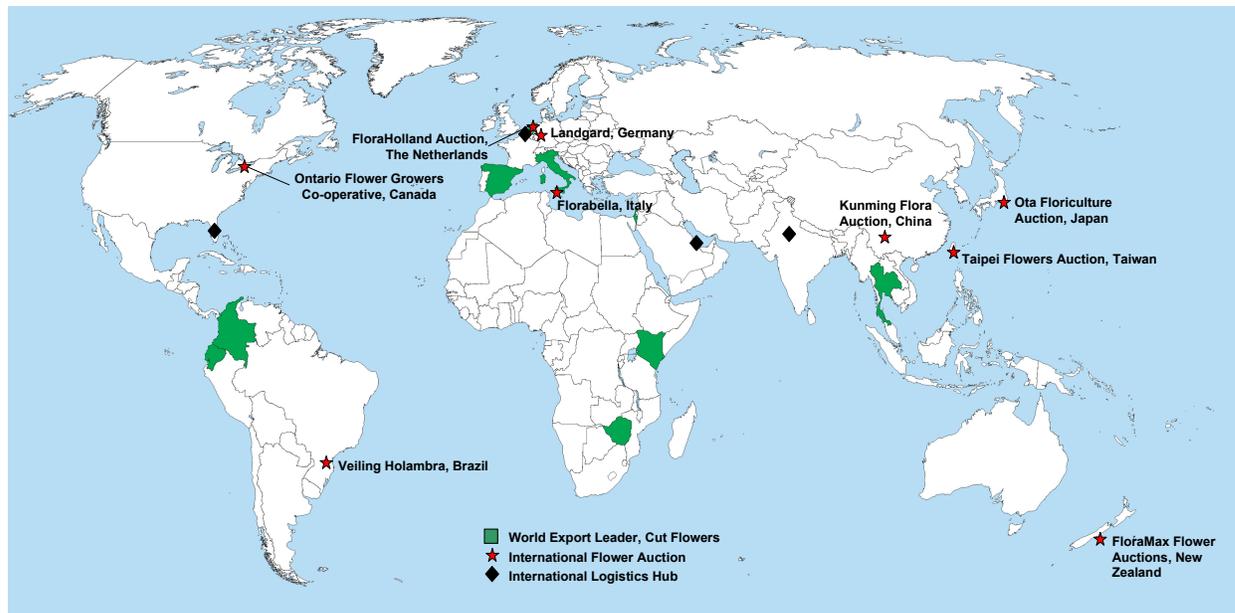
Source: Prof. Michael Porter, Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School; Richard Bryden, Project Director.

Exhibit 3 Major Flower Varieties

English Name	Latin Name	Picture	Volume traded on Dutch auction 2009 (millions of stems)	Price per stem on Dutch auction 2009 (euro)
Orchid	Cymbidium		30	1.980
Anthurium	Anthurium		80	0.406
Eustoma Russelianum	Eustoma Russelianum		114	0.301
Carnations	Dianthus		162	0.135
Alstroemeria	Alstroemeria		218	0.150
Freesia	Freesia		308	0.140
Lily	Lilium		350	0.402
Gerbera	Gerbera jamesonii		862	0.124
Golden Daisy	Chrysanthemum		1,239	0.188
Tulip	Tulipa		1,534	0.130
Rose	Rosa		3,511	0.198

Source: FloraHolland.

Exhibit 4 Global Flower Value Chain

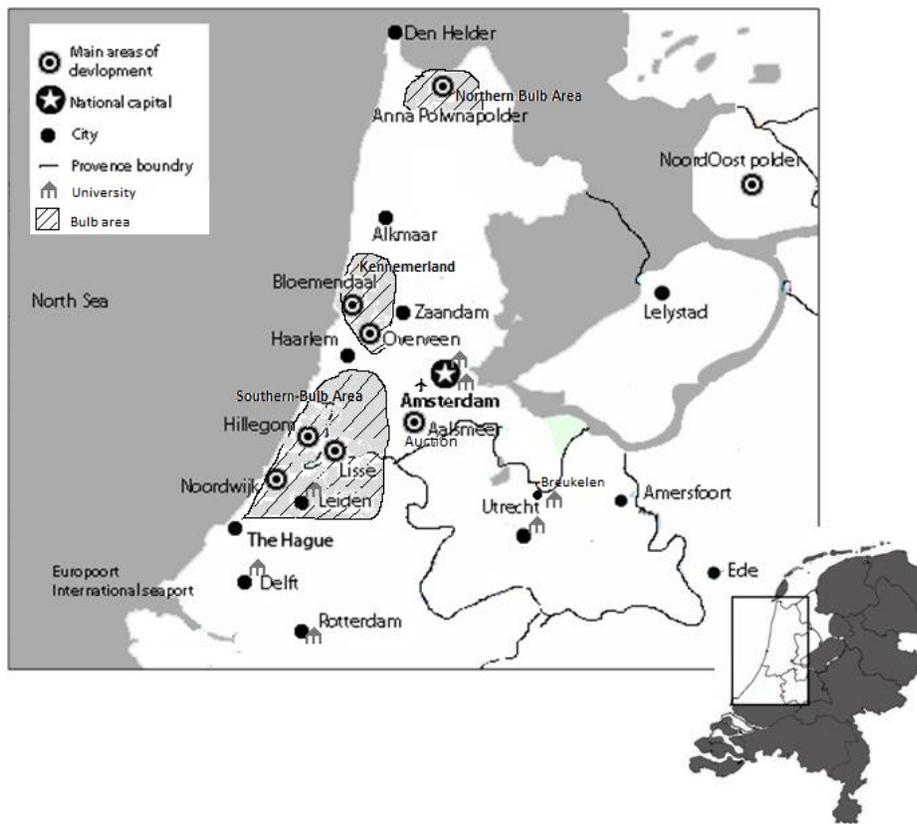


Source: Casewriters.

Exhibit 5 Leading Exporters and Importers of Cut Flowers

	2008 (Million \$)	CAGR 1998-2008 (%)	CAGR 2003-2008 (%)
Top Exporters			
Netherlands	4,450	7.7	8.5
Colombia	1,097	7.0	9.9
Ecuador	566	13.3	13.9
Kenya	527	19.7	24.1
United States	177	3.1	7.5
Italy	223	0.8	3.6
Belgium	196	11.9	18.5
Zimbabwe	186	17.5	25.5
Denmark	139	6.1	4.9
Israel	116	-4.9	-4.8
Top Importers			
Germany	1,365	1.1	6.5
United States	1,160	3.2	5.8
United Kingdom	1,116	7.2	3.2
Netherlands	1,083	6.9	9.7
France	660	3.9	4.6
Russia	580	32.5	56.6
Japan	343	7.2	9.7
Belgium	279	8.9	13.7
Italy	259	5.6	4.8
Switzerland	228	2.6	3.8

Source: Comtrade - UN Commodity Trade Statistics Database.

Exhibit 6 Location of the Dutch Cut Flower Industry

Source: Casewriters based on the Geographical Guide – Maps of Europe, 2010.

Exhibit 7 Development of Cultivated Area, Number of Growers

Year	Under Glass			Open Area		
	Area (hectares)	No. of Growers	Average size of Companies (ha)	Area ^a (hectares)	No. of Growers	Average size of Companies (ha)
2000	3,727	4,112	0.91	2,552	2,251	1.13
2001	3,606	3,788	0.95	2,379	2,097	1.13
2002	3,578	3,576	1.00	2,684	1,955	1.37
2003	3,499	3,454	1.01	2,607	1,850	1.41
2004	3,401	3,255	1.04	2,528	1,823	1.39
2005	3,250	3,026	1.07	2,513	1,736	1.45
2006	3,093	2,818	1.10	2,603	1,677	1.55
2007	3,003	2,248	1.18	2,573	1,522	1.69

Source: CBI Market Information Database - CBS Landbouwstatistiek 2008.

^a Cut flowers and related products included.

Exhibit 8 Economic Indicators, Selected Countries

Indicator	Year	Netherlands	Germany	Colombia	Ecuador	Kenya
Population						
Population, total (million)	2008	16.4	82.1	44.5	13.5	38.5
Population growth (annual %)	2008	0.4	-0.2	1.2	1.0	2.6
Urban population (% of total)	2008	81.8	73.6	74.5	65.6	21.6
Health and Education						
Life expectancy at birth, total (years)	2007	80.2	79.7	72.8	75	54.1
Mortality rate, infant (per 1,000 births)	2007	4.4	3.7	17.0	22	79.8
Health expenditure, total (% of GDP)	2006	9.4	10.6	7.3	5.3	4.6
Health expenditure, per capita (current \$)	2006	3,872.0	3,718.0	217.0	166	29.0
Public spending on education, total (% of GDP)	2006	5.6	4.4	4.7	N/A	7.1
Overall Economic Indicators						
GDP (current \$b)	2008	877.0	3,673.1	240.8	54.7	29.6
Average GDP growth rate (last 5 years, %)	2008	2.7	1.8	5.5	5.4	5.1
Average GDP growth rate (last 10 years, %)	2008	2.4	1.5	3.5	3.7	3.6
Average GDP growth rate (last 20 years, %)	2008	2.8	2.0	3.6	3.3	3.0
GDP, PPP (current international \$b)	2008	677.5	2,918.5	397.2	108.4	60.4
GDP per capita, PPP (current international \$)	2008	40,558	35,539	8,229	7,786	1,712
GDP per capita growth (annual %)	2008	3.6	3.5	3.1	7.3	2.0
Inflation, consumer prices (annual %)	2008	2.2	2.8	7.0	8.4	13.1
External debt, total (DOD, current \$b)	2007	2,613.8	5,116.9	44.5	17.4	7.4
Trade and Investment Flows						
Export of goods and services (current \$b)	2007	560.5	1,572.9	34.2	16.1	7.1
Exports of goods and services (% of GDP)	2007	74.9	46.9	16.9	35.1	26.0
Exports of goods and services (annual % growth)	2007	6.4	7.8	11.4	2.2	5.7
Imports of goods and services (current \$b)	2007	491.2	1,336.6	37.4	15.6	10.1
Imports of goods and services (% of GDP)	2007	66.3	39.9	21.0	34.2	37.1
Imports of goods and services (annual % growth)	2007	5.7	5.0	13.9	7.3	11.1
Net trade goods and services (current \$b)	2008	69.3	236.2	(3.2)	0.5	(3.0)
Current account balance (% of GDP)	2007	8.7	7.9	(2.8)	3.6	(3.8)
FDI, net inflows (current \$b)	2007	120.4	56.5	9.0	0.2	0.7
FDI, net inflows (% of GDP)	2007	15.5	1.7	4.4	0.4	2.7
GDP Structure (% of GDP)						
Agriculture, value added (% of GDP)	2008	1.7	0.9	8.6	6.7	27.0
Industry, value added (% of GDP)	2008	25.5	30.2	36.5	40.6	18.8
Services, etc., value added (% of GDP)	2008	72.9	69.0	54.9	52.7	54.2
Information Technology						
International Internet bandwidth (bits per person)	2007	78,156.0	25,654.2	1,171.3	324.2	8.9
Internet users (per 100 people)	2007	84.8	72.5	27.8	14.6	7.9
Fixed Broadband subscribers (per 100 people)	2007	33.6	23.8	2.7	0.2	0.0
Personal computers (per 100 people)	2006	91.2	65.6	5.7	13.0	N/A
Telephone mainlines (per 100 people)	2007	45.2	64.8	17.9	13.7	0.7
Mobile phone subscribers (per 100 people)	2007	117.7	117.0	76.5	74.5	30.1
Financial Markets						
Credit to private sector (% of GDP)	2008	193.2	107.8	34.2	26.1	30.0
Domestic credit provided by banking sector (% of GDP)	2008	196.0	125.7	43.1	17.3	40.1

Source: Compiled from World Development Indicators (2009), Worldbank External Debt Hub and International Monetary Fund, World Economic Outlook Database, October 2009.

Exhibit 9 Ranking on Competitiveness Indicators, The Netherlands versus Selected Countries, 2009

Rank versus 133 countries (lower rank is better)

	Netherlands	Germany	Colombia	Ecuador	Kenya
Logistical infrastructure	8	3	95	98	80
Communications infrastructure	3	14	73	86	107
Financial market sophistication	10	15	60	80	78
Soundness of banks	111	116	45	78	64
Venture capital availability	17	63	74	103	30
Quality of scientific research institutions	9	5	86	129	44
Availability of scientists and engineers	23	36	90	122	70
Tertiary enrollment	25	43	67	90	124
Utility patents per million population	13	9	90	92	104
Buyer sophistication	12	23	74	79	106
Presence of demanding regulatory standards	5	1	75	92	69
Stringency of environmental regulations	5	1	86	101	79
State of cluster development	17	13	50	92	40
Extent of collaboration in clusters	13	9	59	100	52
Cooperation in labor-employer relations	9	21	56	114	79
Pay and productivity	82	56	104	130	59
Impact of taxation on incentives to work and invest	52	100	124	120	117
Intellectual property protection	10	11	102	127	95
Prevalence of trade barriers	22	30	130	133	100
Intensity of local competition	8	1	81	109	59
Low market dominance by business groups	8	2	126	120	58
Strength of investor protection	86	71	24	100	71
Flexibility of employment	84	89	35	111	20
Regulatory quality	7	19	65	127	79
Tariff barriers	7	7	91	89	107

Source: *Global Competitiveness Report 2008-2009*: Business Competitiveness Index, World Economic Forum.

Exhibit 10 Major Dutch Flower Organizations

No.	Organization	Description
1	Aalsmeer Flower Auction (VBA)	The VBA was formed in 1968 from the merger of two auctions; Bloemenlust and Centrale Aalsmeerse Veiling. With 100 hectares surface area, it was the largest commercial building in the world. ⁸⁰ In 2007 VBA and FloraHolland merged into one auction under the name of FloraHolland (see also no. 9 'FloraHolland').
2	AgroEnergy	Energy buying association
3	Association of Wholesale Trade in Horticultural Products (VGB)	The sector organization for wholesale trade in flowers and plants. It was involved in many initiatives within the industry including logistics, market information and communication technology, and quality control. It also represented the wholesale industry in various industry institutions and negotiated with government on issues such as collective labor agreements for the industry. It developed the Florimark quality program to ensure full and reliable product information from growers to the auctions and traders.
4	Bloemenbureau Holland (BBH), The Flower Council of Holland	An organization that promoted and marketed floricultural products worldwide and was financed by the industry's members. Its activities (e.g. market analysis, sales promotion, training and support and advertising) benefited the cut flower, plant and propagation materials and were aimed at all actors involved in sales, ranging from local florists to wholesalers and exporters. It also participated in international trade fairs and ran international satellite offices in important flower markets such as Germany, France, Italy and the United Kingdom.
5	The Dutch Association of Flower Auctions (VBN)	Trade organization for Dutch cooperative flower auctions. In this role, the VBN was responsible for coordinating and representing the interests of Dutch flower auctions at the national and European levels.
6	Dutch Agricultural Wholesale Board (HBAG)	All Dutch wholesale companies were registered with HBAG, which provided information and special services to the industry.
7	EU, Directive on Phytosanitary Aspects.	EU regulatory body with policies that affected the industry.
8	EU, Directive on Trade of Propagation Material	EU regulatory body with policies that affected the industry.
9	FloraHolland Flower Auction	FloraHolland was founded in 2002, a merger between two auctions whose origins dated back to the Westland in the early 20 th century.
10	FlorEcom	A joint venture of the VBA, FloraHolland and the VGB, established in 1999 to develop and coordinate standards and systems for electronic commerce.
11	Floriade	World horticultural exhibitions initiated by the Dutch Horticultural Council, which took place every 10 years.
12	Flowerbulb Inspection Service (the BKD)	An independent organization supervised by the Ministry of Agriculture, Nature and Food Quality, that monitored and improved the quality and health of the flowerbulbs.

Exhibit 10 Dutch Flower Organizations (cont.)

13	Green-ports Nederland	Founded in 2005, this network organization monitored the execution of policy agreements made to improve the Dutch horticultural industry in five main horticultural regions ('green-ports') in The Netherlands; Aalsmeer, Boskoop, Duin en Bollenstreek, Westland/Oostland, Venlo.
14	Keukenhof	A permanent annual open-air flower exhibition which attracted 600,000 to 700,000 visitors a year. The great majority of these were foreign tourists.
15	Land- en Tuinbouw Organisatie Nederland (LTO), the Dutch Organization for Agriculture and Horticulture	Organization for flower entrepreneurs and employers which promoted the social and economic interests of farmers and growers, as well as a sustainable agricultural and horticultural industry. More recently LTO stimulated initiatives that improved management and marketing skills as well as increased the use of sustainable cultivation practices.
16	Milieu Project Sierteelt (MPS)	Participants in this program allowed products to be assessed on the basis of their environmental sustainability, quality, and corporate social responsibility performance. When standards were met, these products were MPS certified.
17	Nederlandse Tuinbouw Raad (NTR), The Dutch Horticultural Council	One of the oldest (founded in 1908) horticultural organizations still active in The Netherlands which comprised a variety of organizations involved in horticulture. It represented the collective interests of growers, auctions and traders in the flower, plant, tree and bulb industries. The Council's aims were to promote the Dutch horticultural industry's image within and outside The Netherlands and to support the sale of horticultural products. As part of these efforts it organized the Floriade world horticultural exhibitions.
18	Netherlands Inspection Service for Horticulture	Certified a cultivar's origins and the quality of the product (purity, and diseases and weeds.)
19	Organization for Agriculture and Horticulture (LTO)	LTO Nederland was the Dutch Organization for Agriculture and Horticulture in The Netherlands (Land- en Tuinbouw Organisatie Nederland), primarily concerned with political strategies, and provision of advice to individual farmers and groups of farmers.
20	Plant Research International at the University of Wageningen	A scientifically renowned research institute specialized in agrosystems innovations, biodiversity, breeding, bio-interactions, plant health, biometry, and bioscience. Besides doing fundamental research in these areas, the institute offered a range of products for all activities in the chain including pheromone lures to catch harmful insects, biological markers for breeding, software algorithms and methods for reducing herbicide use.
21	Plantum NL	Established in 2001 from a merger of three industry associations representing vegetative breeding (CIOPORA), propagating and growing (NVP), and (licensed) seed producing and trading (NVZP). Later the section of the Association of Dutch Wholesalers in Floricultural Products (VGB) that was active in propagating and growing of floricultural products joined Plantum NL. The association represented around 500 members and focused on breeding, propagating and growing of horticultural plant material.
22	Rabobank	A Dutch cooperative bank with focus on the agribusiness sector.

Source: Created by casewriters from the following sources: Agro Energy, <http://www.agro-energy.nl/>; VGB, <http://www.vgb.nl>; Bloemenbureau Holland (BBH), <http://www.flowercouncil.org/>; "About VBN," The Dutch Association of Flower Auctions, <http://www.vbn.nl/en-US/AboutVBN/Pages/default.aspx>; Dutch Agricultural Wholesale Board (HBAG), <http://www.hbagbloemen.nl/>; FlorEcom, <http://www.florecom.nl>; Floriade, <http://www.floriadeaustralia.com/>; Flowerbulb Inspection Service, <http://www.bloembollenkeuringsdienst.nl/English.aspx>; Green-ports Nederland; Greenport Holland, <http://www.greenportsnederland.nl>; Keukenhof, www.keukenhof.nl; MPS, <http://www.my-mps.com/>; Nederlandse Tuinbouw Raad (NTR), <http://www.tuinbouwraad.nl/>; "Netherlands Inspection Service for Horticulture," ISHS, http://www.actahort.org/books/568/568_14.htm; "LTO-Nederland," Organization for Agriculture and Horticulture, <http://www.onderzoekinformatie.nl/en/oi/nod/organisatie/ORG1239959/>; Plant Research International, <http://www.pri.wur.nl/UK/>; Platnum NL, <http://www.plantum.nl/englishversion/indexengl.htm>; Rabobank Group, <http://www.rabobank.com/content/>..

Exhibit 11 Relative Cost Structure of Cut Flower Producers, Selected Varieties, 2009

CARNATIONS	Netherlands	Kenya	Colombia	Ecuador
<i>(\$/100 stem)</i>				
Revenue	25.6	29.9	36.6	33.7
Cost	24.1	23.8	28.9	31.3
energy	2.7	0.3	0.2	0.2
labor	9.7	1.0	1.2	0.9
transportation to auction	4.6	16.1	20.6	22.9
seeds/other production	7.2	6.5	6.9	7.0
ROSES	Netherlands	Kenya	Colombia	Ecuador
<i>(\$/m²)</i>				
Revenue	134.9	127.5	168.6	188.9
Cost	127.8	104.0	156.2	168.3
energy	42.2	2.1	4.2	7.5
labor	51.1	7.7	10.2	8.2
transportation to auction	24.3	85.0	133.6	145.7
seeds/other production	10.2	9.2	8.2	8.5

Source: FloraHolland.

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