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**THE FLOWER INDUSTRY IN
COLOMBIA. ACTUAL SITUATION
AND PROSPECT FOR GROWTH.**

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Engineering and Management.

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This thesis work closes a stage of my life in which, due to fate, I decided to come and live in Italy. A country totally different from my beloved Colombia, but with which I am deeply grateful for what it has taught me throughout these two years.

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ABSTRACT

The flower industry in Colombia is one of the most fruitful agricultural industries in the country, during the last years it has been recognized for the quality of its products and for its ecological and labor responsibility. Through this investigative document it is intended to show the world situation of floriculture, the main countries involved, main export products and how Colombia actively participates in this agro-industrial activity worldwide through a vital organism known as Asocolflores. On the other hand, aspects such as the disadvantages and obstacles that arise for flower growers in Colombian territory are exposed, however, the strategic advantages that Colombia has that allow it to continue growing in this industry, the labor impact in the sector are also exposed. mainly rural and also how the industry has remained relatively stable, becoming today the second largest exporter of flowers in the world, an agro-industrial success comparable to the export of coffee.

“Character is manifested in the big moments, but it is built in the small ones.”

-- Winston Churchill

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INTRODUCTION

Floriculture in Colombia contributes significantly to the country's agro-industrial industry, which through innovation seeks to consolidate, diversify, and internationalize the exportable offer of flowers in Bogota and the region in general. Likewise, it seeks to promote the sustainable and certified production of flowers [1].

During the development of this thesis, the main topics will be discussed, such as what is understood by floriculture, its main characteristics and the general infrastructure of the process of growing flowers for subsequent commercialization. Likewise, the situation of floriculture worldwide will be generally covered, identifying the main countries that participate in this agro-industrial activity, among which, of course, Colombia is found. This is a relatively young industry in Colombia, compared to the world leader, the Netherlands. During this thesis it will be evident how Colombian flower growers have managed to overcome the different geographical, political and public order obstacles, taking advantage of the strategic advantages of the territory and the coordinated work together to convert a young, fragile and growing industry into what today is the second power in flower exports worldwide.

Overview

The floriculture industry in Colombia began in the 60s, since Colombia enjoyed the optimal conditions for mass flower production. The main cultivation areas are the Bogota savannah and the Rio Negro area in Antioquia, which thanks to the absence of seasons during the year and its temperature between 13 and 21, its uniformity in the hours of light and shade, provided the Ideal environment to produce up to 3 crops in the year.

Years later, more specifically between 1994 and 1996, ECOFLOR was created, an association in charge of promoting good production practices to consolidate the Colombian product in the international market, standing out for its quality and for its improvement in the social and environmental area.

Currently, Colombia is the largest producer and exporter of flowers in the American continent and is only surpassed worldwide by the Netherlands, which dominates the

European market. Colombia exports its product mainly to the US, Europe, and Asia, where its main clients are France, Germany, the United Kingdom and Japan [1].

Floriculture in Colombia has not been exempted from negative episodes like other agro-industrial sectors in Colombia due to the conflictive and violent history of the last sixty years. In fact, one of the reasons why the industry grew so much in the 1960s was because of the cheap labor force; peasants fleeing the armed conflict who came to new places to work for low wages. However, thanks to the internalization of the product, most of the informal jobs in this area became formal jobs. It is estimated that floriculture employs 140,000 employees, most of whom are mothers who are heads of household [2].

Motivation

In Colombia around 8900 hectares of land are used in Floriculture activities. In 2021, Colombian cut flower exports were US\$1,727 million [3], corresponding to 302,000 tons. 94% of these exports were made by airplane and the remaining 6% by sea or fluvial ways, this makes Colombia the leader in flower exports by sea worldwide. In 2018, the total exports of the sector were US\$1,463 million [4].

Colombia exports 95% of what it produces. Regarding the countries that receive or import flowers from Colombia, the United States represents the most important client with 78% (287.4 USD), followed by the United Kingdom and Japan, which are distributed between the two 8% (14.5 USD and 13.1 USD), Canada (11.1 USD) and the Netherlands with 3% (9.6 USD), the rest of the production is shared among ninety others countries among which Russia and South Korea stand out (Values expressed in millions of dollars) [4].

Regarding the socioeconomic impact associated with floriculture in Colombia, this is an agro-industrial sector of great importance in the country in terms of employment generation. According to Asocolflores, this sector provides around 96,600 direct jobs and 43,400 indirect jobs in the country, mostly concentrated in the Antioquia and Cundinamarca region [4]. After Colombia certified its product internationally, the market began to recognize Colombian flowers as a quality product. This is achieved because the industry follows rigorous quality control methods, including formal work. In Colombia, in the agro-industrial sector it is very common for the workforce not to have a formal work contract, which limits their access to social security and the pension system; The flower growing sector is the agro-industrial sector in the country that employs the most formal workers, an average of 17 workers per hectare [3].

The employees of this sector are peasants from the Cundinamarca and Antioquia regions, who have traditionally dedicated themselves to this work and who are deeply rooted in the territory. The vast majority of this work force is made up of mothers who are heads of household, this term refers to single mothers with children who are the only economic support for their family; in most companies they are offered flexible hours and fair remuneration, 60% of the total workforce is in fact female and according to Asocolflores (2019) the flower growing sector formally employs 25% of women in Colombia. This is a sector that has been able to help women in an incredible way in Colombia, especially those with greater social vulnerability.

Objective

One of the most important industries in Colombia is agribusiness, which has an important contribution to the country's GDP. This is how Colombia found a great investment opportunity in floriculture and therefore a prosperous future, due to the large number of internal and external advantages that this sector brings to businessmen who have bet everything on floriculture [5]. This industry was thought of as an export sector, which has placed Colombia in a privileged position in international terms, second only to the Netherlands, in this product category.

Regarding this, the main objective will be to analyze the flower industry in Colombia, how it works and what is its contribution in economic terms to the country as well as the import that during the years that this industry has operated in Colombia it has had a good performance which has allowed it to consolidate itself as one of the most successful economic activities in Colombia, which is comparable to the success of Colombian coffee in terms from exportation. Likewise, the importance of this sector in employment levels in the country will be analyzed, more specifically its socio-economic impact, in a sector deeply entrenched in informal work and finally, possible growth alternatives for Colombian floriculture will be explored.

Methodology

The flower industry in Colombia is complex due to the number of stakeholders that make up the value chain, in addition to the rigorous procedures that must be followed to ensure product quality. However, this is not a relatively new sector in Colombia and, on the contrary, it has been in operation for more than forty years, which is why this research work will be focused mainly on the search for academic documents, or documentation and data provided by the ministry itself of the agricultural industry of Colombia. As far as possible, attempts will be made to contact flower growers in Colombia remotely or virtually, to interview them and understand their point of view as direct industry stakeholders.

To better understand this industry that is being analyzed, the following baselines will be established:

- Understand the flower industry in Colombia.
- Determine the economic contribution of the flower industry in the Colombian economy.
- Confirm that this has been a relatively successful economic activity in Colombia.
- Analyze the dates of the year where more flowers are sold worldwide.

- Measure the socio-economic impact that this industry generates on employment levels.

The search for relevant documents will be the most important and reliable source of importance for this work. Specially give you academic documents from the main universities in the country, from experts in the field or directly from flower-producing companies. Likewise, documents obtained from Asocolflores, which is the Colombian flower export association, an organization that ensures competitiveness between companies and the standardization of the product, thanks to this, the international recognition that is enjoyed today has been achieved, for. Therefore, this social entity has extremely relevant information, most of the data obtained will be through this source [5].

Referential Framework

The numerous theories on international trade that are developed from the economic sciences are important, evaluating the importance and consequences of the exchange of goods and services at an international level. Within this framework, the free trade agreements between the United States and Colombia, the theories of competitiveness and globalization will be evaluated.

To this end, a free trade agreement is first understood as a treaty in which two countries regulate their commercial relationship of goods and services, this is done in order to increase the flow of products from one country to the other, as well as the flow foreign investment, which is why free trade agreements have specific and demanding rules on how and by which means goods, services or foreign investment can be exchanged [24]. In this order of ideas, the theory of free trade maintains that the greater the production capacity, efficiently and sustainably of a country with respect to a specific good or service, the more it should specialize in it. Thus, by means of a free trade agreement, the producing country has unlimited productive capacity because the consuming country can purchase the quantity of product it wants without any trade restriction [28]. That is, in free trade each country could specialize in those goods in which have the absolute advantage and import the goods that are difficult to produce, thus, this international specialization would lead to an increase in the production of goods due to the activity of all the participating countries [27].

Legal Framework

Regarding the legal framework, when free trade agreements are negotiated, evaluated, and approved, they are subsequently signed so that from that moment they begin to apply in a mandatory manner for the parties involved. Colombia is a particular case since it requires an additional step since the Political Constitution demands an additional requirement that consists of the prior review of the constitutional court, prior to the approval of the free trade agreement. Normally, free trade agreements apply indefinitely unless one of the parties proposes either the renegotiation of the agreement or its cancellation. For Colombia, the existence of these treaties is important because it guarantees a stable environment for foreign investment and international trade, this allows the economy to be prosperous, companies create jobs and people have access to foreign products, not to mention the importance of Colombia's diplomatic relations with other countries [15].

- Law 1143 of 2007. By means of which the "Commercial Promotion Agreement between the Republic of Colombia and the United States of America", its "Attached Letters" and its "Understandings", signed in Washington on November 22, is approved. from 2006.
- Law 1166 of 2007. By means of which "THE PROTOCOL AMENDING THE COLOMBIA-UNITED STATES COMMERCIAL PROMOTION AGREEMENT" is approved, signed Washington, District of Colombia on June 28, 2007, and the attached LETTER of the same date.
- Bill of Law No.241 of 2011 Senate "by which the responsibility for infringements of copyright and related rights on the Internet is regulated."

These agreements have been in force for several years now, since the relationship between the United States and Colombia in commercial terms is quite strong due to the proximity of both countries and the strategic geographical position of Colombia with respect to other South American countries.

FLORICULTURE

Floriculture is a sector of agro-industry and part of horticulture dedicated specifically to the cultivation of cut flowers or ornamental potted plants. This activity includes several sub-activities such as landscaping, flower cutting, floral arrangements, garden design and interior floral design, however this thesis work will only focus on cut flowers. Cut flowers are basically flowers grown until they reach their maximum quality in terms of color, aroma, and that is when they are more visually attractive. At this point they are carefully cut in order to continue their preparation process for export.

Once the flowers are cut, they go through the preparation process, where, for example, they are washed to remove any excess dirt or leaves and/or petals that are considered defective are removed, leaving the flower at its best visually speaking. This is very important since flowers are considered a luxury product and are normally bought as gifts on special occasions, so this preparation phase is of the utmost importance for the satisfaction of the final customer.

Subsequently, the flower is wrapped in some protective lining that can be made of paper or plastic, to avoid external contamination while it is being handled during the supply chain, after which it is transported to the main distribution centers depending on whether the distribution is national or international, the distribution centers can be airports, ports or local centers; Likewise, depending on the distances that the flowers have to travel and the delivery time to the end customer, the cold chain must be considered to respect the properties of the flower for as long as possible.

The cold chain consists of transporting and storing the flowers in spaces with relatively low temperatures, in this way the natural decomposition of the product is delayed since at the moment the flower is cut a countdown begins and the flower gradually loses its properties.

A clear example of a cut flower is the Rose, which is the most popular flower in the world. This flower is cultivated in different countries that compete with each other for the global flower consumption market. Roses are cultivated, cut, prepared and marketed throughout the world, as this product in particular is very popular to celebrate certain special dates or Western traditions, such as Valentine's Day.

Floriculture is an industry that requires a lot of labor, workers who are capable of cultivating flowers, also during the growth process they must know the type of flower that is growing since depending on this the care can be one or the other. This is because although in general the conditions in which most commercial flowers grow are similar, in occasions it happens that a particular type requires special care, as is the case with some types of orchids. For example, the ideal temperature for the growth of flowers such as roses or daisies ranges between 20 and 24 degrees Celsius, if this temperature is maintained constantly the flowers grow satisfactorily, likewise if they receive the ideal amount of sun (not directly but under a greenhouse) growth is favored. For this reason, this industry requires a lot of direct labor, trained operators and in large quantities, which is why floriculture is a great source of employment in the agro-industrial sector.

On the other hand, floriculture is an industry that requires large capital investments by entrepreneurs who want to enter it. First of all, it requires a productive amount of land to grow, then you must adapt this space of land to recreate the ideal conditions of temperature, sunlight and humidity for the growth of flowers, this normally requires the installation of greenhouses equipped with canvases that divert part of the sunlight, complex irrigation systems and pest control. Without mentioning of course, the investment in human capital, since as mentioned above the demand for direct labor is quite high. In other words, in order to become a productive and competitive part of the flower market, it is necessary to make an investment relatively early in the project and a feasibility study becomes essential.

Floriculture products are normally exported from the countries where the flowers are produced to the main world consumers, in many cases the export method varies depending on the situation of the exporting country. For example, Latin American countries export through ports that go to Asia, North America and Europe, as well as by planes that go directly to cities like New York, while countries like the Netherlands that are located next to their main consumers can take advantage of train lines or short air routes to export their product easily, quickly and efficiently.

THE FLOWER INDUSTRY, AN OVERVIEW

The flower market in general has had significant growth in the last twenty years, it is estimated that in the year 2000 the sales of flowers, buds, bulbs, etc. exceeded 3.7 billion dollars while in the year 2020 the sales were for approximately 7.9 billion dollars, which represents a global growth of 114%. Currently there are eleven zones that control 93% of flower production worldwide, these zones are found mainly in Europe, Latin America, and Africa [1].

As for Europe, the undisputed leader is the Netherlands, which produces 88.7% of the total produced by Europe, followed by Belarus with 3%, Italy with 2.1% and the rest of the European countries that produce, contribute with less than 1.5% [6].

In the case of Latin America, it has become the second world leader in flower exports since it produces approximately 30% of the product globally. Among the countries that stand out is Colombia that contributes 60% of the flowers in the region, Ecuador that contributes 37%, other countries such as Mexico, Costa Rica, etc., contribute less than 1.5% of the total product [6]. Finally, in the African continent, two countries stand out in the production and export of flowers, they are Kenya and Ethiopia, which contribute 70% and 22% respectively.

In other words, in global terms the main flower exporting countries are the Netherlands with an approximate participation of 50%, Colombia with a participation of 15%, Ecuador with a participation of 9% and Kenya with a participation of 7% [1].

Below is a table that shows the sales in millions of dollars of the most important countries in this sector in 2013, provided by the Bogota Chamber of Commerce.

Country	Sells (Mil USD)
Netherlands	\$ 4.640.301,00
Colombia	\$ 1.334.597,00
Ecuador	\$ 837.280,00
Kenya	\$ 641.494,00
Belgium	\$ 280.174,00
Etiopia	\$ 165.136,00
Malasia	\$ 108.082,00
Italia	\$ 93.564,00
Germany	\$ 90.385,00
Israel	\$ 85.874,00

Table 1. Main exporters of flowers in the world and their sales in millions of dollars [1].

On the other hand, the main importers of flowers worldwide, in other words, the main clients, are usually developed countries, which are found in three areas specifically, Europe, North America and East Asia. Among the most important clients are the United States, Germany, the Netherlands, Japan, and South Korea [7]. The United States is crowned as the main destination for flowers from all over the world, it is estimated that the North American giant concentrates 80.2% of the total world production of flowers.

Below is the table of the main flower exporters worldwide in 2013, according to the Bogota Chamber of Commerce.

Country	(Mll USD)
United Stated	\$ 1.192.830,00
Germany	\$ 1.187.004,00
United Kingdom	\$ 1.036.715,00
Netherlands	\$ 834.966,00
Russia	\$ 702.037,00
France	\$ 443.078,00
Japan	\$ 386.091,00
Belgium	\$ 319.944,00
Italy	\$ 200.082,00
Suiza	\$ 195.253,00

Table 2. Main importers of flowers in the world and their sales in millions of dollars [1].

This phenomenon is explained by the traditions and special dates that are celebrated in the western part of the world. There are more specifically three special dates during the year where the demand for flowers in countries like the United States, Canada, Germany, among others; these dates are December twenty-fourth, International Mother's Day (May 14), and Valentine's Day (February 14).

After Mother's Day, Valentine's Day is the day where more flowers are sold in the United States, in supermarkets, flower shops and informal stores. A study revealed that 20% of the sales participation in the year are for Valentine's Day, Mother's Day with 25% and December twenty-fourth 30%. "Knowing the trends is key to increasing market share. For example, 67% of flower purchases in the United States are given as gifts and the remaining 33% are for personal use. Other important dates are Easter and Thanksgiving Day" [8].

Colombia

The history of floriculture in Colombia is linked to the migration from the manufacturing sector to the agricultural sector, the flower industry in this case, this was since this change represented a great opportunity in economic and social terms thanks to the advantages that Colombia must produce flowers, in terms of geographic location, climate, availability of land and labor.

Colombia is a country with extensive territory, it is rich in nature, it has the climatic and geographical conditions to produce a large number of agricultural products. Sectors such as livestock and horticulture are the main agricultural activities that take place in Colombia. Since the beginning of the 20th century, the foundations of agro-industry were being formed, mainly through the cultivation, milling and distribution of rice, wheat and coffee, as well as the first large cattle farms in the country in the department of Meta. This situation was strengthened in the 1920s and 1930s, when large companies began to appear that processed agricultural raw materials, confectionery, biscuits, bread, chocolate and oil companies, creating a much greater demand for the raw material from farmers, likewise, sausage companies and large butcher shops appeared that favored livestock activity in the country. That is to say, that approximately since 1930 Colombia has migrated to a rural economy, fostering the generation of more and more sectors that would become more relevant over time; The example of coffee is clear, since that time it was already exported and was a precedent for what Colombia could achieve with local products, gaining worldwide recognition. With the strengthening of the agro-industrial sector, more sectors appreciated that wanted to take advantage of the world demand for agricultural goods, so not only coffee but also sugar, wheat, a number of types of fruit became export products with the Colombian seal, it is in this context that the floriculture seed appears in Colombia.

Floriculture in Colombia was born thanks to the possibility of satisfying the real needs of international and national clients, that is how, at the end of the sixties, floriculture was born as a product of the investment of other productive sectors in Colombia such as the textile sector or the metal-mechanic sector, that is, capital investment by Colombian businessmen in order to venture into the international flower market. What was presented is that they replaced rural areas that were used for milk production or potato cultivation and adapted for the production of an apparently more lucrative product and with the hope of being profitable, these first entrepreneurs invested quite a large capital and were the ones who started the

legacy of flowers in Colombia, just as a rural development project that years later proved to be the right decision. The flower growing sector began to grow rapidly, many new flower companies began to appear in Colombia as an attempt to become part of a business that at that time was very lucrative; Thanks to this growth of the flower grower union, in 1970 Asocolflores was created, which is an organization made up of Colombian flower growers whose objective to this day is to bring together all the active members of the supply chain to create competitive advantages and avoid cannibalism among companies. Asocolflores played an extremely important role for this sector from its creation until today.

Since then, the sector has been growing more and more, in an incredible way. This is due to the aforementioned advantage of Colombia in geographical terms, it has the right cultivation areas and conditions and this is known by local and foreign investors, this explains the accelerated growth of Colombia until it became the second largest producer of flowers in the world. This great investment added to the laws of protection and development of the field in Colombia have been the perfect scenario for growth, as well as the constant demand for flowers throughout the world. The flowers are demanded in different countries for the celebration of special dates or decoration, the great demand for these is reflected in a business opportunity for those who have the wisdom to take it, in Colombia this has been the case since from the first flower growing companies there was evidence of a clear possibility of profitability, which generated that the business expectation was positive. The country has access to both oceans and must not pass through the Panama Canal, which represents a great advantage in terms of exporting any product, as well as direct contact with Chinese ports thanks to the ships that leave the port of Buenaventura.

Thanks to these advantages, exports in the 1990s began to grow exponentially, extending not only to Europe but also to Asia and by then Colombia was already known as a producer of quality flowers, by then it had earned the title of the second largest exporter of flowers in the world.

Below is a graph showing how exports increased between 1994 and 1999.

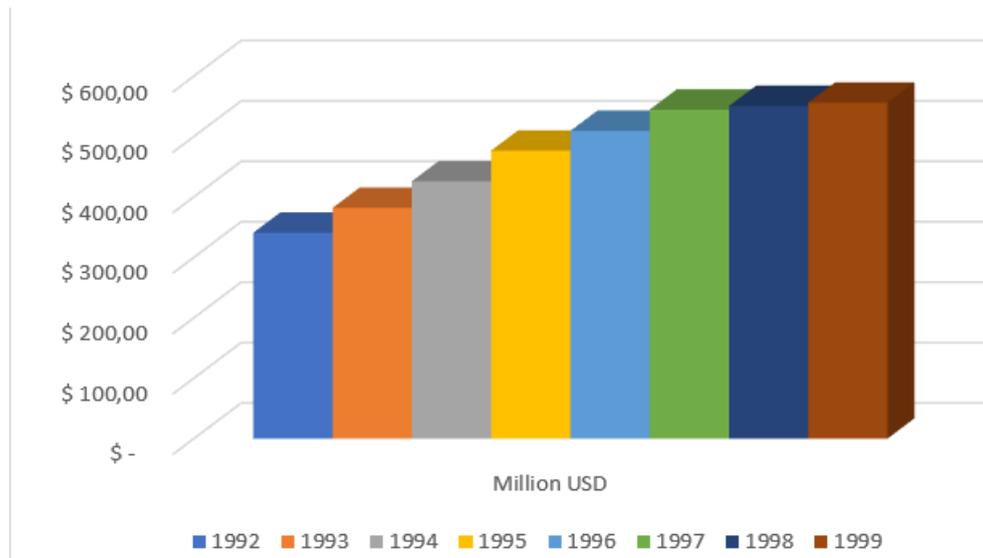


Figure 1. Colombian exports on Million dollars, from 1992 to 1994 [5].

The situation in the 2000s was equally encouraging, by then flowers were the second most exported agricultural product in Colombia, only after coffee. In terms of quantity produced, according to the Ministry of Agriculture and the Environment of Colombia, for the year 2013 the production was 224,504 tons of flowers, that an average of 33.03 tons were produced per hectare [1]. Considering This is important to know how many productive hectares Colombia has and where they are located geographically. Colombia is a tropical country with many flat floors and a lot of diversity in terms of its terrain, which is why depending on where the flowers are produced, its means of exportation is determined, that is, if it is closer to airports or the main loading docks such as Barranquilla or Buenaventura. The main producing departments are Cundinamarca with 73% followed by Antioquia with 25%, Boyacá with 1%, Risaralda with 1%. It should be noted that the municipality of Madrid in Cundinamarca owns 13% of the total produced, which makes it the city where the most flowers are produced in Colombia.

To better understand these data, the following map is presented, where the main distribution centers to other countries are highlighted.

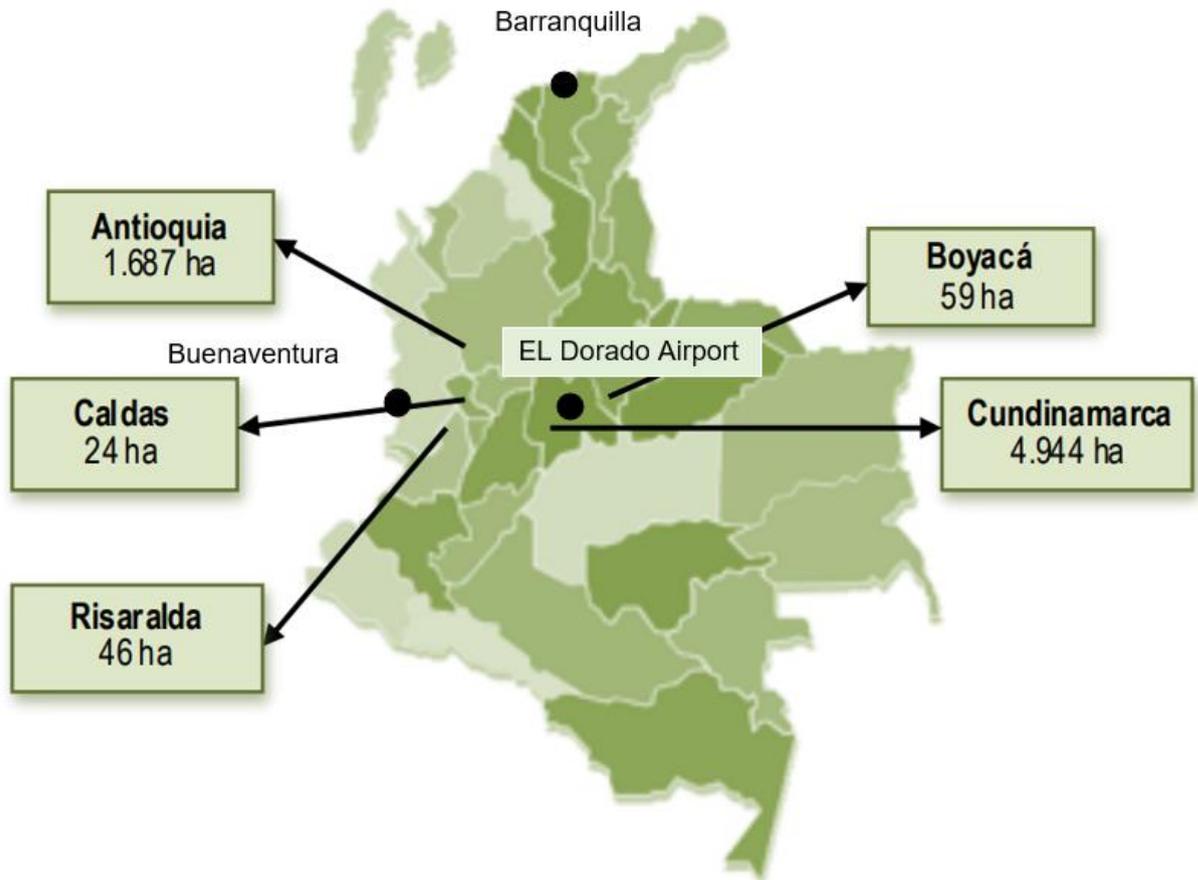


Figure 2. Main flower and foliage producing departments in 2013. Source: (Ministry of Agriculture and Rural Development MADR, 2014), extract from [1].

Colombia's main customer is the United States. Thanks to its geographical location, Colombia can make shipments both through the Atlantic Ocean (By Barranquilla) or by the Pacific Ocean (By Buenaventura), likewise from Bogota planes loaded with flowers are dispatched directly to Miami. "Colombia is by far the main supplier of cut flowers of US, with an import value of USD 1 billion. The country's important share has not changed in the last decade and its about 60%" [13].

According to Asocolflores (2013), approximately one million Colombians depend on Floriculture since this product represents the first non-traditional agricultural export of the country. According to the Ministry of Agriculture, this activity contributes 6.6% of the national agricultural GDP and 40% of regional GDP [15]. However, this sector is exposed to a high risk by basing its competitiveness on a changing rate, affirmed Fernando Tenjo in a study carried out by the Bank of the Republic in 2006; Although it is a product that is normally marketed in dollars, its direct costs, inputs, and labor have a high national component and are linked to internal inflation in country [15].

On the other hand, the supply chain in Colombia in this sector is first made up of supply providers, who basically provide plant material, chemical products, machinery, and tools. Followed by the producers who may be independent companies or large business alliances, they sell their product to national marketers who oversee sending the cut flowers to their international destinations. This activity generates a significant income of foreign currency to Colombia, in 2018 1402 million dollars entered [14]. Likewise, this sector generates approximately 104 thousand direct rural jobs and some 90 thousand indirect ones that are distributed during these three stages of the supply chain.

The current situation in Colombia is encouraging, although the sector has had to go through difficult situations related, for example, to currency exchange, which mainly affects when purchasing inputs. Floriculture has so far managed to remain strong thanks to global demand, the appearance of new markets such as the Middle East, and the constant work of Colombian businessmen who invest everything in the floriculture project.

Netherlands

The Netherlands is the country that is crowned as the largest exporter of ornamental flowers in the world and is in direct competition with countries like Colombia and Ecuador. The Netherlands plays a very important role in the field of world flower production, it is focused on consumers with high purchasing power, which is why its main clients are in Europe, the United States and Japan, as well as its global positioning and its Recognition for its quality product allows it to export 70% of what it produces [18].

The main destinations for Dutch flowers are Germany, the United Kingdom, France, Russia, and Italy, which for the year 2013 had a share of total exports of 26.6%, 18.3%, 13%, 7.6% and 3.8% respectively. "The products that are most used for export of flowers in that country are Roses, with a share of 28.2% of the total number of flowers exported for the year 2013, followed by chrysanthemums with a share of 11.3%, Lilies with 8.3% of participation, in the case of the carnation, the Netherlands has a low production in its flower market with a participation of 2.8% of total flower exports" [15]. In the Netherlands, the cultivation of flowers only occupies 4% of the total agricultural area, this is due to the low availability of soil for cultivation that this country has, however, the massive use of greenhouses generates half of the productive value of the industry, which is approximately three million dollars [13]. Likewise, the Dutch flower companies are controlled by families that in turn are linked to a flower auction system, which implies that there is an entity in which the producers participate. and through which they market their product. This is a tool that the Netherlands uses as an intermediary between local growers, foreign growers and wholesale buyers, in this way a price is set, and this price is the one that normally leads international trade [15].



Figure 3. Adjudication devices today. Extracted from [20].

However, the limited availability of Dutch territory, high labor costs, the use of chemicals for agriculture and the environmental policies of the government have limited the growth of the flower industry in the Netherlands, since the cultivated area does not comply with what is required by world demand and a relative stability has been observed in recent years. "This stability with a downward trend in the cultivated area of flowers in this country has not been a factor in generating the same effect in production, which has maintained a slight positive trend, derived from the fact that most of the production is carried out under controlled conditions in greenhouses. Drops in production are avoided by the large investments made by Dutch entrepreneurs in their fields, through the use of better inputs" [15].

The Netherlands is a nation that has been dedicated to the commercialization of flowers for many decades, being the leader in world exports and having so much experience in this industry, the country enjoys certain advantages that it has developed over the years [19]. The Dutch market integrates the entire value chain, from cultivation to retail, and includes many organizations specialized in this process. This is an example of value creation in the Dutch value chain; The country invests a significant number of resources in research and development related to flowers, many public and private institutions work together in this research, this has allowed them to rapidly introduce new technologies to create new types of flowers, increase the life of flowers Cut flowers and methodologies to improve cultivation and production techniques [15]. Thanks to this, the Netherlands has stood out as a leader in the flower industry and currently leads mainly developing countries such as Zimbabwe and Thailand in the substitution of less profitable crops for flower crops, an action that is promoted by international organizations. where the Netherlands is a pioneer.

To compensate for its great scarcity of land as well as the climatic changes inherent to its geographical location, the Netherlands has designed modern closed cultivation systems in greenhouses, which are equipped with the latest technology. Thanks to the

impressive investment of resources, they have managed to build a production and distribution infrastructure for flowers, which includes warehouses, greenhouses, automatic irrigation systems and specialized transportation. Regarding this, the Netherlands has managed to overcome those disadvantageous situations in its territory and create new competitive advantages, difficult to replicate by its direct competitors [22].



Figure 4. Mass greenhouse of chrysanthemums in the Netherlands, extracted from [23].

To maintain its market, the Netherlands has had to be intensive in quality capital investment in its final product. They use the most modern technological and genetic advances, currently more than one hundred thousand people work directly doing research to improve the natural characteristics of each spice and make it more economically profitable as well as more desired by consumers. They have incredible export levels, both of flowers produced in the Netherlands and flowers that are imported from other countries and re-exported. Likewise, government support is essential, through education, investment and diffusion of the sector, the Dutch government supports the companies that are dedicated to this work, which generates high levels of innovation and optimization, not to mention its advanced auction system of flowers [21].

Ecuador

The flower industry in Ecuador has been gaining ground in recent years. In 2004 together with Dutch investors they cultivated approximately 3.3 thousand hectares of flowers of which 75% corresponded to roses, thanks to this operation in that year they managed to generate more than 340 million dollars that entered the country for exports and generated a total of 500 thousand direct and indirect jobs, which positions Ecuador as the third most important flower producer in the world [24].

Ecuadorian flowers are considered one of the most famous in the world, thanks to its geographical location, Ecuador has a great advantage. In terms of climate, territory and lighting, this means that the flowers have straight and thick stems, that the petals have more vibrant and clear colors, that their life is longer, among other characteristics, which have put the Ecuadorian product on the map competing with the Dutch and Colombian product with its North American clients, especially [25].

Ecuador not only enjoys geographical advantages, in fact it is known that there is a great potential of the country that is not yet being used in this industry, but also has sufficient technological infrastructure and technology to ensure permanence in the flower industry in the long term in the international context. Likewise, in Ecuador flower growers give importance to the environment and apply good practices to guarantee the sustainability of the industry, in fact they have the German green seal that accredits them for this work. There is also an organization called "Flor de Ecuador", which is basically the organized guild of flower growers that keeps informed of global trends and oversees updating and training its members to be at the forefront of the flower industry. Likewise, this entity requests producers that their farms comply with the rigorous protocols that ensure the quality of the product for its subsequent exportation [25]. "Efforts are made to reduce production costs as much as possible by optimizing plant care tasks. Only technical plantations would have economies of scale. The most technical plantations are able to operate globally. Good relations with the governments of countries such as Spain, Italy, the United States, Russia, the Netherlands, and Germany, among others, allow us to keep the markets active and with the possibility of gradually expanding them" [15].

Floriculture in Ecuador is characterized by having excellent territorial, climatic and geographical competitive advantages, for its beautiful flowers of excellent quality, considered some of the best in the world. It is a sector with a high level of productivity thanks to its infrastructure and technology, which allows it to compete in different international markets and stay there in the long term, since this means that its plantations optimize their economies of scale, which is very important when it comes to being a perishable product, the supply chain must be precisely coordinated.

In Ecuador, floriculture has had a great impact at the national economic level, as well as the thousands of families that are directly or indirectly involved in the supply chain, it has served many people living in rural areas. Although this industry is relatively

new in Ecuador, enough time has elapsed for the Ecuadorian flower to become one of the most beautiful and demanded in the world.

In Ecuador, more than 570 farms dedicated to the cultivation of flowers for export are currently estimated with approximately 4000 planted hectares, which corresponds to 1.46% of the total national GDP [15]. It also highlights the fact that 420,000 people in Ecuador are directly involved in activities related to floriculture and depend on it to survive in Ecuador, likewise, the average remuneration of people involved in floriculture is the highest compared to others. agricultural activities. Floriculture is the agricultural industry with the most international seals of environmental quality, good practices and labor quality that are highly demanding [25].

Below is a graph showing the area (in hectares) of flower cultivation between the years 2014 and 2020. In 2020, a severe decrease in the planted area is evident, basically due to the effect of Covid-19, which decreased demand and raised prices, therefore producers decreased their production.



Figure 5. Area of flower cultivation between 2014 and 2020 [26].

Likewise, the main and largest flower growing companies in Ecuador are concentrated in the following six regions: Cotopaxi, Pichincha, Carchi, Tungurahua, Imbabura, and Azuay. “The province of Cotopaxi has 50% of the companies in its area; its capital is the city of Latacunga, where flowers are grown for export, especially in temperate zones. The companies recovered their plantations affected by the lack of fertilization, pruning, cutting the stems and irrigation during the confinement by the Covid-19. Some areas were eradicated to start planting new flower varieties and, in some areas, it was decided to venture into blueberry cultivation, which is in high demand in the international market.” [26]. Below is a table that shows the number of

flowers growing companies located in each department or area of Ecuador.

Zone	Number of Companies
Cotopaxi	449
Pichincha	366
Carchi	16
Tunguranga	13
Imbabura	12
Azuay	11
Guayas	8
Santo Domingo	6
Chimborazo	5
Cañar	1
El Oro	1
Esmeraldas	1
Manabí	1
Morona Santiago	1
Zamora Chinchipe	1
Total	892

Table 3. Concentration of floriculture companies in the Ecuador territory [26].

In the year 2020, despite its decrease in the cultivated area, Ecuador managed to export flowers to more than 100 countries in the world, among which are large consumers such as the United States, the European Union and Russia. approximately 70% of the Ecuadorian production and where the Rose is the star product, which represents 70% of the total value exported. Currently Ecuador is crowned as the second exporter of flowers in South America and becomes the direct competition of Colombia in regional terms.

Global

The flower industry is very diverse and encompasses many countries that participate in the buying and selling of flowers. Among the most popular trends of the last twenty years is the sale of flowers through virtual platforms and the rapid rise of countries on the equator line as flower exporters worldwide. The first is explained thanks to the new technologies that allow consumers to order and purchase flowers without having to move from their households, “Potted plants and nursery products are bought through a wider range of retail channels than cut flowers. However, there is one major trend impacting both categories: the rise of online sales. The market share of online sales of cut flowers in total cut flower sales ranges from 4% in Russia to 10% in the UK. Online potted indoor plant sales already account for 7% in Germany, 8% in Russia, France and the Netherlands and 12% in online retail forerunner the UK. It seems that garden centers are challenged as they are the ones losing most market share in the UK, France, Germany, and the Netherlands.” [12], the second is explained by the fact that these countries have sufficient land availability and the ideal climate for cultivation. flowers, as explained above. Countries like Colombia, Ecuador, Kenya, and Ethiopia have been paying more participation during the last years, becoming internationally recognized as exporters of quality flowers [5]. Below is a figure that shows how the participation percentages of each country have changed between 2005 and 2015 according to a study carried out by Royal FloraHolland and taken directly from the literature.

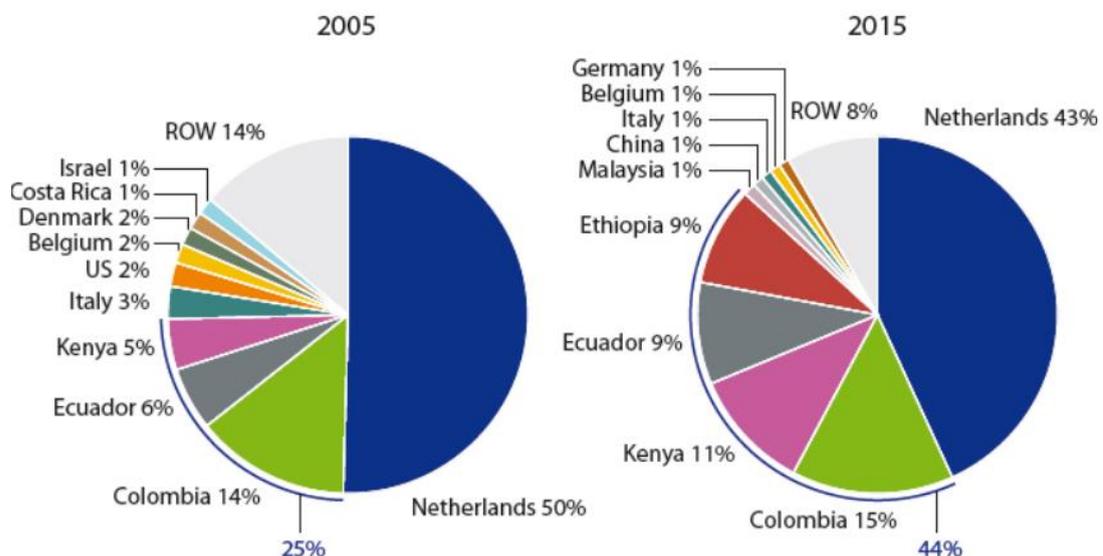


Figure 6. Percentages of participation in world flower exports, comparison between 2005 and 2015, extracted from [12].

As can be seen, the Dutch share in the global flower export market decreased in a 10-year range and although the Netherlands is currently the world leader in exports, the countries on the equator have been gaining greater participation with the years, as explained in previous chapters, is due to the fact that these countries have adopted rigorous methodologies to ensure quality and gain international recognition for their product, as well as environmental and climatic conditions that give them strategic advantages over the Netherlands, Especially Colombia, which has a port exit to the Atlantic Sea and the Pacific Sea, for this reason this country leads flower exports by sea.

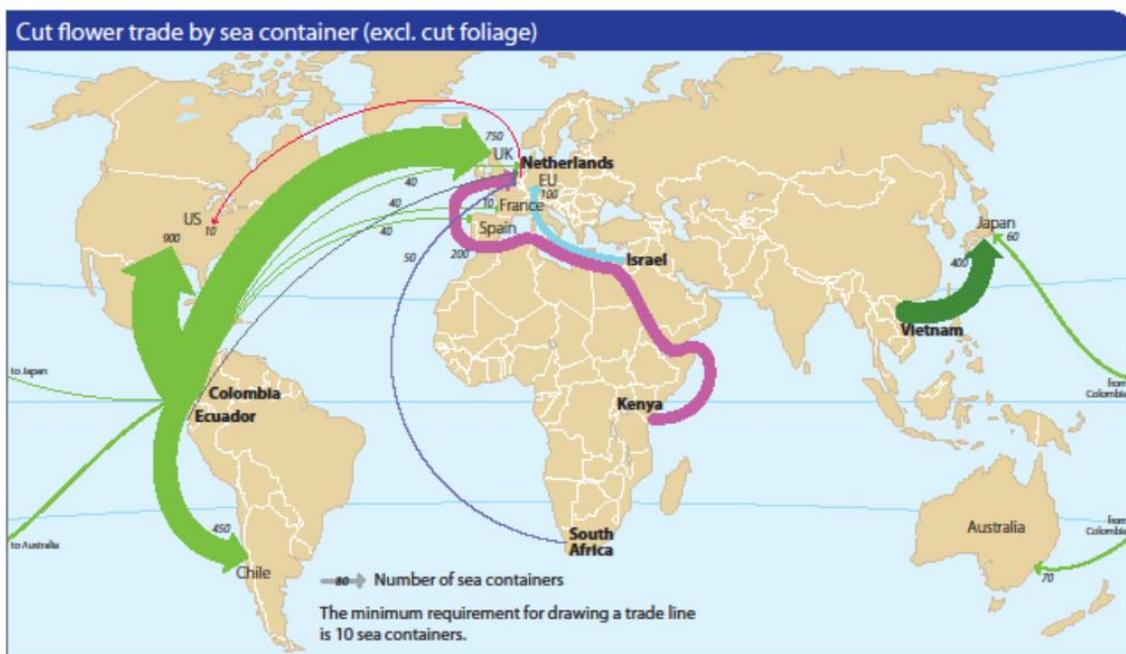


Figure 7. Map of exports by sea in containers, extracted from [13]. Source Royal FloraHolland, Rabobank 2021

Between 2015 and 2020, the total number of flowers exported by sea has grown by approximately 40% [13], thanks to cryogenic conservation techniques, the flowers can withstand longer trips and can be sent in the containers of large ships, which gives countries with access to the sea a competitive advantage in this industry.

For many years the market focused on selling flowers to the most frequent customers in regions such as North America and Europe, but between 2015 and 2019 the Persian Gulf, Arab countries such as Qatar and Saudi Arabia have shown steady growth in demand for flowers [13], this puts them on the map as potential customers. Its main suppliers are Ethiopia, Kenya and the Netherlands. Likewise, during the year 2020 thanks to the Covid-19 pandemic, the industry suffered certain logistical complications that had repercussions throughout the world, with a large shortage of flowers.

Products

The range of products in this agro-industrial sector is quite wide, there are flowers and foliage, but in this work, we will only focus on the flower market, therefore only the types of products classified as flowers will be considered. As seen previously, the demand for flowers depends largely on the culture of each country, its important dates and the traditions that are followed on those dates, likewise, this is a product that is mostly bought as a gift and not so much for own use, and the demand for each type of flower depends on these same traditions [5].

Below is a table of the most popular types of flowers, that is, those that are sold in greater quantity and are more desired by consumers.

Flower type	Participation share
Roses	18%
Carnations	12%
Chrysanthemums	7,50%
Orchids	1,30%

Table 4. Most popular flower type around the world [5].

It is important to note that the type of product most in demand depends on the country where it is being marketed, for example, in Germany there is a greater preference for tulips than for roses. However, roses are the eternal winners as the most demanded flower worldwide, this is a flower that grows much easier in climates with a maximum of 25 degrees Celsius, so in countries like Colombia or Ecuador they can grow much faster, and They can also be cultivated up to three times in year [9]. "A good soil for floriculture should have between 20 and 25% macropores, 20 to 25% mesopores and between 15 to 20% of micropores, which guarantees root aeration, moisture retention and drainage, the optimal texture is of the loam type in which the fractions are well proportioned, and in which the root system develops freely" [1]

Market Size

Regarding the international flower market, it is estimated that between 2000 and 2005 they presented an annual growth of 9%, in monetary terms they went from selling 3.6 billion dollars to 5.4 billion dollars, respectively [10]. This upward trend in the consumption has also been presenting in recent years and can be explained by the fact that the most developed countries such as Germany, England and the United States have increased their demand for flowers. Likewise, producers have revitalized the market, adopting new management and cultivation techniques, which have not only

increased the profits of producers but have also increased the supply of flowers in the year, putting countries like the Netherlands in a position of strategic and competitive advantage [11].

World Floriculture Situation

Basically, floriculture is the commercial exploitation of cut flowers, ornamental flowers, flower bulbs or foliage, through their cultivation and subsequent national or international commercialization. This is a product that within economic theory is considered a normal good, that is, its demand is directly related to the purchasing power of the individuals who consume the product, the greater the purchasing power, the greater the consumption of good [16].

The demand for flowers worldwide is closely related to the economic development of the consuming nations, likewise it is directly related to the demands of the consumer. In global terms, the demand is concentrated in three regions, North America, Western Europe, and Asia. For example, Japan has become one of the target customers of producing countries since the country has a high level of per capita income [17]. In Europe, Germany is the largest importer of flowers, its main supplier is the Netherlands, which also supplies Switzerland, France, and the United Kingdom. In America, the main importer is the United States, and it is supplied mainly by Colombia and Ecuador. Lastly, in Asia, Japan receives flowers from China, New Zealand, and Europe [13]. In other words, the movement of intercontinental floriculture trade is defined in the following directions: From South America to North America, from South America to Europe, from the East Middle to Europe and from Africa to Europe [15].

CHARACTERISTIC OF THE COLOMBIAN FLOWER SECTOR.

In this chapter the Colombian floriculture sector is characterized, analyzing the competitive advantages considering the free trade agreement with the United States. By characterization it is understood to analyze their products, supply chain, economic subsidies received by the Colombian State, as well as the level of technology in production. The advantages of climate and territory, the sustainability policies of environmental protection will also be considered. To begin with this analysis, the following collection of data already mentioned is made. Colombia is the second exporter of flowers worldwide, only surpassed by the Netherlands, it has been exporting since the sixties and since then it has exported 95% of its annual production, the vast majority of the flowers it exports are roses and carnations; Valentine's Day is the most important day of the year for flower growers in Colombia because it is when they collect 60% of their annual sales. Approximately 400 companies that employ some 140 thousand people are involved in this industry, of which 60% are mothers who are heads of household. These companies export to more than 90 countries around the world, of which the United States stands out (because of the aforementioned free trade agreement), European countries, Japan and Korea, being an important factor that is in the culture of these countries to celebrate the day Valentine's Day, which creates the perfect scenario for flower consumption [5]. In the world the classification by exported value of flowers is as follows: 42% corresponds to the Netherlands, 13% to Colombia, 7% to Kenya, 5% to Ecuador, 4% to China and 3% to Israel. It is estimated that worldwide there are a total of 190 thousand cultivated hectares of ornamental flowers for export, a total of 145 countries participates in terms of imports, the most relevant being the United States, France, Germany, Japan, the United Kingdom, among others [29].

The free trade agreement between the United States and Colombia, which entered into force on May 15, 2012, allows these two countries to exchange most of the goods in the agribusiness sector without tariffs, which naturally encourages consumption and export by the United States. consumers from both countries. In other words, according to Asocolflores, this free trade agreement is almost a requirement for the flower business to be economically viable for the businessmen involved, since this treaty allows the direct entry of the product to the United States, a country whose consumption is quite high [29].

During the 70s in Colombia, floriculture began to gain popularity, especially in the departments of Cundinamarca and Antioquia. This, added to the low costs of raw materials and labor, led many businessmen to bet on this agricultural product and began to export it directly to Miami since the shipping charges were not very expensive and the profitability was quite good, thus floriculture became one of the agricultural activities that contribute the most economically to the country and also generate a greater number of formal jobs per hectare [24]. “Based on data from the Asocolflores bulletin as of May 2014, the Colombian flower sector is one of the main sources of income for the national economy, representing 6.6% of Colombian agricultural GDP. The cultivated areas to 2013 are 6783 hectares, which increased by 287 hectares compared to 2012 and decreased by 2185 cultivated hectares compared to 2010. The distribution by sectors is 76% found in the Bogotá savannah, 19% in Antioquia and in the center and west of the country FLORICULTURE PRODUCTS CUT FLOWERS FOLIAGE POTS CUT POTS TRADITIONAL TROPICAL PLANTS WITHOUT FLOWERS BOUQUET 17 5%. Production is concentrated mostly in roses with 36% of cultivated area in Colombia, followed by carnations with 11%, hydrangea and pompoms with 9% each, mini carnations with 5% and others with a 12% share. leading products in the Colombian market they are flowers, carnations, pompoms and alstroemerias” [15].

Floriculture products			
Flowers		Foliages	
To be cut		Potted	
Tradiciotal	Tropical		Plants without flowers

Table 5. Illustration of the main products produced in Colombia regarding floriculture, classifying them into two branches, whether they are flowers or foliage, each one with two sub-branches that refer to whether it is potted or cut.

However, according to Asocolflores, the flower industry in Colombia is one of the most fruitful in the country within the agro-industrial sector, even being as important as the export of coffee. For the year 2013, the floriculture sector contributed approximately 6.5% of the national GDP. During the year 2010 the total cultivation area was 8968 hectares, with a decrease in 2011 of 1068 hectares; As previously mentioned, most of the companies that participate in the export of flowers are in the Bogota savannah and the rest are in Antioquia, the distribution according to the sectors would be 76% in Cundinamarca, 19% Antioquia and 5% other territories in the center of the country.

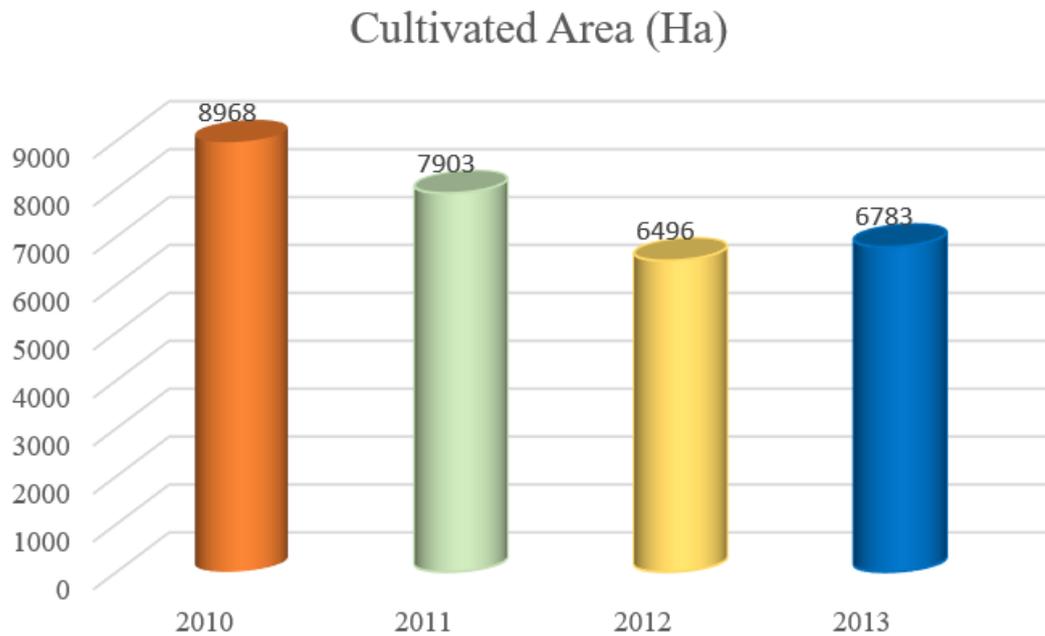


Figure 8. Differences in the number of hectares of flowers cultivated in Colombia between 2010 and 2013, according to Asocolflores.

As for the products that occupy the largest cultivated area in Colombia, the west winner goes to roses, which correspond to 36% of the cultivated area. Due to its great popularity among consumers, this is the flower that sells the most and therefore the one that is cultivated the most, the second place is taken by carnations, which are also a very popular product. Also, due to the large number of flower species that are cultivated in Colombia, 28% of the total cultivated area is destined for the cultivation of "indeterminate flowers" referring to the fact that they are a wide range of species that are cultivated for export.

To better illustrate this panorama, the following graph is presented, which has been constructed with the data available on the Asocolflores website and which corresponds to the year 2013.

Percentage of planted area

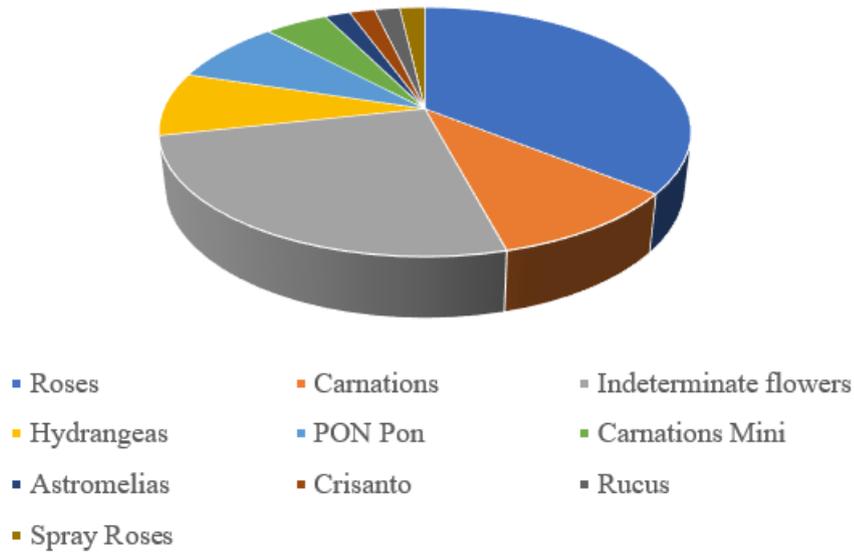
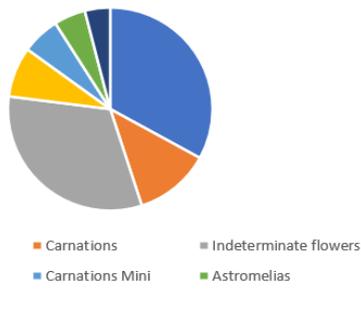


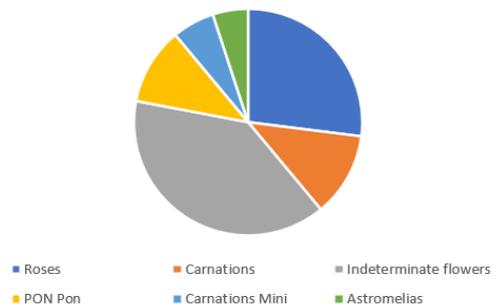
Figure 9. Planted area in Colombia in percentage of each flower type, according to Asolcolflores in 2013.

Colombia can produce approximately 1,500 varieties of different flowers, many of which are endemic to the country, therefore Colombia has the advantage in terms of marketing. Likewise, it has conditions of humidity, sunlight, temperature and fertile soil so that the flowers grow quickly, in addition to that they can be cultivated throughout the year. As previously mentioned, the United States is Colombia's largest client in terms of flowers, followed by the European Union and some Asian countries. Below are the graphs obtained from DANE (National Statistical Administrative Department of Colombia), which show data between 2010 and 2013 for the cultivated area for each type of flower [31].

2010 Percentage of planted area



2012 Percentage of planted area



2013 Percentage of planted area

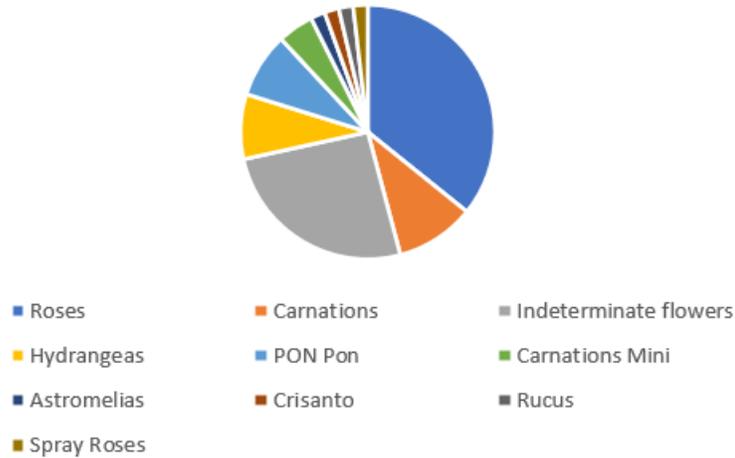
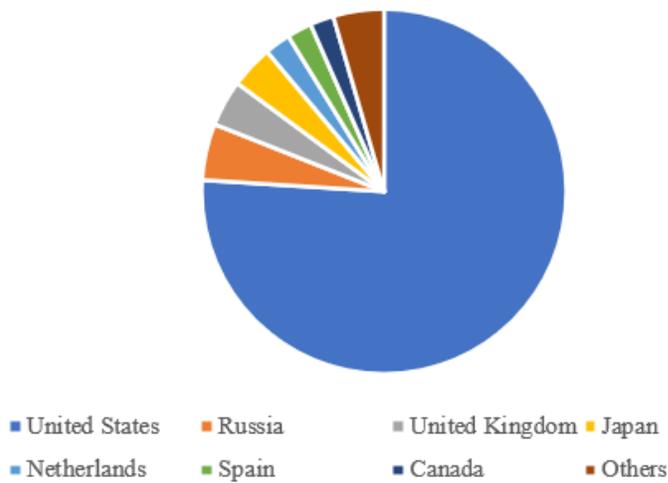


Figure 10. Comparison of the percentage of cultivated areas according to the type of flowers in 2010, 2012 and 2013 according to Asocolflores.

Based on the data collected from Asocolflores and DANE, a comparison can be made of the main destinations of the flowers that are exported to Colombia. Using the data from the years 2010, 2012 and 2013, the following graphs are presented.

2010 Percentage



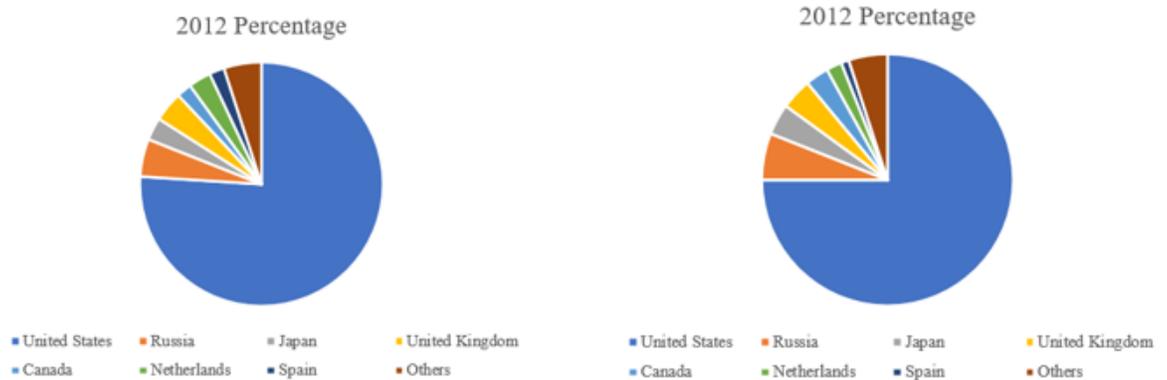


Figure 11. Main importing countries of flowers from Colombia in the world, comparison of the years 2010, 2012 and 2013. Data obtained directly from Asocolflores [29].

Colombia exports 95% of what it produces, and its main clients are the United States, Russia, and the United Kingdom, considering the previous graphs. Likewise, a large percentage of the flowers that are exported go through a supply chain, that is, there are many agents or intermediaries from the producer to the final customer, this of course limits the direct participation of flower growers and sets competitive prices in the market. In the floriculture industry, a product called "Bouquet" is normally sold, which means a floral arrangement, which has replaced the old product, the flower box, that is, sales to the final consumer are normally measured in units [29]. Likewise, this industry, like all others, can be affected by negative or positive economic events that occur globally, increasing or decreasing demand. For example, the case of the year 2020. Due to the global crisis caused by Covid-19, the consumption of flowers decreased worryingly for flower growers worldwide because this product does not enter the family basket of many.

Now, the supply chain of Colombian flowers is the set of actors that interact with each other to get the raw product, in this case flowers, to the final consumer in a more elaborate product with added value. Actors are understood as producers, suppliers of inputs and services, transporters and distributors, marketers, and consumers [32]. Each of these are like productive links that exchange flows of information and materials; depending on how well communicated these links are depends on the operation and performance of the chain in general. The Colombian supply chain consists of three main links that are production, marketing and distribution, but there are also support activities such as maintenance and infrastructure or administrative activities without which the

main links could not function. Next, the productive structure of flowers in Colombia is explained in more detail.

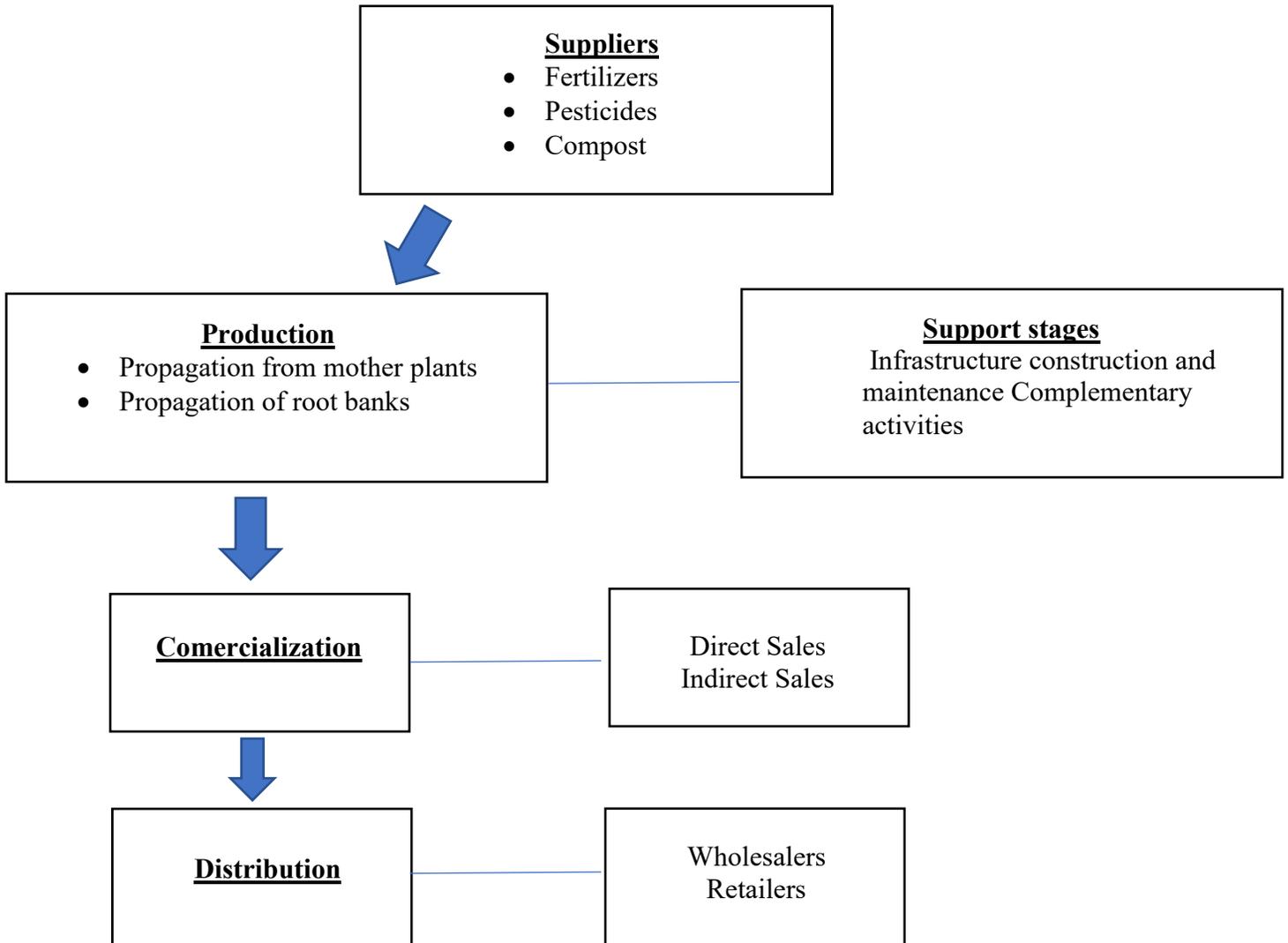


Figure 12. Productive structure of flowers in Colombia, data obtained from [15].

The productive process of flowers in Colombia follows the following general scheme, first the mother plants are propagated in a cultivation area, then the rooting banks are propagated, which is where the rootless cuttings are placed, after these preparatory steps of proceeds to the planting of the species of flower to be cultivated and finally the harvest is made where the flowers are collected if they are prepared for commercialization [33].

Appellation of origin.

“An appellation of origin is the name or indication of a geographical place, which can be a specific country or region, which designates a product that, because it originates from that region and because of the production or transformation customs of its inhabitants, has certain characteristics and / or reputation that make it different from similar products from other geographical locations.”

This means that there are authenticity seals that certify that a product originates from a nation, region, city or geographical area and that this product has certain characteristics that ensure that its quality is unique and proper because it is produced in that specific geographic region. Currently in the world, any legal or natural person dedicated to the extraction, production or cultivation of a particular product can access this benefit, protecting this product or products under the designation of origin. In other words, this is a right of Colombian citizens, therefore any person who wishes to register their activity of extraction, cultivation or production of products can apply to start the process of registering their activity within the point of origin denomination.

However, the term declaration of protection should not be confused with appellation of origin, because the declaration of protection is simply a trademark that registers a product as intellectual property of some natural or legal entity, authenticating the person or entity that has owned it as the owner. developed or cultivated giving them the right to market it only to the owners. On the other hand, the denomination of origin authenticates with a seal that the product being registered has certain quality characteristics, due to the fact that it is produced in a specific area, this implies that geographical factors are taken into account, such as altitude, climate, humidity, soil quality, endemic fauna and flora, as well as the human factors involved in the production, cultivation or extraction process, that is, the culture of the region, folklore and local customs, particular forms of production, cultivation techniques, among many others.

For example, the wine from Barolo in northern Italy has a DOCG designation of origin (Denominazione di Origine Controllata e Garantita), this is because the soil where the grapes that will later be used to produce the wine are grown have a high concentration of Tortonian marls rich in lime that produce the most aromatic and fruitful wines, giving

rise to the type of Nebbiolo grape. Likewise, the wine production process in the Cuneo area in Italy dates back to medieval times, where the Nebbiolo grape was already used as a base for wine at that time, this means that the wine production techniques are many years old. to be implemented and to this day they serve to obtain an extremely high quality product, with unique characteristics and highly desired by wine tasters from all over the world.



Figure 13. Barolo wines with denomination of origin, extracted from [37].

So, this product is obtained thanks to the geographical factors of the Cuneo area, very close to the city of Alba in Italy, thanks to the properties of the soil, the local climate and humidity conditions, as well as thanks to human factors. such as the cultivation techniques of the Nebbiolo grape and the wine production processes with many years of history in this area. In other words, it meets the requirements to be protected under the denomination of origin, which certifies it as a quality product, increasing its price and global demand. In addition to this, no other wine in the world that is produced differently can be defined as "Barolo Wine", which makes it an exclusive product.

Colombia has managed to become the second largest flower exporter in the world through good cultivation practices, which have established the country as a quality

producer. Colombia has the natural conditions to house an immense amount of flora and fauna, Colombia is in fact the second most biodiverse country in the world, it has access to the Atlantic and Pacific oceans, it is also the land crossing that connects South America with North America, it has also a large number of thermal floors where different unique ecosystems of the region are found, also within its territory is an important part of the Amazon jungle. Colombia is then the perfect setting for wildlife, it has the largest number of types of birds in the world, a large number of species of mammals, reptiles and fish, as well as an extensive number of types of plants within which it is found. the incredible quantity of 1400 different species of flowers.

Of this incredible number of flower species, it is estimated that at least 730 are endemic to Colombia. This means that they are native to the area and that they grow under the geographic and climatic conditions that the Colombian territory possesses. Which means that it gives Colombian flower growers the opportunity to identify which of these endemic flowers are desired in the global market, identifying a market niche that is interested in them and later designing an economically viable productive system that allows them to take advantage of the conditions of Colombia to grow these products.

However, taking into account the definition of denomination of origin, the endemic flowers of Colombia that only grow under particular climatic, geographical, altitude and humidity situations make them perfect candidates to be protected under the denomination of origin. Since they will be cultivated in this way under artificial climatic conditions, in a greenhouse in another region or country, they will not have the same characteristics as those that grow naturally in Colombia. The denomination of origin then certifies the Colombian flower as one of the best in the world since, being cultivated in Colombia, it has unique natural characteristics and its quality is superior to some others cultivated in other parts of the world. In this chapter, the main species of flowers that have denomination of origin in Colombia will be defined, this includes the species and subspecies of the same flower.

The flowers that are most desired in the world from Colombia are those products that give Colombia an advantage over the other producers, which is why it is of the utmost importance to identify which ones they are and why they are so desired, so it can be understood that the the efforts of flower growers in Colombia to preserve the quality of the flowers have a quite logical reason, to take care of the quality of their product so that the denomination of origin of the Colombian flower does not lose its level of quality.

“The geographical location and diversity of natural resources make the country an ideal land for the production of different types of flowers. What is this privilege due to? To the thermal floors that Colombia has! For example, the cold and páramo conditions in departments like Cundinamarca allow the production of beautiful flowers such as roses, carnations and alstroemerias”.

In departments like Antioquia, the chrysanthemum flower and hydrangeas are cultivated, thanks to its warm and temperate climate. While, 4,270 species of orchids grow in different regions of Colombia, thus making it the country with the most types of orchids in the world.” [38].

Of 1,400 species of flowers in Colombia, three have their respective seal of determination of origin, these are Carnations, Roses and Chrysanthemums, which thanks to their color and quality are recognized as original Colombian products. It is precisely because of these characteristics that Colombian flowers are coveted all over the world. Its different shapes, colors and sizes are fascinating and inspire more than one. In addition, its high quality, appearance and duration are characteristics recognized by the international market [38].

Colombian Roses

These are the flowers par excellence in the world, they are the most commercialized and desired. They are related to love and normally when you think of giving flowers you think of roses. There are different types of roses, such as garden roses or miniature roses, which are better known as "Spray". This flower is directly related to dates like Valentine's Day in the USA, weddings and birthdays. This is why their worldwide demand is extremely large and for flower growers around the world they represent an excellent market opportunity.



Figure 14. Roses from Colombia, image taken from [38].

The main characteristic of roses is color, for example, there are beautiful red roses, as well as white roses, which are used to celebrate special occasions such as weddings because they are perceived by consumers as a representation of love, passion and beauty. On the other hand, pink roses are more desired to represent gratitude towards someone and are more used in business arrangements. Depending on the special occasion or date, consumers demand one type of rose or another, for example, yellow flowers to represent happy moments, orange roses represent enthusiasm, and purple roses represent good wishes, or at least that is how the behavior of the consumer has been interpreted. consumer of flowers in recent years.

Colombian Carnations

Carnations represent the second most exported product in Colombia and are produced in two presentations, the normal size standard carnation and the mini carnation used for other types of floral arrangements. Just like roses, the main attraction of carnations is the huge number of colors in which they can be found, which are widely desired by consumers, among these colors are red, yellow, white, pink, among many other colors. In fact, in the year 2000 in Colombia the carnation was genetically modified and the first viable and sustainable crop of blue carnations was obtained.



Figure 15. Carnations from Colombia, image taken from [38].

Carnations are an extremely versatile product, consumers mainly like their grace and vivid, intense colors. Carnations are used on various occasions depending more than anything on their color, for example white carnations are used for wedding decoration, yellow ones for home decoration and so on, knowing the type of carnation that consumers prefer is useful for producers to interpret market demands and respond to them.

Colombian Chrysanthemum

The chrysanthemum is a complementary flower, that is to say that it is normally used to accompany roses, carnations, orchids or other types of flowers in the best-known flower arrangements such as Bouquets. They are very resistant plants which facilitate their transport and distribution throughout the supply chain, in addition to being easy to maintain once they reach the hands of the final consumer. It is a very desired flower, its meaning is golden flower and they represent life.



Figure 16. *Chrysanthemum* from Colombia, image taken from [38].

Its hue can vary from a wide range of colors such as white, to beige, yellow, orange, pink, red, violet and blue, this is because this is a hybrid flower, so its properties are quite particular. They are generally used for interior decorations in homes or offices, through centerpieces, bouquets or as bouquets in vases. Also in Catholic countries it is widely used for the celebration of communion where floral arrangements with mainly white colored chrysanthemums abound.

These are the three species of flower that have denomination of origin in Colombia, likewise they are the species that are most commercialized nationally and internationally. However, there are other species that, although they do not yet have their seal of determination of origin, are produced in Colombia and are also endemic to the territory, which is why it is important to point out the floral species for which Colombian producers feel so proud.

Colombian Orchids.

Colombia is the country where more types of orchid can be found, the May flower or cattleya flower as it is commonly known is nothing more and nothing less than the

national flower of Colombia, it is found and made in its national coat of arms since it represents a patriotic symbol for Colombians. This is a native flower of this region and can be found in different shapes, colors and other physical characteristics, which is only possible thanks to the great natural diversity of the Andean country.

In Colombia there is an incredible number of 4,270 types of orchids, of which 1,572 are endemic to Colombian territory [39]. Orchids have different smells, colors, shapes and sizes, this is due to the great diversity of the country and its geographical position. Orchids grow in the different thermal floors of Colombia, that is the reason for their variety, for example they can be found in dry forests, in humid moors and even in the farms or homes of Colombian citizens. Although orchids can be found throughout the country, it is in the Andean region (the region closest to the Andes mountain range) that has the greatest number of types of orchids, which is why the regions where the most orchids is Antioquia, Boyaca, Cundinamarca and Caldas since in these areas the climate is perfect for the growth of these flowers. Likewise, a large number of types of flowers are found in the department of Choco, Valle del Cauca and Cauca, since they are different thermal floors that allow the growth of other species. In the whole world there are approximately 260,000 species of flowers and only Colombia is home to 10% of this wealth, it is a country naturally blessed to be a producer in this industry and orchids are undoubtedly the greatest pride of Colombians when it comes to flowers.

Below are the types of orchids that grow in Colombia that are more likely to be exported thanks to their natural characteristics that are highly attractive to consumers.



Figure 17. Orquidea *Cattleya quadricolor*, endemic flower of the Colombian territory, extracted from [39].

“It has light pink, almost white petals and sepals. Its labellum has the other three colors: mauve (lilac) on the tube, yellow on the throat, and a purple spot on the disc. Unlike other orchids of this species, its flowers are half-open and slightly inclined, and they also have an exquisite aroma.” [39].



Figure 18. *Acacallis cyanea* orchid, extracted from [39].

It is a difficult plant to cultivate, since it grows naturally in the Amazon between the heat and humidity of the jungle, where part of its body is submerged in the waters of the

rivers and only its flowers stand out on the surface, it is a plant beautiful and wild that consumers quite like to decorate their patios or gardens, although it is not easy to care for.



Figure 19. *Dracula platycrater*, Colombian Pacific orchid, extracted from [39].

This is another flower that requires very high humidity levels to grow, also heat is very important for its growth, which means that it is not often a flower that can be exported to faraway places.



Figure 20. *Cynoches haagii* Barb, wild orchid from the Colombian Orinoquía, extracted from [39].

Supply Chain and Logistic Issues.

In this chapter the development in general of the flower industry in Colombia will be explored, which directly implies the analysis of the progress in logistical terms of the industry which, as time goes by, has meant an economic development for the country. Naturally, the logistical development of Colombia in an evolutionary way and comparing it with competing countries in terms of export of local products supposes a competitive advantage for the country worldwide. When talking about the logistics structure of a country, it can be evidenced in this the current state of it in terms of development, which is why factors such as distribution strategies, the most used means of transport, the efficiency of transport and loading of products, among other factors that are important for its analysis.

Colombia throughout its last years has had an evolutionary growth in terms of logistics and its value chain, as mentioned in other chapters, strategic alliances have been generated thanks to Asocolflores, which have guaranteed competitiveness by avoiding cannibalism among flower growers and it has even allowed them to develop projects that boost productivity and flower exports. As has been seen, these alliances are something very good for the industry since it generates job stability, fair competition and an opportunity for economic growth for the country [40].

There are different logistical skills that can be evaluated to determine the possible drawbacks and logistical limitations that Colombia presents, for example the means of transport, the technology used, time management, the socio-political state of the country with their respective situations of public order. All this information is valuable to understand what proposals can be made and what measures can be taken to improve the state of the floriculture supply chain in Colombia.

Transportation systems

Colombia has had a common logistical problem for many years, since most industries do not have their own transport systems, but rather most transport companies are totally independent entities, often they are natural persons who simply have a large truck. and provide transport services, however, this situation generates many logistical problems since it is difficult to coordinate the activities of the flower growing companies with the transporters, often presenting delays. It is also quite difficult to negotiate a fixed and stable price, flower growers often find themselves in the difficult situation of facing extremely high prices for transportation, because there is no contract between the carrier and the growers, that is, if the carrier You consider that your transport service costs more, you

can raise the price at will. Likewise, flowers are a product that requires a constant cold chain treatment from the time it is cut until it is delivered, this is essential to preserve its physical properties and attractive characteristics. On many occasions, carriers do not have adequate vehicles for transporting flowers or products that require a cold chain, few offer this service, which further increases transportation costs for producers.

Likewise, most of the transport trucks do not have real-time location systems, which makes it extremely difficult to track the truck and forecast its delivery time. In general, delivery times of up to 8 days have been presented, which it can be disastrous for the conservation of flowers. It is also important to mention that in Colombia not all roads are in adequate condition for the transport of products, many areas do not have pavement and although the trucks are capable enough to pass through those areas, the delivery time extends worryingly. In addition to the fact that the risk of accidents is quite high, approximately 19% of the roads in Colombia are not paved and there is a risk of landslides, which generates constant repairs and road closures.



Figure 21. Collapsed Road in Colombia, taken from an article in the newspaper El Tiempo. [41].

On the other hand, Colombian geography becomes a point against when it comes to transporting flowers from farms to places of distribution such as ports or airports. Colombia has a mega diverse geography, there are high mountains, jungles, rivers and valleys that limit transportation in general, which normally represents an increase in transportation times. Due to this great diversity of territory and other socio-political problems, Colombia does not have a system of train lines for the transport of cargo, that is to say that the only viable option for land transport is relieved by trucks [40].

Colombia is a country that has been in armed conflict and civil war since the 1950s, this conflict mostly affects rural areas where state power is weaker and where military forces have less presence. On some roads in Colombia there used to be armed blockades by the FARC or ELN guerrillas that forced private or cargo drivers to pay a sum of money in exchange for passage, this evidently discouraged carriers from working in certain areas of the country and left producers with few options to move their products, not to mention the time lost in those blockades; Although this situation has improved a lot, in the territory from time to time these situations continue to occur.



Figure 22. FARC-EP military checkpoint on public roads limiting the passage of vehicles, image taken from the internet.

On the other hand, Colombia is a country with a long history of war against drugs, the country has gone through more than three decades trying to limit the criminal activities of the cartels in alliance with organized armed groups, for this reason there are exhaustive customs controls that They review national products in detail, especially those destined for export, mainly to the United States or Europe, since these are the target countries of the cartels. Due to this, it is very normal for the anti-narcotics police to carry out exhaustive searches in airports or coastal ports in order to ensure that no illegal substance is hidden among the exported products. This represents a problem since the flowers cannot remain alive for a long time after being cut, so this basically represents the bottleneck and the last challenge before being able to reach the destination country, sometimes, they must remain much longer than expected in the cold rooms which generates an increase in the logistics cost [40].



Figure 23. Customs control of the department of Cesar seizing contraband merchandise [42].

As possible solutions to these problematic situations, flower growers could consider allying with some transport companies and reach agreements that allow both parties to be profitable, thus avoiding the sudden rise in transport prices. Likewise, there is the possibility of making a vertical integration with transport systems and looking for a viable way to acquire the trucks and form a fleet that serves solely and exclusively for the transport of flowers, obviously taking into account the technical specifications that are required [40].

Information Systems

The information systems used by flower growers in Colombia are quite basic and many of them are not updated, for example the lack of real-time truck trackers makes it difficult to estimate delivery times to distribution centers. Lack of connectivity between end customers and producers is another serious problem, since it limits the understanding of the market in terms of supply and demand, because as mentioned in previous chapters, understanding what kind of flowers are the most desired in the world allows Generate a production plan and adapt to market trends and separate from the sales made by the final retailer. For this reason, it is advisable to use business information systems instead of private ones, which allow a complete visualization of the flow of information to monitor activities and intelligently analyze the data provided by the market.

Time management and distribution

Regarding the delivery time of the flowers, the analysis goes beyond the aspects that can be controlled in the supply chain, that is, there are factors that producers, distributors and minimalists can control and optimize cutting times, packaging or distribution by optimizing operational activities; however, as previously stated, there are different external factors that cause delays in the supply chain, of hours or even days; Also public order factors that generate road closures, alterations in national routes and even discourage active participants in the chain from continuing with operational operations in some areas. Likewise, the general operating costs increase worryingly in some cases, which hinders the possibility of making the business profitable for flower growers, especially the smallest ones who still do not have sufficient economic strength to resist the sometimes-difficult intransigence. and complicated situation in Colombia, mainly in the rural areas of the country.

GDP Analysis.

Ecuador

In Ecuador, different natural products are produced for the internal use of the country and for exportation. In particular, he has a large participation in agriculture, forestry, livestock and fishing; In terms of agriculture, the orange code 06 represents live plants and flower products. In the year 2020, a total of 237 floriculturists were registered, which were found in the Ecuadorian territory and approximately 174 were found in the province of Pichincha. These companies generate an important employability that especially benefits people in a vulnerable situation; approximately 28775 employs were generated in the year 2020 which reflected an impressive form as 36% of the total employs that generate the small and median companies in Ecuador. In Ecuador that same year, more than 4,900 hectares of flowers were cultivated, of which 67% corresponded to the cultivation of rose stems, 10% to Hypericum, 6% to Gysophilia, and another 6% to transitory flowers depending on demand. of the market and the remaining 12% to other types of flowers [43].

Below are the data of the gross value added, the total value of GDP and the total percentage of the contribution in the national GDP of the flower sector from 2017 to 2020.

Year	Gross Value Added	Total GDP	GDP share
2017	553.29	70,956	0.78%
2018	549.00	71,871	0.76%
2019	550.84	71,879	0.77%
2020	546.74	66,308	0.82%

Table 6. Data related to the contribution to Ecuador's national GDP of the flower sector (values are in billions) [43].

Ecuador's main exports are to the United States, approximately 37% of the stems that Ecuador exports go to this North American country.

This agricultural sector depends both on the exports of its products abroad, as well as on the imports of inputs, vehicles and technology from other countries, for this reason its profits depend a lot on the price of the dollar, and although the economy of Ecuador

is dollarized since 1999, all industries are affected positively or negatively depending on the current state of the dollar. Below is an analysis of the income statement from the year 2017 to the year 2020 in Ecuador for the flower growing sector.

Accounts	2017	2018	2019	2020
Income	800.08	848.67	861.66	778.20
Costs and expenses	783.17	835.79	860.15	771.68
Net profit	16.90	12.88	1.51	6.52

Table 7. Data related to the net profit of the flower sector (values are in billions) [43].

From this information we note that in 2020 the income accounts as well as the costs and expenses decreased by 10% compared to previous years, however the net profit increased quite favorably in that year. This is an industry that up to now has been sustained over time in Ecuador and that is profitable if imported materials and inputs do not increase their price much or that sales remain at a reasonable level.

Netherlands

The Netherlands is a country that has come a long way since the last fifty years, the country has decreased its agricultural activity in general. The Netherlands has been characterized by its banking activity and its technological advances and after the Second World War its economy has grown in a very favorable way, so much so that in its relatively small territory it has managed to position itself as one of the countries of the European Union with the highest nominal GDP. Since the 1970s, the share of agriculture in the national GDP of the Netherlands has decreased significantly. It is estimated that in 1970 the percentage of GDP corresponding to agriculture was 5.6%. During the course of the following years, the agricultural activity began to decrease slowly in the country; It is important to mention that in the Netherlands the availability of land to cultivate is quite limited, this could have been one of the reasons why the country decided to use its territory for other types of activities, in evidence to this, in the year 1995 the contribution of agriculture to GDP was 3.1%, the same thing happened from that year to the present date, agricultural activities decreased substantially and for the years between 2012 and 2023 the average contribution to GDP of agriculture is 1.5% Below is a graph that shows

this much more clearly [44].

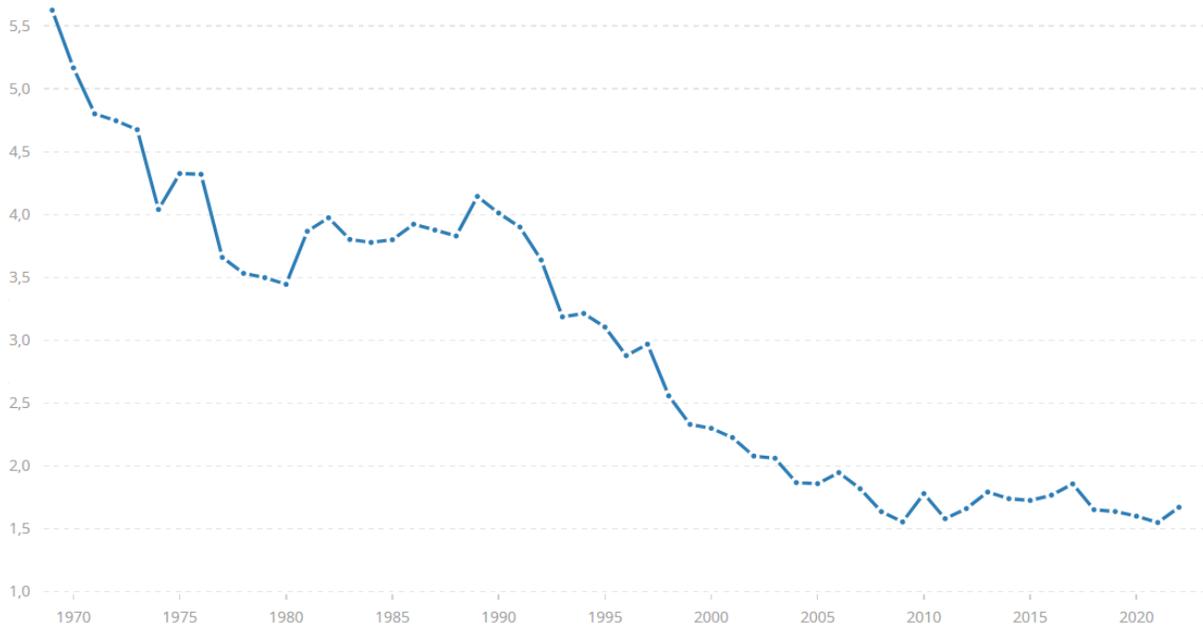


Figure 24. Percentage corresponding to the contribution of agriculture in the national GDP of the Netherlands over the last decades, extracted directly from [44].

The Netherlands exports agricultural products that are well known worldwide, among these are mainly flowers, being the largest producer and distributor in the world, but also for its cheese production, tomato cultivation and beer production. Of these, the horticulture sector, that is, the one that manages live plants, has an excellent and efficient logistics network, this allows customers in the United States or other countries of the European Union to buy flowers the same day they have been grown. Regarding the latest annual reports of income from products sold and operating expenses, Flora Holland provides some data that is extremely relevant to understand the current situation of the flower industry in Colombia. Flora Holland is an association with over a hundred years of experience in uniting Dutch flower growers to work together and create strategic advantages in the global flower market.

Year	Product Revenue	Operating Income	Total Assets	Operating Expenses	Profit/Loss After Taxes
2020	4,654	341.3	728.6	346.3	-5.8
Difference in percentage 2020-2021	20.9%	14.8%	5.6%	10.1%	100%
2021	5,627	391.9	769.3	381.3	6.5
Difference in percentage 2021-2022	8%	14%	-2%	20%	-168%
2022	5,166	448	752	456	-4

Table 8. Economic indicators of the Dutch flower industry in recent years. [45].

Colombia

Colombia is a country with a relatively long history in the flower industry, for the last forty years it has been exporting in this agricultural sector and is currently the first supplier of flowers in general to the United States and has also established itself as the largest exporter of carnations worldwide, surpassing the Netherlands. Currently, more than 6,800 hectares are dedicated to the cultivation of flowers in Colombia, in addition, the country takes advantage of its privileged geographical position to export more easily to different continents of the world by air and sea, in fact it is the country that exports the most flowers by sea since it has access to both oceans, the Pacific and the Atlantic. Thanks to its biodiversity, Colombia exports a wide variety of flowers that range from the typical roses, carnations and chrysanthemums to the rare orchids from different areas and Colombian thermal floors, which are endemic to the territory, for this reason Colombian products have earned recognition. and even some of them have denomination of origin that position them as highly desired products. Currently 89 countries in the world import flowers from Colombia, which represents a great opportunity for the country and an income for the gross domestic product.

Floriculture in Colombia is an industry that currently generates 120,000 direct jobs and 25% of the female rural workforce is linked to this industry with formal employment contracts. It is estimated that floriculture contributes approximately 7% of the gross domestic product in national agricultural sector, which is not a derisory figure considering that Colombia has very strong industries in the agricultural sector.

In the last twenty years, Colombia's gross domestic agricultural product has grown substantially, in the year 2000 it was approximately 8.3 billion dollars. From the year 2000 to the year 2008, Colombia achieved several milestones in terms of public order under the government of Alvaro Uribe Velez, in which it was possible to regain control of many rural areas from the hands of the guerrillas, improving the situation of many peasants who could working the land safely and the transporters managed to pass through previously blocked roads. In 2014, the agricultural gross domestic product was already 17.55 billion dollars, which represents a growth of 230% in just fourteen years. Last year 2022, an agricultural gross domestic product of approximately 28 billion dollars was evidenced. The following graph shows the growth of the agricultural sector since the 1970s in Colombia.

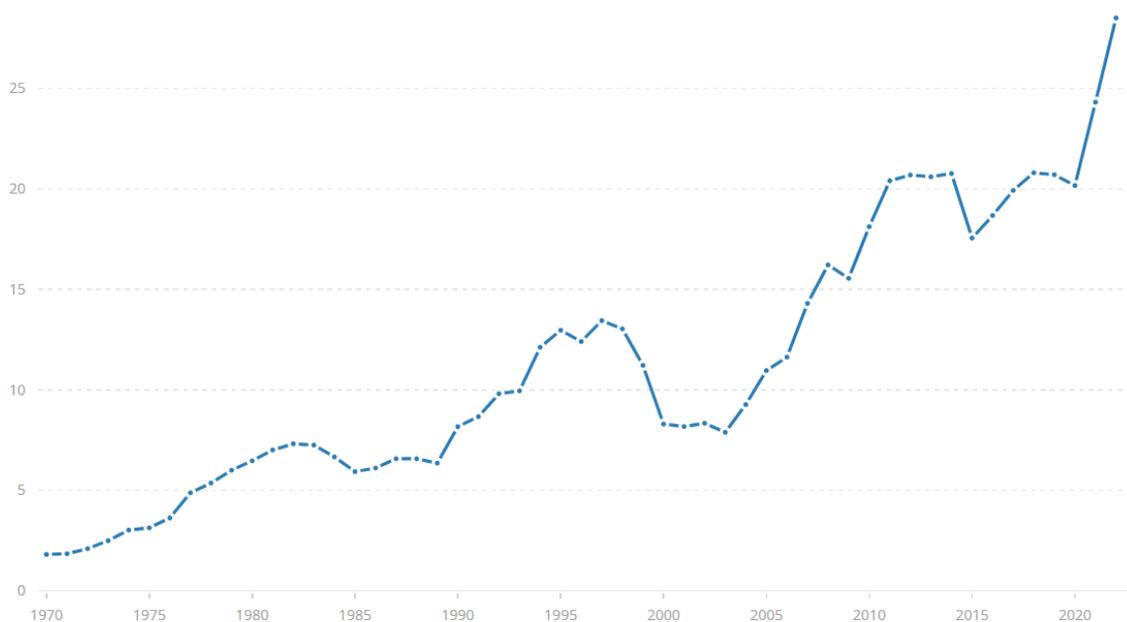


Figure 25. Gross domestic agricultural product of Colombia from the year 1970 to the year 2022. Extracted from [46].

It is also evident that the GDP of the agricultural sector had certain variations during the years 2010 and 2015 where with respect to the national GDP it grew less significantly. Below are some comparative data on the national GDP, the national agricultural GDP and the fraction of agricultural GDP that includes agricultural products such as sugar cane, legumes and of course live flowers or live stems.

Year	2011	2012	2013	2014	2015
National GDP	6,6	4	4,9	4,4	3,1
Agricultural GDP	2,1	2,5	6,5	3,1	3,3
GDP Cultivation of other products agricultural (includes flowers)	2,9	3,1	4,9	1,4	0,6

Table 9. Variation of the percentage of the national GDP and comparison with the agricultural sector. [47].

It is also important to expose the financial statements of the flower industry in Colombia, below are the figures of assets, liabilities and equity.

Year	2013	2014	2015
Assets	798.649	869.449	1.034.778
Liabilities	366.552	414.694	545.269
Equity	432.097	454.755	489.508

Table 10. Assets, liabilities and equity in billions of dollars of the floriculture sector in Colombia between the years 2013 and 2015 [47].

“When comparing these variations with those sustained by the total number of companies that continuously reported financial information to the Superintendency of Companies for the period 2013-2015 and under local regulations, it is evident that, except for equity, the growth in indicators was lower. The foregoing, as the equity of the sample of all companies grew by 10.7% from 2014 to 2015, and assets and liabilities grew by 10.4% and 10.1% respectively, in the same period.” [47].

The figures of income, expenses and operational costs registered in the years 2013, 2014 and 2015 for the floriculture sector and finally the profits or losses of these years are also presented. These years are important for the flower industry in Colombia since it presented certain variations in the level of agricultural GDP.

Account	2013	2014	2015
Operating Income	\$831.418	\$950.563	\$1.238.859
Non-Operating Income	\$46.093	\$84.598	\$111.232
Costs of sale	\$694.730	\$795.530	\$994.487
Administration Expenses	\$83.973	\$89.225	\$108.835
Selling expenses	\$45.434	\$51.056	\$61.713
Non-operating expenses	\$46.660	\$74.282	\$143.322
Net profit	-315	14.806	21.837

Table 11. Revenues, costs, expenses of the income statement and net profit [47].

This review serves to identify the state and performance of the flower industry in relatively recent years, and how it has contributed to the gross domestic product of the country, especially in the agro-industrial sector. As can be seen in the income statements, the situation of the industry varies constantly depending on the socio-political state of the country, on market variations and on the exchange rate, mainly with respect to the dollar.

Prospect of growth.

The growth of the flower industry as well as the exploration of new markets worldwide have been a constant in the flower industry in recent years, more specifically during the last 50 years since Asocolflores existed, which has been a dedicated association to work for the improvement and growth of this agricultural industry in Colombia.

Asocolflores is responsible for Colombia's success globally in terms of exports and world growth. Asocolflores is a trade association that encompasses most flower-producing companies at the country level. It is important to highlight the fact that all flower producing companies are different in terms of cultivated products, size, target markets, target customers, cultivation and distribution strategies; however, they all have certain common characteristics that unite them in some way. As similar, Asocolflores focuses on these common factors to unite companies and make them work under a model called competitors and partners. This means that the companies that produce flowers in Colombia are competitors among themselves in global terms and in the international market, but at the same time under a collaboration scheme to achieve collective growth without sabotaging each other [34]. This is an association model that benefits all members, for this reason it has been sustained for so many years and has evolved over the years, generating activities to guarantee, from an economic point of view, job creation and growth, from an economic point of view. From a social point of view, the well-being of all its members and their equity so that there is no cannibalism from the largest companies to the smallest, likewise Asocolflores has played a very important role in the environmental aspect, respecting the natural capital of Colombia.

All these efforts have managed to position the Colombian flower as one of the most desired in the world before the different international markets and before consumers in general who are quite demanding. In large part due to their efforts in the fight for gender equality in the allocation of jobs, likewise, due to the large number of formal jobs generated by floriculture in Colombia; On the other hand, Colombia has focused on environmental conservation, which gives it many points internationally. likewise, the investment in infrastructure that has allowed not only to maintain but to improve the quality of the logistics chain to guarantee the quality of the product, as well as the constant innovation when reading the international market and the great strategic

alliance that Asocolflores has built during these years has allowed Colombia to retain its position as the second exporter of flowers worldwide.

The work of Asocolflores has been very important for this industry in Colombia, the main idea is that flower growers in Colombia are at the forefront in terms of technology, quality and global trends. For this reason, Asocolflores has intervened in order to reduce the environmental impact of the flower industry, for this the first step was to control the use of chemicals in the flower growing process, normally based pesticides are used. of chemicals that end up in the soil or in nearby waters, in Colombia it has been possible not only to reduce 50% of pesticides, but also the strongest chemicals have been eliminated from the inputs used. Another very important point is the use of water; while before the water was obtained from surface or underground sources, which is the most traditional method, in Colombia a rainwater collection system has been applied that is later used to irrigate flower crops, at this time more than Half of the cubic meters of water used are recycled from rain [34]. The use of renewable energy is also a factor that has been present for several years as well as the use of bio-inputs that replace traditional chemicals as mentioned above. These efforts have awarded Colombia the "Flor Verde Sustainable Flower" certificate for its commitment to reducing the carbon footprint, the proper use of water, the proper management of chemicals used in crop soils, among others. further. These practices position Colombia as an exporting country that is concerned and acts on the matter in the face of a global problem that is caring for the environment, which benefits it in its exports since most consumers today are concerned about where the products, they consume live, due to this global trend it is important for Colombia to continue innovating in this point of view.

A very important issue for this industry is the useful life of the cut flower stems that are ready for export. Being an organic product that loses a lot of water after being cut, it must be at the service of the final customer in a few hours, otherwise the beauty of the flower will be impaired, and the consumer will perceive that flower as low quality. For this, Asocolflores has also played a fundamental role, because it has managed to unite practically all the actors in the logistics chain to act in a synchronized and efficient manner. Basically it brings together the industries that supply plastics, packaging, cardboard, and other inputs necessary for the correct packaging of cut flowers; likewise, to the shipping companies including national carriers, aircraft or ship fleet companies that are in charge of taking the flowers to the destination countries and the local carriers of each destination country to minimize delivery time and that the flowers are in the

showcases available to consumers.

Asocolflores has incorporated an innovation center dedicated exclusively to the flower sector, its name is Ceniflores and its job is basically to change the traditional way of thinking and acting when talking about flowers [34]. This innovation center applies a technique known as the Innovation Triangle, which basically consists of an alliance in search of new knowledge and new practices between the Colombian Agricultural Research Corporation (Agrosavia), the best-known Colombian Agricultural Institute such as ICA and different public or private universities that work together to generate change in the Colombian agro-industrial sector and with specific actions for the flower growing sector have achieved many strategic advantages over the last decades. Although it can be considered that innovation is part of any type of industry, in the flower industry it is too important a factor because it is about exporting an approximate amount of 60 different species of flowers and foliage each with their respective varieties to more than one hundred countries around the world, each species of flower has a different logistics, conservation and transport process, which is why it is essential that for the growth of this industry in Colombia, innovate daily to guarantee that the final product not only does not lose its characteristics that not only make it attractive to the end consumer, but also improve its quality so that it remains one of the highest-rated products on the market.

Another of the tasks of Asocolflores has been the generation of strategic alliances with the main players worldwide related to the flower market and flower-growing activity in general, this mainly serves to be able to participate in international events of great importance organized by flower-growing guilds. In this way, Colombia can expand its economic and cultural relations, in addition to polishing its image as an exporter [34]. In the year 2022 the president of Asocolflores Augusto Solano was elected as director of the board of directors of Union Fleurs, one of the most important flowers growing organizations in Europe, this gives great renown to the Colombian work in the flower industry and increases its reputation with global consumers. In this way, Solano becomes the first American to be elected as president of the Union Fleurs board of directors. On the other hand, Colombia does Asocolflores is part of Summit, which is an association that brings together the 9 main floral guilds in the United States and Europe [34]. When talking about the growth of the flower industry in Colombia, it is necessary to talk about Asocolflores since this has been the entity in charge of bringing the flower industry in Colombia to what it is today, in addition to this, it works daily with different international and national organizations to improve their activity and products, for this reason the first

part of this chapter is dedicated to the occasional actions that Asolcolflores has carried out to bring Colombia to where it has reached today.

From the above, we can conclude that Colombia enjoys natural advantages of territory and economic advantages that have been key to its amazing growth in the flower industry for several years. Among the natural advantages is the temperate climate and the absence of seasons during the year, which allows several harvests throughout the year, the thermal floors, the fertile soils, and the variety of endemic flowers of the country. Among the economic advantages are the relatively cheap labor prices and the low transportation costs to the ports or airports since the cultivation areas are close to the main ones in the country, in addition, there is a great advantage in terms of international market due to the free trade agreement with the United States, which reduces tariffs and allows the export of more product.

However, it is necessary to talk about the disadvantages that Colombia faces in this agro-industrial sector because these disadvantages limit the growth of the flower industry over time. An example of this are the environmental restrictions imposed by Japan and Europe, which prohibit the sale of organic products if certain types of inputs are used for their production, which increases costs for producers. Another great disadvantage is that even though Colombia invests in research and development, the investment is not high enough to compete with the Netherlands, which invests much more, therefore many techniques must be copied directly from the competition. The high costs in Colombia related to the cold chain, necessary to preserve some types of flowers, is another of the economic disadvantages that marketers face as soon as the flowers begin their journey to the final consumer [35]. Intrinsic market risks are also considered, related to pests or temperature changes that reduce production on some date, or the difficulty of selling any variety of flower in international markets because it is not very popular with international customers, this is highly risky. for the producer since the national flower market has little absorption, which makes the flower companies depend mostly on the behavior of clients from other countries. Among other economic disadvantages is the dependence of some inputs on the price of the dollar, since these are imported, any variation in the exchange rate affects many industries in Colombia and the flower industry is no exception. In addition, most flower growing companies in Colombia are SMEs, this means small or medium-sized companies, therefore, it is difficult for these companies to access financing services such as working capital, bank loans, among others, since they do not have a financial base that supports its activity before the financing entities.

Finally, there is a very particular disadvantage of Colombia, since due to its long history of the war against drugs, normally the products that are exported outside the country, especially to the United States and Europe, are highly attractive for cartels to hide illegal products like drugs, for this reason the Colombian police and army carry out constant controls on the shipments that are supposed to leave the country towards the aforementioned destinations; However, this is highly disadvantageous because flowers are products that cannot remain for long without refrigeration, so the lengthy police checks leave two options, one to pay additional hours in cold rooms at airports or to let the flowers lose their natural characteristics and become less attractive when they reach the final consumer, without a doubt it is a rather worrying scenario for the entities involved in this industry [35].

As explained above, most of the companies that make up the Colombian flower growers' union are SMEs, however, all companies are subject to the advantages and disadvantages of the Colombian agro-industrial sector and over the years these companies have faced the inherent obstacles of operating in an industry of organic products for export purposes and whose turnover and demand is not constant but rather stationary. That is why during the last years it has been possible to identify certain difficulties that must be overcome in order for the flower sector in Colombia to grow to an optimal level in order not only to remain in second place among world exporters, but also to be able to face the direct competitors; This is why the work of Asocolflores has been and will continue to be very important since it has been the entity in charge of directing all the actors involved to unite efforts and achieve all the advances that have been achieved to date and that have allowed Colombia to overcome so many barriers at the international level. In fact, a classification of companies has been made into three types, the utility of 50% of the companies has depended on the efforts of the entrepreneurs and the market conditions such as the exchange rate with respect to the dollar, 30% of the companies have been able to sustain their profits consistently over time and the remaining 20% have had very little economic viability and struggle daily with the difficulties of not being productive enough [35]. Finally, in the flower industry, there will always be challenges to overcome and it will be the job of Asocolflores and the businessmen to find viable ways to continue growing and competing constantly worldwide, with the precedent that Colombia has already overcome various barriers and has already demonstrated its ability to remain competitive.

Labor Impact.

In order to understand the labor and social impact that the flower industry has generated in Colombia, it must first be understood the social phenomena that have occurred in the Colombian agribusiness during the last seventy years. An example of these social phenomena is the legacy of the armed conflict that people who live in rural areas of the country have had to endure and that has unleashed a wave of negative consequences for thousands of families. The armed conflict in Colombia leaves as a result scenarios such as the displacement of peasants from their homes in the countryside to the cities fleeing and in search of safety, the increase in unemployment, the feeling of vulnerability in children and young people who consider joining the ranks of armed groups, the appearance of new criminal groups, school dropouts, family disintegration, of course, the death of innocent people [2].

All these consequences lead to a great impact at the country level, which is basically that progress and economic development slow down; However, the flower sector has not been the exception when suffering from these war scenarios and of course many flower growers have had to face the consequences related to the armed conflict, such as having to abandon productive activities for fear of being involved in a fight that does not belong to them. There are also other socioeconomic factors that affect the flower industry, such as the working conditions of flower growers, the regulations of good social responsibility practices in the country, the vulnerability of women in the agribusiness, labor outsourcing, among other situations that arise in the Colombian labor context.

It is also important to know the profile of the typical Colombian flower grower, in this way many situations of the labor reality in the agricultural sector in Colombia can be analyzed. To begin with, only 27% of employees finished their secondary education, for this reason 94% of employees perform repetitive operational tasks, since they have had little access to academic entities and their opportunities to grow in the industry and occupy other positions is very small, in fact it is known that 53% of employees remain from 3 to 15 years in the same position as operators. Likewise, the fact that 60% of the employees are women stands out, while the vast majority are mothers who are heads of households who see floriculture as a permanent employment opportunity to support their family [2].

However, it is necessary to analyze the labor impact in terms of employment generation generated by this sector of agro-industry. Floriculture generates approximately 140,000 jobs in Colombia, of which 69% are direct jobs and 31% are indirect jobs. As previously mentioned, most flower growing companies are in the Cundinamarca and Antioquia region, therefore the regions where there is the greatest labor impact are these, positively affecting many small or rural communities. As an example of this, the following table of the municipalities in the Antioquia region and the total employment contribution of that specific community is presented.

Municipality	Employment contribution (%)
La Ceja	28%
Carmen de Viboral	26%
Rionegro	19%
La Union	8%
El Retiro	4%
Marinilla	4%
Aberrojal	3%
San Vicente	2%
Guarne	2%
Sonson	1%

Table 12. Percentage corresponding to the contribution of floriculture employment to the municipalities of Antioquia [2].

In Colombia, the agribusiness sector has been characterized in labor terms by the lack of formal contracts for its employees, this means that workers cannot access the pension system or social security. Most employees working in rural sectors that perform agricultural activities do it for the daily profit and they do not have the security of a permanent job that generates monthly income, this generates in Colombia a deficit of manpower where the main affected are the employees and their families, while the level of employment, poverty and halt the progress of Colombian agro-industry increases. However, flower growing in Colombia is the one that generates the greatest number of formal jobs, being an agricultural sector, this phenomenon is due to the intervention of Asocolflores as a union that has ensured that the cultivation and export of flowers in Colombia is seen as a responsible industry with the environment and its workers to earn recognition from customers worldwide.

One of the most frequent labor problems in Colombia is the role of women in the world of work. Many women face the situation in which they must put themselves at the

head of their home and their children. This of course generates a social problem in Colombia since these families enter the long list of families in a situation of vulnerability, which represents additional spending for the state to subsidize basic services such as education, health, among others. Most of the women who find themselves in this situation are not people with higher education and the jobs they can find are quite basic or operational, such as cleaning services or general labor and in most cases, it doesn't exist a formal employment contract, which is known as informal work. The consequence of informal work is that most of the time people work entire 8-hour workdays but with a salary lower than the established legal minimum, as well as the absence of social benefits. In Colombia, even informal work is considered when measuring the level of unemployment in the country.

According to Asocolflores figures, the majority of the country's workforce that works as labor force in the flower industry are women; however, the labor impact generated by floriculture in Colombia is reflected in the fact that the Most of the contracts that are registered in floriculture are formal work contracts, which for the social context of Colombia in terms of agriculture is quite significant and much more so in the agro-industrial area. Asocolflores assures that it contributes to approximately 25% of formal female work in the country, which not only represents a change in the situation of families but is also an indication to measure the level of employment in the country. However, in this industry there are still many challenges to overcome, because although most of the people involved in floriculture activities have stable employment contracts, the agro-industrial sector continues to be very precarious, and job opportunities in general are very scarce. In many cases, floriculture generates health complications for those people who perform these tasks for several years, mainly due to lack of protective equipment or inadequate infrastructure, this phenomenon is known as job insecurity, which is basically a work environment with structural deficiencies for its workers, which is a problem in Colombia since the beginning of the twentieth century by the neoliberal governments that produced the most important social reforms in Colombia in recent decades [36].

Conclusion.

The flower industry is an agribusiness sector that represents an opportunity for different companies that have invested their capital and time in the hope of participating in the world flower market. Flowers are products that are not included as fundamental in household lists, that is, they are luxury goods, which are only frequently purchased by people with greater purchasing power. It is to be expected that the countries with the highest per capita income be those with the highest consumption of flowers per year, here is the great opportunity for companies that bet everything on the export of flowers. This opportunity has been taken advantage of by countries such as the Netherlands, whose history with the cultivation and export of flowers is quite old in the European market, but mainly developing countries such as Colombia, Ecuador, Kenya, among others, that have taken advantage of its socio-political, economic, geographical, and climatic advantages to seize a portion of the flower market in the global context. However, the Netherlands continues to be the world leader in flower exports, since despite the aggressive competition represented by these other countries, the investment in research and development that the Dutch government provides to this industry, added to the extensive distribution network and infrastructure for cultivation, not to mention the renown of Dutch flowers as some of the best in the world, crown this country as the undisputed leader in flower growing worldwide. In fact, practically all the other countries that grow flowers for export depend on Dutch advances to be able to implement them in their respective territory, which represents a great disadvantage for competitors who can't gain the upper hand and must always be chasing Netherlands in this race to gain more market share, hoping to imitate their growth strategies.

Analyzing the main importing countries of flowers, or clients of the flower industry, it is possible to better understand why the Netherlands has been the leader in sales for more than twenty years until today. The flowers with products that are demanded on special dates that are related to Western culture and taking into account that the countries with the highest per capita income are those with the highest annual demand, the Netherlands is practically a neighbor of the main world clients such as Germany, France and UK as well, the Dutch have a history of shipping to America so they have been able to supply the US easily. Because of this, the Netherlands has developed commercial relationships with the main consumers for a long time and, due to its geographical location, distribution is facilitated to the majority of its clients.

Likewise, Colombia has an ideal geography, a perfect climate and a unique diversity that allows the growth of different unique species such as some types of orchids; Colombia has endemic flower species, which makes its products highly desirable and makes it difficult for its competitors to replicate the ideal conditions for the growth of these flowers. For this reason, Colombia has a competitive advantage over its competitors, since the Colombian product is difficult to repeat and over time it has become known for its quality and attractive characteristics, attributing the denomination of origin to three of its high-demand products that certifies them as genuinely Colombian products that have been cultivated under certain conditions and therefore their characteristics are special.

Even so, the efforts of different countries such as Colombia and Ecuador have been strong enough to enter the market approximately in the sixties and remain there in a relatively stable manner. Colombia, more specifically, has stood out from the competition and has been crowned the second largest flower exporter in the world, of course it still depends a lot on the technological advances of the Dutch giant, but it has managed to consolidate its own market and has differentiated itself of the competition, using internal organization and distribution strategies, in addition to taking advantage of the geographical and climatic advantages that it enjoys. One of the great advantages of Colombia in the flower market is that from practically the beginning there has been a union in charge of uniting all the actors involved in the supply chain to facilitate the flow of the product to the final customer. Basically Asocolflores has been the main entity responsible for putting Colombia in the position it is in today, its work has consisted of international relations with clients and competitors to gain a place in the international market, likewise, it created a system that promotes responsible competition among flower growing companies in Colombia, in this way there is no cannibalism but rather collaboration between businessmen so that everyone can enter the market and can stay there. In addition to this, Asocolflores has managed to train national producers in good production practices to maintain the quality of the flowers that today enjoy the denomination of origin that positions them as one of the most beautiful in the world in addition to being cultivated. with labor and environmental responsibility, which has been another of Asocolflores' efforts to show the world the commitment of Colombian flower growers to responsible cultivation.

It is also important to mention that Colombia is a developing country and for this reason its infrastructure often does not have the ideal conditions for transportation and distribution throughout its territory, it has roads in a terrible state that make it difficult to passage of trucks that carry supplies or take products to distribution points, as well as

the lack of technological elements that facilitate interconnectivity and the flow of information, which is a disadvantage when measuring the effectiveness of the supply chain, without mentioning the public order problems that the country has faced during the last fifty years that limit free passage through certain areas of the country and that precisely affect rural areas of Colombia.

In conclusion, Colombia is a country with a lot of economic potential, it has the capacity to produce a wide range of agricultural products since it has the availability of land and the labor capacity necessary to cultivate and export. A great example of this is Colombia's resounding success in exporting coffee to the entire world; This success is comparable to the flower industry. During the years that the flower industry has been active in the country, it has played a satisfactory role that allowed it to grow over time, overcoming political and economic obstacles characteristic of Colombia. This is a success story for the Colombian industry, since it often happens that an industry starts but quickly disappears due to lack of resilience; However, thanks to the work of flower growers and Asocolflores, this has not been the case of floriculture, which today is a strongly consolidated industry, where the majority of those involved work for mutual growth and not their own. generating a wave of collaboration and strategy that has given them that resilience that is so needed to survive in such a competitive market. Also the flower industry in Colombia represents a great economic contribution to the country and is a way of publicizing Colombian products, disassociating the country from its history with drug trafficking, even so, flower growing in Colombia faces many challenges but has enough possibilities of continuing to grow, with the intervention of Asocolflores and the support of the national government, floriculture can become one of the sectors that contributes the most to the national GDP and can mean a change to Colombia's dependence on oil exports. On the other hand, floriculture has shown that it can generate enough decent jobs for many people with low education and represents an opportunity to empower many mothers who are heads of household in the country. Without a doubt, Colombia is a country with great potential for economic growth and growth in their existing industries.

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