



Ministry of Foreign Affairs

# *Water Logistics and Transportation Final Report*

*Commissioned by the Netherlands Enterprise Agency*

*>> Sustainable. Agricultural. Innovative.  
International.*



# Water Logistics & Transportation



River Navigation  
Harbor Development  
Maritime Technologies

## Executive Summary

In preparation for a trade mission to Colombia in November 2018, organized by the Dutch Enterprise Agency, this report aims to provide insights into the challenges and opportunities for Dutch companies in Colombia's water logistics and transportation sector. More specifically, this report focuses on the sub sectors river navigation, harbor development and maritime technologies.

In Colombia, economic growth and increased trade have fueled the need for an effective (water) logistics and transportation network within the country. Poor connection between Colombia's main production and consumption centers in the interior of the country and major ports along the Caribbean and Pacific coast lead to a mere 1.5 percent of freight being transported under a multimodal scheme. Navigability issues of the country's key inland waterways such as the Magdalena river are one reason for this.

Moreover, the country's main ports at Cartagena, Barranquilla, Santa Marta and Buenaventura are in need of port expansion in order to be able to handle bigger ships and increase cargo throughput. Planned access channel improvements for instance create a demand for dredging activities and specialized equipment. Additionally, big data systems are still lacking in most ports as well as in river navigation and could increase efficiency of entire logistic supply chains within the country.

Flooding issues as a consequence of coastal erosion, poor flood protection along Colombia's rivers and lack of rainwater drainage systems pose a need for improvement as well.

Aforesaid challenges lead to an increased demand for private companies specialized in the water logistics and transportation sector. With their expertise in sustainable port and river development, hydraulics and dredging, integrated water management, flood protection and shipbuilding, Dutch companies can provide solutions for significantly improving Colombia's water logistics and transportation sector. Existing cooperation between the Netherlands and Colombia through the *Colombian-Dutch Alliance for Water* has already strengthened the relationships between both sides in regard to the sector.

Furthermore, a positive sector outlook in Colombia due to increased government initiatives regarding national infrastructure development and sustainability will pose multiple opportunities for growth in water logistics and transportation. The focus will continue to be on sustainability and innovation, whereby trends such as digitalization and automation will play a leading role as well.

Considering the positive sector outlook and by seizing the opportunities presented above, the Colombian water logistics and transportation sector it thus a lucrative sector for Dutch companies to develop projects in. Nonetheless, certain challenges such as corruption, security issues and cultural differences also need to be considered by Dutch companies before taking on projects in Colombia.

Therefore, it can be concluded that it will be strongly recommendable for Dutch companies to enter the Colombian water logistics and transportation sector. By combining the Dutch expertise in the sector with opportunities presented in Colombia, a successful business relationship can arise between both sides.

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## Introduction

### Purpose and Scope

In November 2018, a trade mission to Colombia for Dutch companies, organized by the Dutch Enterprise Agency and Dutch Embassy in Bogotá on behalf of the Dutch Ministry of Foreign Affairs will take place. The mission will be in the presence of Dutch Prime Minister Mark Rutte, the Dutch Minister of Agriculture, Nature and Food Quality, Dutch Minister of Medical Care and Sport, Curaçao's Minister of Economic Development and Aruban Minister of Finance, Economic Affairs and Culture. Throughout the mission, Dutch companies will have the opportunity to explore business opportunities in the Colombian market, more specifically in four different sectors, one of which being water and logistics ("Handelsmissie").



Netherlands Enterprise Agency

In line with said trade mission, the purpose of this report is to provide insights into the Colombian water logistics and transportation sector and present business opportunities for Dutch companies, specialized in this sector, in Colombia. The report thus aims to paint a full picture of the developments, challenges and opportunities in the Colombian water logistics and transportation sector. More specifically, it will focus on the following three sub sectors within the water logistics and transportation sector:

- Harbor development
- River navigation
- Maritime technologies

### Structure

This report is structured as follows. First, chapter one "PESTEL analysis" will provide a general overview of macroeconomic conditions in Colombia, relevant to Dutch companies active in the sector. Based on the insights gained in the first chapter, the following will provide an in-depth analysis of each of the three sub sectors, starting with chapter two "Sub sector: Harbor development", then moving on to chapter three "Sub sector: River navigation", followed by chapter four "Maritime technology". Moreover, each sector overview includes a 'Porter's five forces' analysis of the competitive environment Dutch companies will be faced with in each sub sector. Next, chapter five "Consolidated SWOT Analysis" serves to sum up insights gained from previous chapters through the use of a SWOT matrix, presenting sector specific opportunities as well as challenges for Dutch companies in Colombia.

Chapter six "Golden triangle corporation approach" then provides a graphical overview of the potential cooperation between Dutch companies, knowledge institutes and governmental institutions in entering the Colombian market, followed by chapter seven "Business Model Canvas". Chapter eight "Sector Trends" and chapter nine "Sector Forecast" then present both sector specific trends and based on these a five-year forecast for the water logistics and transportation sector in Colombia.

Lastly, chapter ten "Conclusions" serves to sum up the most important insights presented throughout the report. Based on aforesaid conclusions, chapter eleven "Recommendations" provides final recommendations to Dutch companies active in the sector, aiming to enter the Colombian market.

## 1. PESTEL analysis

In order to understand how the Colombian macroenvironment affects companies aiming to do business in the country, the following PESTEL analysis will provide an overview of ways Colombia's political, economic, sociocultural, ecological and legal environment affects business in the water logistics and transportation sector.

### 1.1 Political environment

#### Safety

The 2016 peace deal with the Revolutionary Armed Forces of Colombia (FARC) led to less violence and more stability within Colombia. This has made it safer to do business in the country but some (rural) areas are still troubled where rebel groups, either former FARC members disagreeing with the peace agreement or other guerilla groups such as the National Liberation Army (ELN) are still causing violence. The map to the right provides an overview of areas remaining under FARC and ELN influence. Most areas along the Pacific coast are still under the influence of guerilla groups, which should be considered when aiming to do business there (i.e. port of Buenaventura and Tumaco). Colombia's Caribbean coast however is mostly under the control of the Colombian government (e.g. Port of Barranquilla, Cartagena, Santa Marta) and thus less risky for doing business.



Figure 1- Map showing areas of guerilla influence in Colombia (Source: Aljazeera)

#### National Development

In the National Development Plan 2014-2018, the Colombian government has made infrastructural development of the country a top priority. Investments in infrastructure have been and will continue to be made, governed by the Public Private Partnership law (PPP). This includes investments in projects such as road, railway, river and port development ("Doing Business"). Such initiatives include:

- The **2014 Fourth Generation (4G) program**: aims to increase road infrastructure in order to decrease travel times between Colombia's cities.
- The '**CONPES directive**' for port expansion set in place by the National Council for Economic and Social Policy: aims to modernize Colombia's ports and in order to make them more competitive. This includes the expansion of port access channels (e.g. in ports of Barranquilla, Cartagena, Buenaventura), prioritized by Colombia's National Infrastructure Agency (ANI) as well as the development of port terminals in 17 ports (e.g. Barranquilla, Cartagena, Buenaventura) out of which 3 were already approved by



October 2017 (“Colombia Studying”). An example of a Dutch company involved is APM Terminals which has opened an upgraded container terminal in the port of Cartagena in a joint venture with a Colombian port operator (“What’s New”).

- The ‘**Colombia Plan Maestro Fluvial**’: aims to develop Colombia’s inland waterways. Dutch companies have already been involved in such projects, such as Royal HaskoningDHV which was contracted in 2013 for the development of Canal del Dique (“Ministers”). Alongside HaskoningDHV, the Dutch water knowledge institute Deltares was also involved. Another project in this regard is the Magdalena River Waterway PPP, carried out mainly by the Brazilian company Odebrecht S.A. However, corruption scandals lead to difficulties in the completion of the project, as further elaborated on in the following paragraphs. The project aims to increase the navigability of the Magdalena river, Colombia’s key inland waterway. The Magdalena river is the largest river in the country and accounts for 45 percent of inland cargo movement as it is linking Colombia’s Caribbean ports (e.g. Barranquilla, Cartagena) to economic centers in the interior of the country such as Bogotá (Bernal Melgarejo).

According to ProColombia, in the ten-year period from 2007 until 2017, different countries have already invested in Colombia’s logistics and transportation industry in a total of fifty-four projects. An example is the Chinese investment in a center of economic activities (CAEB) in Buenaventura, including road and other infrastructure improvements. Throughout this report, further foreign investments will be mentioned regarding each sub sector.

Thus, infrastructure has evolved significantly over the past decade but there is still a strong need for improvement, posing an opportunity for companies specialized in the (water) logistics and transportation sector. The following map provides an overview of planned road construction and improvement by 2021.



Figure 2- Map showing planned road construction and improvement by 2021 (Source: Stratfor)

## Corruption

Furthermore, for companies aiming to enter the Colombian market it is important to be aware of the fact that in Colombia, corruption is still present on bureaucratic levels. According to a survey by the World Economic Forum in 2016, corruption was named as the second most problematic factor when doing business in Colombia (Schwab et al.). Corruption can delay operations significantly. Obtaining permits and other important documents may thus take a significant amount of time. This can be seen as a major barrier for those wishing to invest in the sector water logistics and transportation as these are generally large long-term projects, involving large sums of money.

The Odebrecht scandal in early 2017 can serve as an example for a corruption case in the sector. Odebrecht S.A., a Brazilian construction company, was the main contractor in a consortium to increase the navigability of Colombia's Magdalena river through dredging activities. Contracts were signed in 2014 and construction was scheduled to begin in 2016. However, after Odebrecht had been accused of bribery across many Latin American countries in order to secure contracts, the company's financing for the project was revoked by the funding bank. Consequently, Odebrecht was no longer able to provide project funding, leading to the termination of the construction contract by the Colombian government in early 2017 ("Colombia to"). It was estimated that Odebrecht had paid up to 27 million Euros of

bribes in Colombia, also being accused of making illegal payments in Colombia’s 2010 election campaign. The company has since admitted to the bribery accusations and a number of involved officials have been imprisoned by the Colombian government (“Brazil’s”). This example shows the reality of corruption on bureaucratic levels in Colombia in the specific sector, as an attempt to secure contracts and speed up operations.

## 1.2 Economic and Infrastructure environment

### Infrastructure

Most economic activity in Colombia is taking place in and around the big cities (i.e. Bogotá, Medellín, Cali). Infrastructure within these cities is significantly more developed than in rural areas. However, there is a lack of sufficient access from the big cities (i.e. Bogotá, Medellín, Cali) in the heart of the country to Colombia’s ports, especially along the Pacific coast (e.g. Buenaventura). Certain geographical characteristics described in the sub section “Ecological environment” are the main reason for this. This makes transportation of goods within the country a time-consuming process as can be seen in the following map. Transporting cargo from Bogotá to one of Colombia’s ports can thus be more than twice as expensive as shipping the same cargo from one of the country’s ports to Asia (“Colombia”). Please see the following paragraphs for further differentiation between different types of transport.

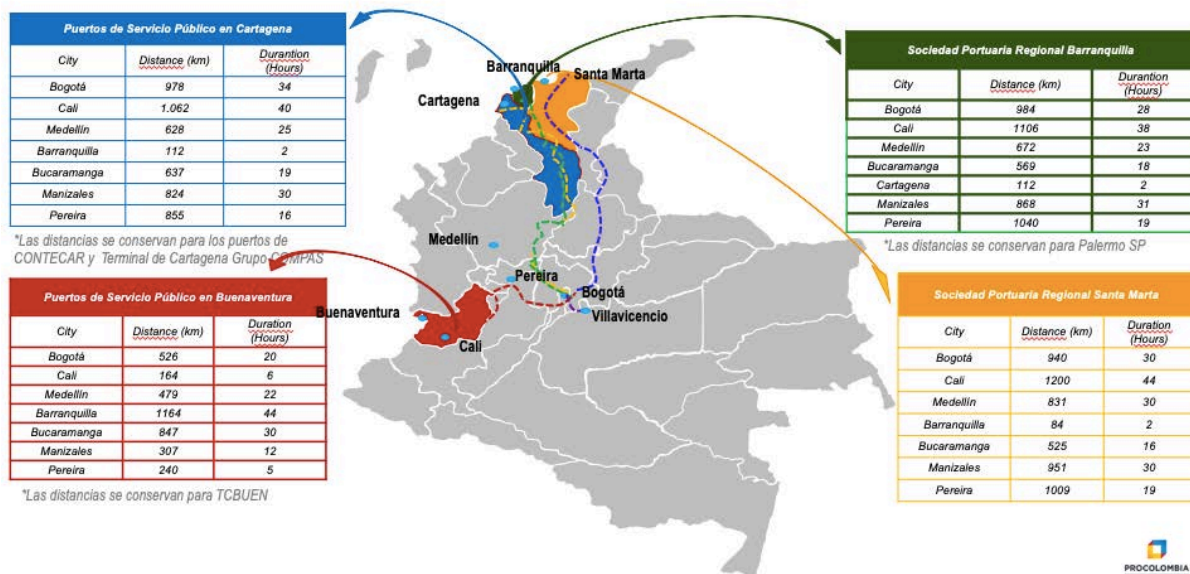


Figure 3- Map showing transportation distances and travel duration between major ports and cities (Source: ProColombia)

Overall infrastructure in Colombia is ranked as weak by the World Economic Forum. The following shows a ranking of different infrastructure segments in Colombia according to the 2016-2017 Global Competitiveness Report by the World Economic Forum (Schwab et al.). One can see that railroad and road infrastructure are still very much underdeveloped, while port and air transport infrastructure are ranked as slightly more developed.

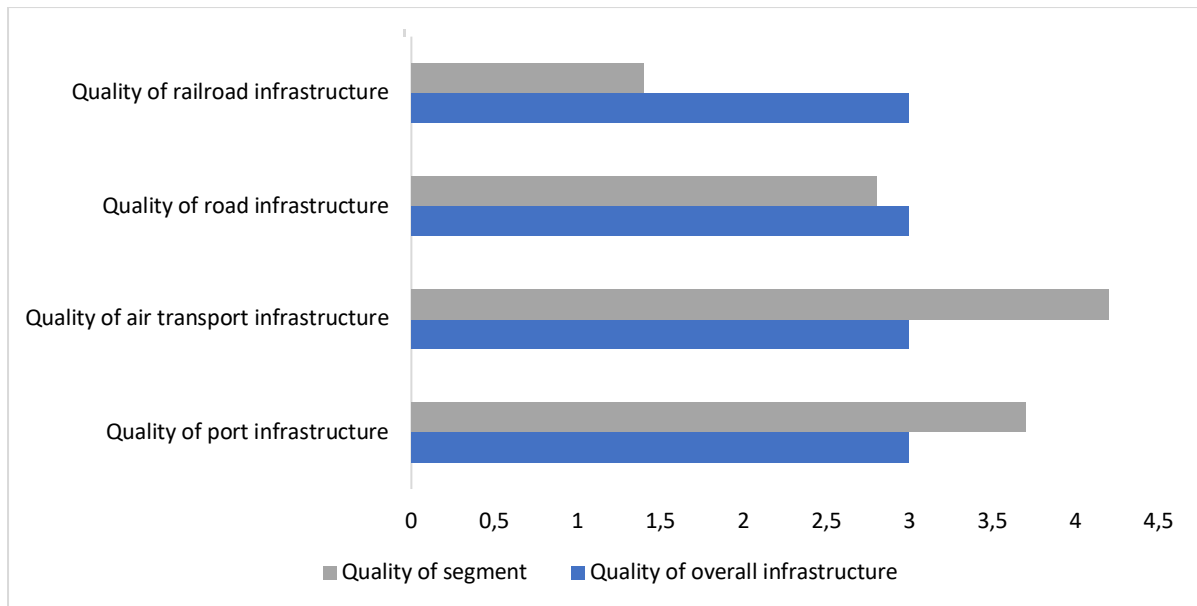


Figure 4- Quality of infrastructure in Colombia by segment (value 1= extremely undeveloped, 7= completely efficient by international standards) Source: World Economic Forum

**Port infrastructure** is mostly used for international freight of raw materials coming in large quantities such as bulk cargo (e.g. coal), liquid cargo (e.g. petroleum) and containerized cargo. Please see chapter 2 “Sub sector: Harbor development” for further description of Colombia’s major ports and types of cargo handled at each port.

**Air transport** is used for transporting smaller quantities of lighter goods which have to be mobilized in a quick manner. Examples are horticultural products such as roses, which are produced in Colombia and typically shipped to countries like the US in refrigerated planes (Haragan). Such horticultural or agricultural products have to be shipped fast in order to remain fresh, such as tomatoes and avocados. Air transport is the fastest, yet costliest type of transport. The country’s biggest international airports are:

- Bogotá: El Dorado International Airport (BOG)
- Medellín: Jose Maria Cordova Airport (MDE)
- Cartagena: Rafael Núñez International Airport (CTG)
- Cali: Alfonso Bonilla Aragon International Airport (CLO)
- Barranquilla: Ernesto Cortissoz International Airport (BAQ)
- Santa Marta: Simón Bolívar International Airport (SMR)

The majority of existing **railroad infrastructure** in Colombia is not in operation due to the fact that the quality of railroad infrastructure is very poor and outdated, as can be seen in the figure above. This is mainly due to the fact that rail systems in Colombia are much narrower than in the rest of the world and thus only suitable for mid-twentieth century trains (“Colombia Railway”). The last few rail lines in operation can be found mainly in the North of the country and are used specifically for transporting coal to the Caribbean coast, such as from Chiriguaná to Santa Marta (see map below). The majority of these lines are owned by the rail concession Fencoco S.A., with one privately owned line used for coal transport between the Cerrejón mine and Colombia’s Caribbean port Puerto Bolivar (see map below).

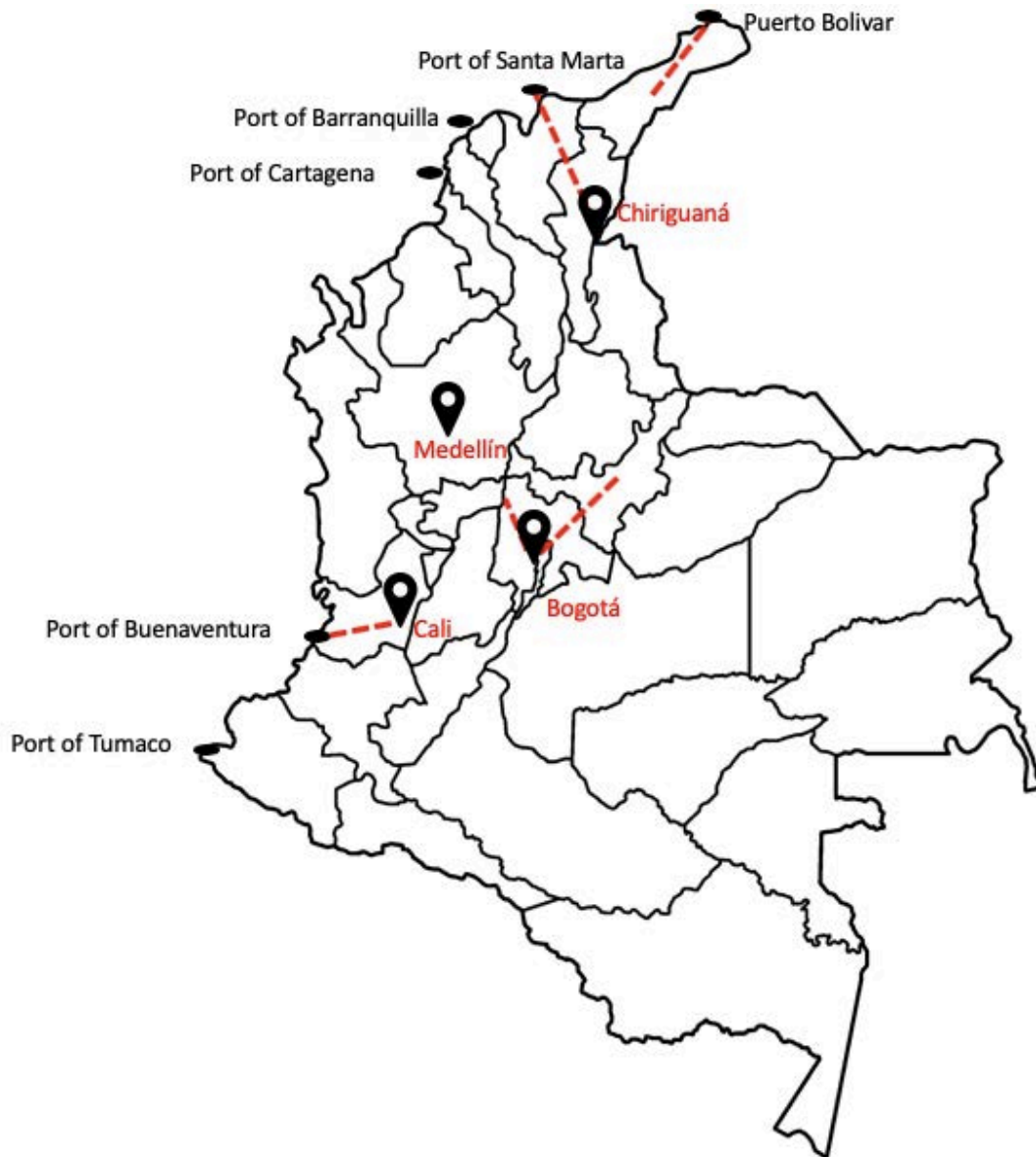


Figure 5- Map showing Colombian railways in operation

**Road infrastructure** accounts for over 90 percent of freight movement within Colombia (“Transport”) and is used by the majority of companies for transporting goods for instance between ports and production centers. Yet, road transport is the most time-consuming mode of transport within the country due to Colombia’s weak road infrastructure described before (“Transportation”).

The following map provides an overview regarding the quality of infrastructure in different parts of the country.

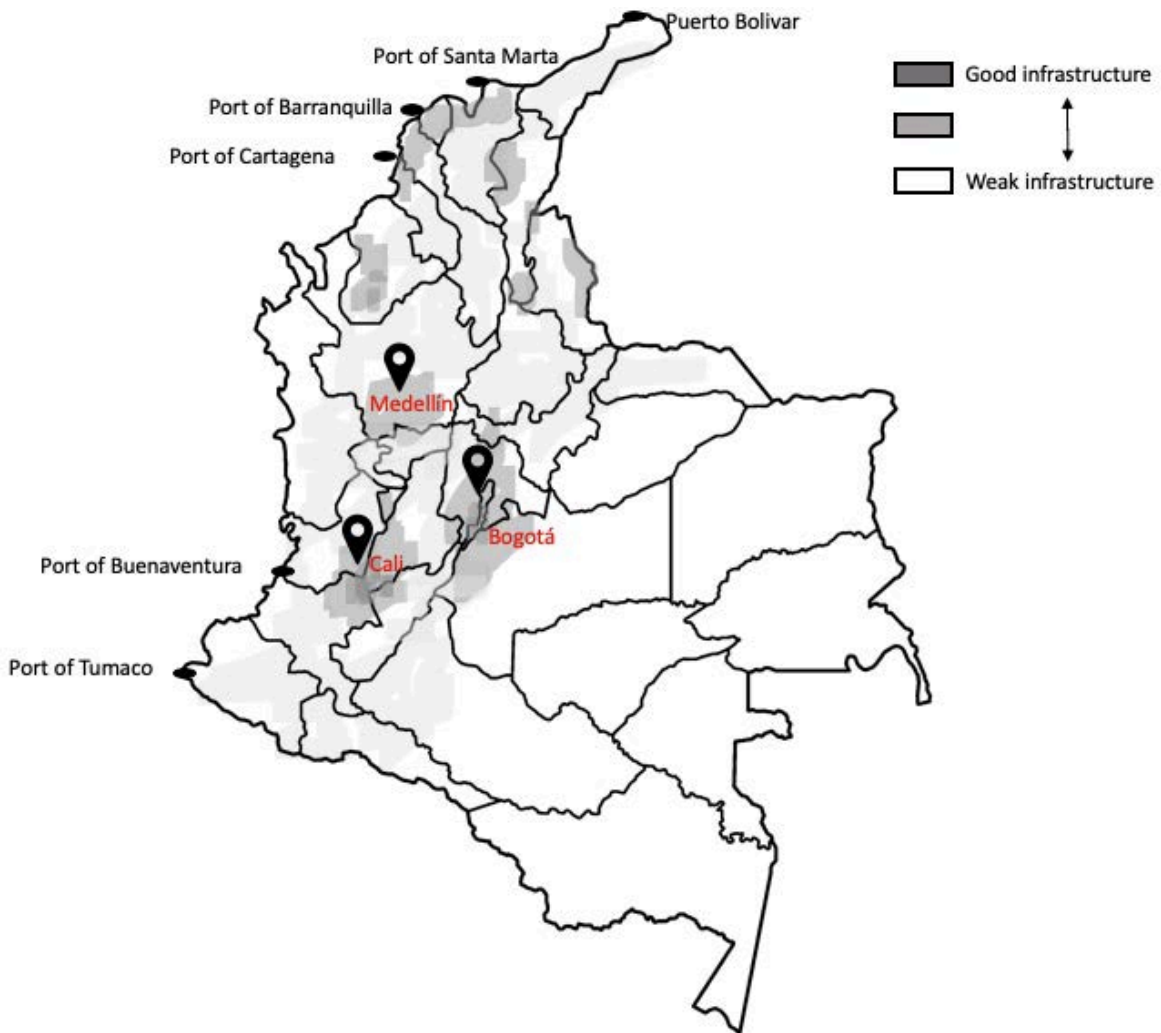


Figure 6- Map showing the quality of infrastructure in different parts of Colombia

### Free Trade Zones

Free Trade Zones (henceforth FTZs) in Colombia play an important role to companies active in water logistics and transportation, aiming to do business in the country. Colombia has a number of permanent FTZs, in which companies can benefit from reduced income tax rates (15% instead of 32%) and customs tax/tariff exemptions on imported goods. In addition, exporters can take advantage of Colombian trade agreements when doing business in one of Colombia's FTZs (Thompson). Within the FTZs, Dutch companies in the water logistics and transportation sector can thus benefit from Colombia's free trade agreement with the European Union, for instance when importing machinery or other equipment needed for operations. As can be seen in the following map, some FTZs of relevance to Dutch companies active in the sector are Cartagena (Bolívar) and Barranquilla (Atlántico), as these for instance include the port of Cartagena, Canal del Dique and port of Barranquilla.

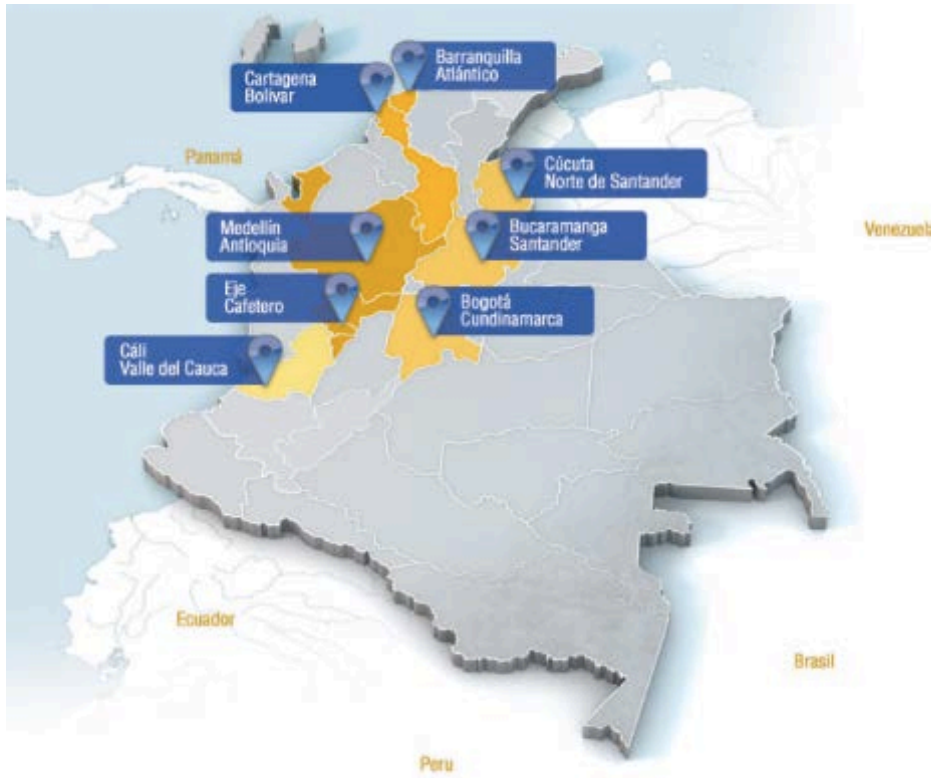


Figure 7- Map showing permanent FTZs in Colombia (Source: ProColombia)

According to ProColombia, when aiming to set up a business in one of Colombia’s Multi-company FTZs, there are certain requirements to be met regarding sum of total assets, extent of the investment and number of direct employees (“Permanent”). The specific requirements can be seen in the table below.

TOTAL ASSETS (USD)	INVESTMET (IN MILLION USD)	DIRECT EMPLOYMENT
0 – 130.207	0	7
130.207 – 1,3 Millions	260,414	20
1,3 Millions – 7,8 Millions	1.3 millions	30
More than 7,8 Millions	3 millions	50

Table 1- Table showing Multi-company FTZ requirements (Source: ProColombia)

Companies can also apply for setting up a single enterprise FTZ anywhere within the country, provided that they follow sector specific investment and employment requirements. Taking the port sector as an example, the investment must be at least 39.1 Million USD and has to create at least 20 direct and 50 indirect jobs in order to qualify for a single enterprise FTZ, according to ProColombia (“Single”).

Therefore, it depends on the desired location, amount of assets and investment as well as number of jobs created for a Dutch company active in the water logistics and transportation sector to qualify for a business establishment in a permanent FTZ or a single enterprise FTZ.

### 1.3 Sociocultural environment

#### Urbanization

Urbanization also affects transportation and logistics in Colombia, with the country's population being clustered in and around the big cities such as Bogotá, Medellín or Cali. Currently, Colombia's urban population makes up for 80.8 percent of the total population. Even though transport infrastructure is generally more developed in these urban areas, e.g. roads, this infrastructure was built to suit much smaller population sizes. It is thus not able to accommodate the high amounts of traffic arising from a growing urban population, according to a study by the Development Bank of Latin America. This leads to high traffic congestion, increasing travel times within and around the cities significantly (Akbar and Gilles). Therefore, there is a need to elevate this transportation bottleneck, for instance by further development and provision of road infrastructure within and around these highly populated urban centers.

The following map provides an overview of the country's areas with the highest population density. One can see that most people live along the northern coastline and especially in the center of the country, where the country's biggest cities and thus economic centers are located. The south and east are sparsely populated yet making up around 60 percent of the country ("The World"). As mentioned before, transportation and logistical infrastructure to connect urban centers is still lacking, posing an opportunity for companies specialized in the (water) logistics and transportation sector.

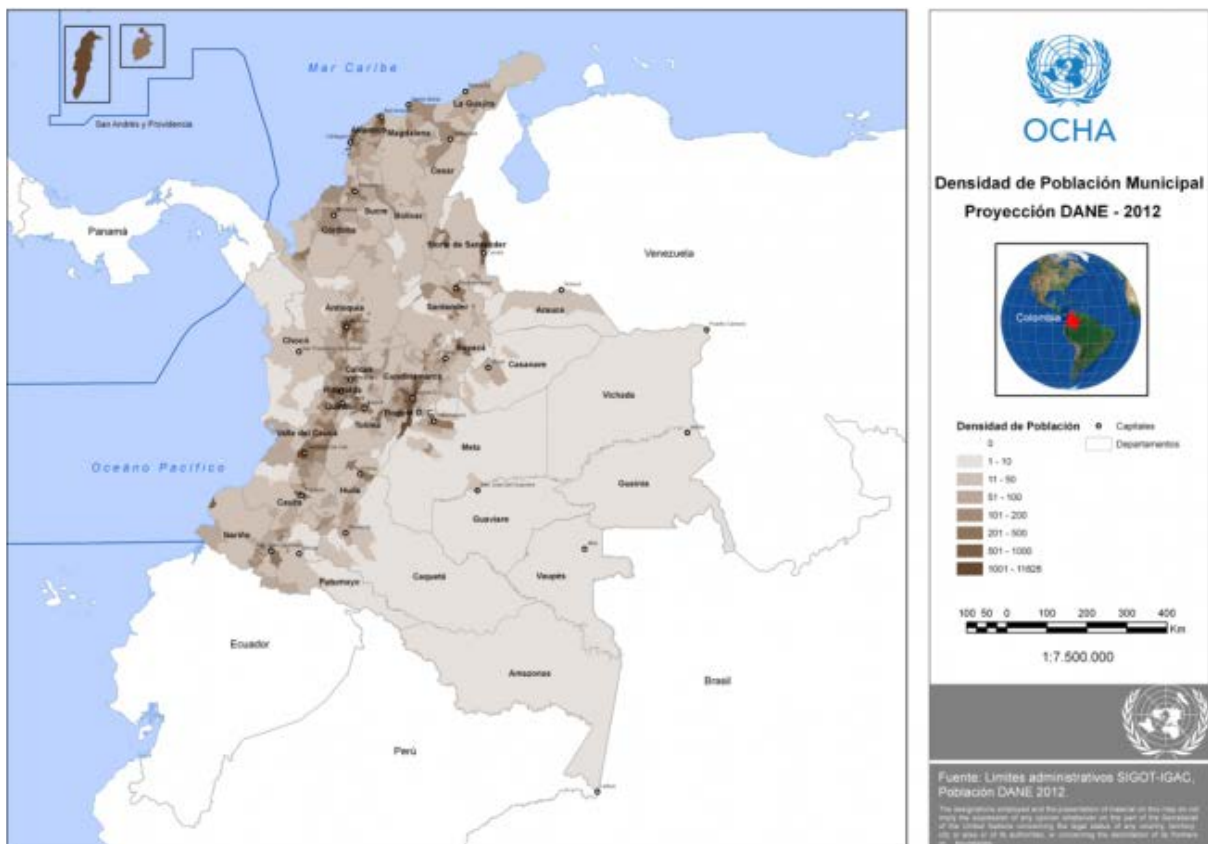


Figure 8- Map showing population density in different areas of Colombia (Source: Reliefweb/DANE)



## Business culture

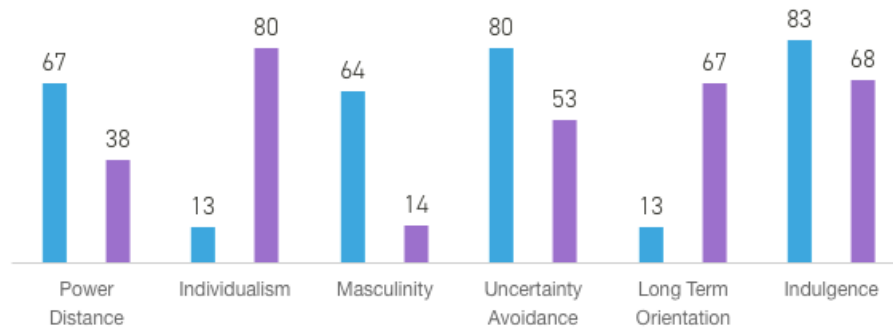


Figure 9- Hofstede's 6 dimensions: comparison between Colombia (blue) and the Netherlands (purple) (Source: Hofstede Insights)

When comparing Colombia and the Netherlands according to Hofstede's six dimensions, both countries are ranked quite differently in a number of dimensions, as can be seen in the figure above. When doing business in Colombia, it will be advisable to take a look at these differences in order to avoid potential cultural misunderstandings and make the most out of business connections with Colombian partners.

Networks and the right connections for instance play an important role in the Colombian business life, as shown by the country's low score in individualism. Established relationships are the backbone for trust in the other party. In comparison, the Dutch are more task oriented rather than relationship oriented when it comes to doing business. Moreover, hierarchy in Colombian organizations is much stricter as implied by a high score in power distance, whereas Dutch organizations are typically flat ("Colombian Culture Business"). When doing business in Colombia, it is thus advisable to take time in getting to know Colombian business partners before doing business together and moving towards the task at hand. Moreover, creating a network of business connections can be key in establishing oneself successfully in the Colombian business world. It also has to be considered that decision making processes in Colombia can take much longer, due to hierarchical organization structures.

Additionally, Colombians are less consensus-oriented when making decisions, as implied by the high score in masculinity. Uncertainties also tend to be avoided and change is often seen with skepticism. Colombia is also significantly less long-term oriented than the Netherlands, which becomes apparent in business, whereby the focus lays more on short-term results rather than the distant future ("Country Comparison"). Due to the characteristics of the water logistics and transportation sector, with projects typically carried out over a longer time frame, this short-term orientation can thus become an obstacle. Therefore, it may be advisable to involve a Dutch manager in the project who can maintain a long-term focus.

## Language

Spanish is the official language spoken in Colombia. According to the EF English Proficiency Index, English proficiency in Colombia is low with a score of 49,97, whereas in the Netherlands it is very high with a score of 71.45 ("EF"). Therefore, when doing business in Colombia, having a certain level of Spanish skills is advisable. Otherwise involving a translator can be another option to avoid potential language barriers.

## 1.4 Technological environment

Global technological trends in the water transportation and logistics sector over recent years include the implementation 'Big Data' systems such as Electronic Data Exchange (EDI) systems, in order to improve coordination between different logistical parties in a supply chain. In the harbor development sub sector for instance, EDI systems can lead to improved information flow regarding cargo movements and thus decrease lead times ("EDI").

EDI systems are already offered by certain Colombian companies such as Group Seres, whose systems have been implemented by multinational logistical companies such as DHL or TNT in Colombia ("Clientes").

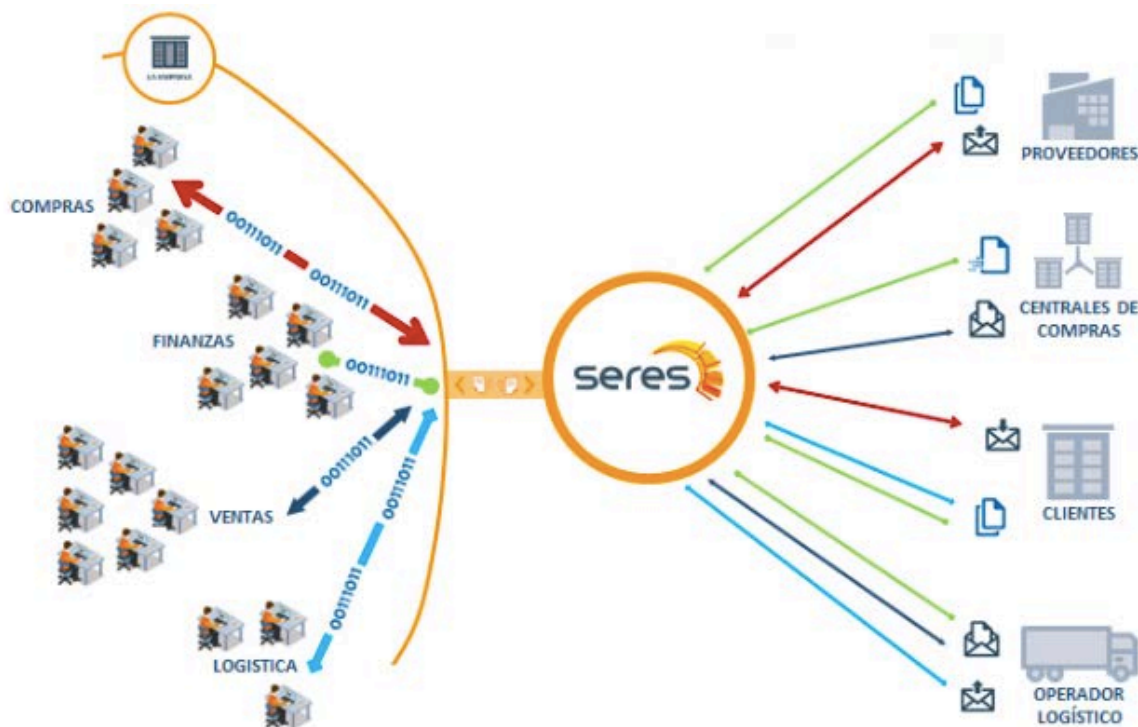


Figure 10- EDI system by Colombian company Group Seres (Source: Group Seres)

Moreover, according to World Port Source, the port of Cartagena is already making use of the software tool SPROnline. The system is accessible to all logistical parties involved in cargo movement and simplifies the exchange of information and processing of documents in order to make port operations more efficient ("Port of Cartagena"). However, EDI systems are still not implemented to a large extent in many ports, as well as in river navigation. This poses a big opportunity for Dutch companies specialized in this field in the Colombian water transportation and logistics sector.

The Dutch container terminal operator APM Terminals, already active in Colombia in the ports of Cartagena and Buenaventura has recently announced the launch of its new 'Global Core Competency Centre' (GC3). The initiative will include training employees in new port technologies such as Terminal Operating Systems (TOS), Wireless Fleet Management systems (WFMS) and Application Development (AD) - IT support systems to make terminal operation more efficient ("APM"). It can be assumed that these new technologies will soon be applied in APM's Cartagena and Buenaventura terminals.

## 1.5 Ecological environment

### Sustainable Development Goals

In 2015, along with many other United Nation member states, Colombia has made a commitment to achieve the UN's 17



Sustainable Development Goals by 2030. This goes in line with Colombia's recent membership in the OECD in May 2018. In order to become an OECD member state, the country committed to a specific roadmap of internal developments in order to reach OECD best practices ("OECD Sets"). This included the commitment to the UN's SDGs, whereby countries' performances on reaching said goals are monitored by the OECD ("OECD"). In order to comply with its responsibilities as an OECD member, it is thus of high importance for Colombia to stick to its commitments by actively working on fulfilling the SDGs by 2030. Two goals in particular are important to be aware of when looking at the Water Logistics and Transportation sector:

- **SDG 9: "Industry, Innovation and Infrastructure - Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation" ("Goal 9").** The Colombian National Development plan already described in sub section "Political environment" is an example of how the country is aiming to achieve said goal. Dutch companies can contribute to achieve this goal by developing reliable, sustainable and resilient quality infrastructure and transportation to support economic development and human well-being in Colombia, increasing the participation of the transport and logistics industry in the employment sector and in the Colombian GDP. Another way of working towards this goal in the water logistics and transport sector is by helping to modernize the infrastructure and rehabilitate certain industries, trying to make them sustainable by increasing their efficiency in resource use and by adopting new and environmentally friendly technologies (United Nations).
- The icon for Sustainable Development Goal 9, featuring the number 9 in a white circle on an orange background, with the text "INDUSTRY, INNOVATION AND INFRASTRUCTURE" and a graphic of three interlocking cubes.
- **SDG 14: "Life below water - Conserve and sustainably use the oceans, seas and marine resources for sustainable development" ("Goal 14").** Looking at the relation of this SDG to the sector, it is important to be aware that harbor and river development, as well as maritime technologies can often negatively affect local marine ecosystems. Therefore, when looking at the future development of water logistics and transportation in Colombia, it will be important to conserve marine ecosystems, such as coral reefs and fish species in order to comply with this SDG. Dutch companies are well skilled and have the highest technology in this field to provide equipment and improve the infrastructure of the water logistics and transportation sector without harming the marine environment. Therefore, Dutch companies can contribute to achieving SDG 14 by making sustainable development a key factor of the investment and encouraging and creating mechanisms for the sustainable use of marine resources (United Nations).
- The icon for Sustainable Development Goal 14, featuring the number 14 in a white circle on a blue background, with the text "LIFE BELOW WATER" and a graphic of a white fish swimming above three wavy lines representing water.

Because Colombia has committed to reach said goals by 2030, investments in sustainable infrastructure are needed to be able to fulfill them. For the Water Logistics and Transportation sector this need for sustainable (marine) infrastructure poses an important opportunity for companies specialized in this field, especially regarding a “Build with Nature” approach. For more information regarding the United Nations SDG’s please visit the website: <https://sustainabledevelopment.un.org/sdgs>

### Geography

Colombia’s rough geography remains a bottleneck for logistics and transportation. The country is divided by the Andes mountains range and Amazonian rainforest which are acting as natural barriers regarding transportation and movement of goods within the country. This poses a challenge for road or railway development in these areas. Moreover, the River Magdalena is one of the only waterways connecting most of the country, yet it is still not fully navigable between Barrancabermeja to Puerto Salgar or at Canal del Dique (Salin et al.). Please see chapter 3 “Sub sector: River navigation”, sub section “Magdalena river” for more information regarding this aspect, as well as a map showing navigable parts of the river.



Figure 11- Map showing Andes mountain range (Source: Climates To Travel)

Overall, these geographical characteristics are one of the main reasons for the weak infrastructural connections across Colombia, already described.

### Weather conditions

Challenging weather conditions also greatly affect the transportation and logistics sector in Colombia. The ‘El Niño’ phenomenon leads to long rainy seasons causing floods, landslides, roadblocks, etc. This phenomenon is affecting the entire country however, the following map provides an overview of the areas of highest precipitation in the country. One can see that cities along the Pacific coast suffer from the highest precipitation rates. An example is Buenaventura, one of the rainiest cities in the country, where heavy rainfalls often cause operations in and around the city to be shut down temporarily (Salin et al.).

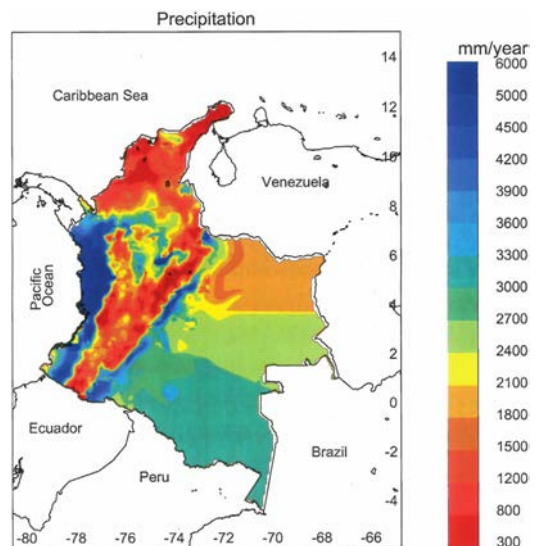


Figure 12- Map showing annual precipitation in Colombia (Source: ResearchGate)

Moreover, many cities such as Barranquilla are still lacking rainwater drainage systems causing severe streams of rainwater to flood the cities and leading to destruction of roads and other infrastructure, as well as posing a danger to people’s lives (Wightman et al.). Landslides are another consequence of heavy rainfalls. In May 2018, mountain landslides along the Cauca river caused damage on construction activities at the Hidroituango dam,

blocking tunnels under construction and flooding turbine rooms. This caused severe flash floods in the area with hundreds of local people losing their home (Bedoya et al.). These examples show how heavy rainfalls and their consequences can challenge operations in Colombia significantly. Companies aiming to do business in the country, for instance along Colombia's Pacific coast should thus be aware of these weather challenges. At the same time, this poses an opportunity for Dutch companies regarding the development of infrastructure more resistant to the country's heavy rainfalls and flood protection projects.



Figure 13- Landslide at Medellín-Bogotá highway in 2016  
(Source: eNCA)



Figure 14- Water streams flooding Barranquilla and turning the streets into turbulent rivers (Source: El Espectador)

## 1.6 Legal environment

It is important for foreign companies entering Colombia to know how to legally register their foreign direct investment. Since 1990, Colombia has started with the liberalization of reforms regarding national treatments of foreign investors. National investors have the same investment restrictions as foreign investors. Registration at the Superintendence of Corporations and the local chamber of commerce is necessary for companies, as well as the registration of any foreign investment with the Colombian Central Bank. Besides this, investors have to provide information on any changes to the investment. The circumstances are equal for foreign parties, however national parties or ones with national capital are often preferred ("2015 Investment").

Dutch Companies can start working directly with Colombian port and river concessions for new technology and harbor/river development or directly with the government and Colombian companies. But having a local intermediary (e.g. a local agent, representative, lawyer or consultant) can be very useful and make things easier. These intermediaries already know local regulations and how to deal with business negotiations. Since Colombians prefer to do business with people they know and trust, having a Colombian consultant helping the negotiation can make things faster. Therefore, third-party contacts can be very important to the business success. An example of a local maritime agency in Colombia is Seaport S.A., working with both national and international clients. The company has offices in all major port cities, i.e. in Barranquilla, Santa Marta, Cartagena and Buenaventura ("Seaport").

## 2. Sub sector: Harbor development

Colombia has ports on both the Caribbean and Pacific coast. The country's biggest ports include Barranquilla, Cartagena and Santa Marta (Caribbean coast) and Buenaventura and Tumaco (Pacific coast). The following will provide an overview of each major port.

### 2.1 Port of Barranquilla



Figure 15- Port of Barranquilla (Source: Puerto de Barranquilla)

The port of Barranquilla is Colombia's biggest port along the Caribbean coast. Unlike all other major ports which are sea ports, it is situated along the Magdalena River and is thus a riverine port. Logistically, this poses a big advantage as the Magdalena river is the country's main inland transportation channel. Please see chapter 3 "Sub sector: River Navigation", sub section "Magdalena River" for further information regarding the potential of increasing the river's navigability. Many exporting companies have thus established themselves in Barranquilla and the city has been booming in recent years, especially due to its industry (Moss).

The port handles 14 percent of Colombia's total exports and imports. It is one of the country's top export destinations to the US and Europe. In 2015, 65 percent of shipments processed were imports and 30.5 percent were exports. The port mainly handles grain shipments to supply the close by poultry production region of Santander (Salin et al.). In total, grain shipments account for 41 percent of total throughput, container shipments account for 25 percent followed by loose cargo (19%) and coke fuel (15%).

Moreover, it is Colombia's major port for storing fish, chicken and pork due to its efficient refrigerated storage facilities (Moss).

Ongoing projects include the deepening of port access channels to allow bigger ships to enter the port. In the process of building Barranquilla's new Pumarejo Bridge for instance, access channel depth was reduced. Therefore, dredging activities are planned to make the affected access channel deeper again after the expected completion of the bridge by May 2019 ("May 2019", Moss).

Other plans include the implementation of process automation technologies, increased port security and re-surfacing activities of surrounding roads. Out of 128 planned infrastructural projects, 68 have already been carried out within a year, according to the vice president of Sociedad Portuaria Regional de Barranquilla (Moss).

The Dutch company Vopak N.V. has already opened a terminal at the port of Barranquilla, specialized in liquid bulk cargo (“Vopak Barranquilla”). Moreover in 2016, the Dutch company Witteveen+Bos has been researching the development of a new port in Barranquilla to be located at the opening of the Magdalena river into the Caribbean Sea. This has been done in collaboration with the Dutch Antea Group and the Dutch Maritime Research Institute MARIN (“Witteveen+Bos”).

However, the port is also faced with a specific challenge. The Barranquilla area is subject to regular flooding, due to the fact that it is lacking rainwater drainage systems. This leads to immense water streams (*arroyos*) flooding the streets during times of rainfall (Wightman et al.). When doing business at the port of Barranquilla, this can put operations to a stop and cause the destruction of facilities and access routes. Nonetheless, this challenge also poses an opportunity to Dutch companies to provide solutions, potentially integrated with existing flood protection projects in Colombia by Dutch companies such as Royal HaskoningDHV.



Figure 16- Flooding in Barranquilla (Source: El Universal)

## 2.2 Port of Cartagena



Figure 17- Container Terminal at Port of Cartagena (Source: Puerto Cartagena)

The port of Cartagena is Colombia's leading exporter to the US and one of the most efficient ports in the Latin American region. According to ProColombia, it offers the country's "most safe and modern port infrastructure" ("Free Trade").

The port of Cartagena specializes in container transport, with 66 percent of Colombia's containerized cargo passing through this particular port ("Free Trade"). In 2015, 75 percent of the port's handled shipments were container shipments. In the same year, international traffic accounted for 57 percent of operations, imports for 25 percent and exports for 16 percent. Main export commodities include oil, coffee, platinum, petroleum, manufactured goods and coal ("Perfil Logístico"). Besides its cargo operations, the port of Cartagena also operates a cruise ship terminal.

The Dutch company APM Terminals already successfully invested in the port and in a joint venture with the Colombian company Compañía de Puertos Asociados S.A. has opened a new container terminal with upgraded facility and equipment ("What's New"). Another Dutch company operating a terminal in the port of Cartagena is Vopak N.V., specialized in liquid bulk cargo ("Vopak Cartagena").

Current projects include the deepening of port access channels so that the port will be able to handle Post-Panamax vessels after the expansion of the Panama Canal in 2016.



## 2.3 Port of Santa Marta



Figure 18- Port of Santa Marta (Source: Semana)

The port of Santa Marta has traditionally specialized in dry bulk cargo, handling extensive amounts of bulk coal (Moss). It provides deep access channels and in 2015, imports accounted for 70 percent of handled shipments, while exports accounted for 28 percent (Salin et al.). As can be seen in the graph below, in 2016 the port of Santa Marta was Colombia's leading port in terms of throughput.

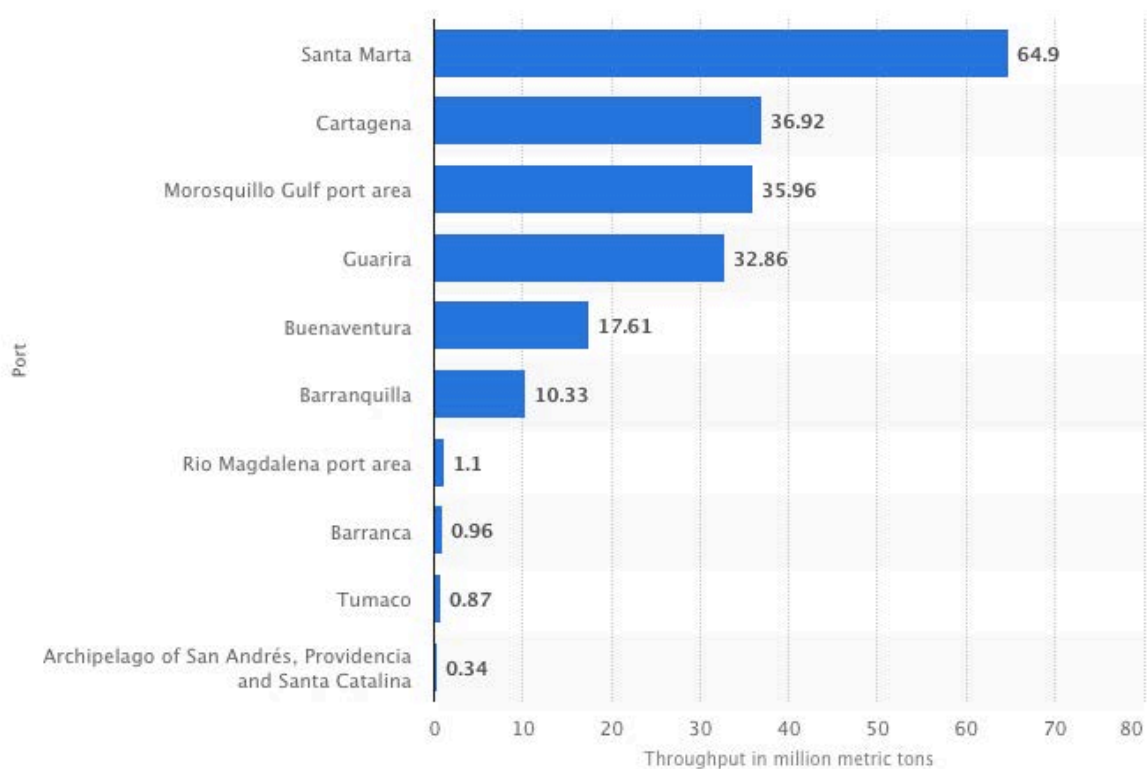


Figure 19- Leading Ports in Colombia in 2016, by throughput in million metric tons (Source: Statista)

However, in the last years, the port has aimed to diversify operations in order to become a true multipurpose port. Especially rolling cargo throughput has increased and the port of Santa Marta has become an important import point for many automotive brands like Audi, BMW or Mercedes-Benz (Thompson).

This is mostly due to a strategic alliance between Panamá based company Fast Terminal International S.A. and the Santa Marta port concession. Fast Terminal, specialized in operating rolling stock port terminals, has opened a port terminal in Santa Marta as well as a free trade zone terminal in the Las Americas Free Trade Zone close to Santa Marta (“Fast Terminal”).

Free Trade Zones play an important role in the success of the port of Santa Marta, as income tax rates are set at 15 percent instead of the regular 32 percent. In addition, there are no customs taxes and tariffs on imported goods and exporters can take advantage of Colombian trade agreements (Thompson). Moreover, according to ProColombia, Santa Marta has been ranked as favorable for doing business, showing high ratings in the ease of obtaining construction permits, registering property and paperwork needed to start a business in the 2015-2016 period (“Free Trade” 59).

The amount of containerized cargo has also increased over the past years, with refrigerated cargo making up the majority of containerized throughput. The US-based company SSA Marine is operating Santa Marta’s container terminal in a joint venture with the Santa Marta port concession (Thompson).

Lastly, an ongoing freight railway project by Fenoco SA aims to connect the port of Santa Marta to the center of Colombia (“Colombian Port”).

## 2.4 Port of Buenaventura



Figure 20- Port of Buenaventura (Source: China Dialogue)

Its location along Colombia's Pacific coast has made the port of Buenaventura Colombia's main port for exports and imports to and from Asia, also providing direct access to the west coast of the United States, Ecuador, Peru and Chile. According to the Financial Times, the port handles around 50 percent of Colombia's maritime trade. It is also the closest port to Colombia's economic centers Bogotá, Medellín and Cali, the regions with the country's highest production and consumption (Long). The port also has a connection to Puerto Berrio-Popayan railroad ("Port of").

Buenaventura is a free trade zone ("Ocean Freight"). Please see chapter 1 "Pestel analysis", sub section "Economic environment" for a detailed description of benefits such FTZs pose for doing business.

The port of Buenaventura is able to handle containers, solid bulk, liquid bulk and multipurpose cargo. In 2015, imports, mostly solid bulk accounted for 79 percent of handled shipments while exports, mostly bulk coal, molasses and sugar accounted for 21 percent ("Perfil Logístico").

The port is faced with various challenges. Firstly, with poverty and unemployment below national average, high crime rates and gang violence have been the result of poor living standards in the Buenaventura region (Long). Security challenges have to be considered when aiming to do business in the area, which is rated a 'no-travel' zone by the Dutch Ministry of Foreign Affairs.

Moreover, challenging weather conditions due to high rainfalls in the area make operations difficult. Port expansion possibilities are also limited to its closeness to the city of Buenaventura.

Furthermore, significant funds are needed to connect port terminals to the economic centers of Bogotá, Medellín and Cali via highways in order to gain a competitive advantage out of the port's strategic location. In addition, there is a need for deeper access channels in order to be able to handle even bigger vessels (Salin et al.).

Ongoing projects include the creation of CAEB, a center of economic activities in Buenaventura, financed primarily by Chinese investors. This includes investments in road infrastructure and electricity, as well as other technological and structural investments to make the port and city more competitive both on a national and international level ("What's New"). The project is currently in its preparation phase and expected to be put out for tender in 2019. Involved in the project are Colombia's National Infrastructure Agency (ANI), the Department of National Planning (DNP) and other governmental institutions ("Proyecto").

In 2017, a new terminal called Puerto Aguadulce was also opened in a joint venture between the Philippine company International Container Terminal Services, Inc. and Singapore-based PSA International ("ICTSI").

The Dutch company APM Terminals is already active in Buenaventura and operates the container terminal TCBUEN, which it acquired in early 2016 ("Historia").

## 2.5 Port of Tumaco



Figure 21- Port of Tumaco (Source: El Espectador)

The port of Tumaco, located in the Nariño department, is Colombia's second most important port along the Pacific coast behind Buenaventura and mostly imports liquid bulk and general cargo ("Perfil Logístico"). It is however significantly less modern and advanced compared to the ports mentioned previously.

As former FARC territory, the city of Tumaco and its port have been subject to violence and drug trafficking over many years. This is also due to the fact that the municipality of Tumaco shows one of the country's highest coca productions. Despite the peace agreement with the FARC, military action had to be taken in January 2018 after increased violence in Tumaco led to the murder of hundreds of people in the area. According to Colombia Reports, homicides from armed conflict between gangs and drug traffickers in Tumaco, seeking control over the area increased by 77 percent in the year after the FARC peace deal. Increased governmental militarization however is aiming to stabilize the area (Alsema). Nonetheless, the entire Nariño department is ranked as a 'no-travel' zone by the Dutch Ministry of Foreign Affairs ("Reisadvies").

According to El Espectador, recent developments include the concession of the port in 2017, now operated by Sociedad Portuaria Regional Tumaco Pacific Port S.A. Investments are planned to be made in hydrocarbon storage systems in order to increase fuel supply in the area ("Concesionaria").

## 2.6 Porter's 5 forces: Harbor development

The objective of the Colombian harbor development sector is to increase the efficiency and competitiveness of Colombia's ports. This includes further development of port terminals, port access channels, expansion of port platforms and other operations so that ports can handle more capacity and cargo. To do so, engineering and construction services, specialized equipment and technology are needed. This demand poses an opportunity for Dutch companies specialized in this sector. However, before entering the Colombian harbor development sector, the competitive environment should be considered. The following analysis according to Porter's five forces will provide an overview of the competitive environment in Colombia's harbor development sector ("Colombia-Infrastructure").

### **Threat of new entrants**

Colombia's high investments in the development of sea and riverine ports over recent years have created a demand for private companies specialized in harbor development, such as the Dutch company Witteveen+Bos. Even though this increased demand may encourage new entrants to enter the sector, entry barriers for new companies remain high. This is because the harbor development sector can be characterized as a highly specialized sector. This can be illustrated by the example of a dredging company. Dredging companies require substantial financial resources to acquire operational equipment like dredging machinery from manufacturers of such specialized machinery. For new companies aiming to supply dredging services, raising the necessary capital to purchase machinery is thus a big obstacle, leading to a low threat of new entrants in the sector ("Colombia-Infrastructure").

**Supplier power** in the harbor development sector is strong, as most companies operating in this sector are dependent on various resources.

Firstly, suppliers of specialized machinery and technology needed for harbor development have strong bargaining power, as they provide the necessary equipment and knowledge to go through with operations.

Secondly, many companies in the harbor development sector are dependent on fuel or electricity suppliers. These suppliers are big multinationals like BP or ExxonMobil, who have strong bargaining power. Examples of Colombian oil and gas suppliers are Ecopetrol S.A., C&C Energia Ltd. (subsidiary of Canadian company Frontera Energy) or Terpel S.A.

Electricity distributors include Emgesa S.A. and Condensa S.A. Companies dependent on fuel have therefore no control over fluctuations in oil prices. OPEC's efforts to limit oil supply for instance have led to increased oil prices in Colombia from 2017 to 2018 ("Transportation").

Moreover, there is a strong sector dependence on the transportation/logistics industry, for instance regarding transport of raw materials needed for harbor development. The transportation/logistics industry is characterized by few big players who provide transport by ship (i.e. Hapag-Lloyd, A.P. Moller-Maersk A/S), plane (FedEx Corporation, LATAM Airlines Group S.A.) or road (FedEx Corporation, Servientrega SA) ("Transportation"). Thus, supplier bargaining power here is also high.

Lastly, the harbor development sector can be characterized as labor intensive. There is a need for highly skilled workers, such as crane operators or drill operators who require specialized

training, which can be costly. No information could be obtained regarding training centers in Colombia for aforesaid functions. However, the Dutch company STC Group has set up a center of excellence together with Colombian Universidad del Norte, including training programs for water logistics and transportation management (“General”).

Lastly, union power in Colombia is relatively low since the occurrence of violence against trade unions in the 1990s (“Transportation”). Therefore, unionization poses little threat to companies operating in the sector.

### **Buyer power**

Due to Colombia significantly pushing harbor development in the country over recent years, there are many potential buyers available within the harbor development sector, from port concessions to private companies specialized in harbor development. Buyer power is moderate as buyers have low bargaining power due to their dependence on knowledge, technology and equipment provided by a relatively small number of firms specialized in this sector.

The size of customer orders can also vary per product/service, with some buyers looking for long-term contractors to take over the entire harbor engineering and construction process, while others are only looking for a one-time supplier of specialized equipment. Therefore, it is difficult to make generalized assumptions about the buyer bargaining power in this sector. Nonetheless, due to the buyer’s low ability to substitute, buyer power can be characterized as moderate.

### **Degree of rivalry**

Few firms specialized in equipment, technology and services needed for harbor development lead to a high degree of rivalry between them. Two major players already involved in harbor development of the port of Cartagena are the Dutch company APM Terminals in a joint venture with Compañía de Puertos Asociados S.A., a Colombian company involved in port and terminal operations (“What’s New”).

Additionally, Terminal Link, a subsidy of the French company CMA CGM is working together with the Colombian port company PIO SAS on the development of the port of Antioquia, expected to be completed by 2022. Potential engineering, procurement and construction contractors in the lineup were the Spanish infrastructure company Acciona S.A., China Harbour Engineering Ltd, Brazilian Odebrecht S.A., Portuguese Mota-Engil, among others.

All of the above are major players in the construction and harbor development industry. Consequently, there is a high degree of rivalry between these major players in the sector (“French”).

### **Threat of substitution**

The threat of substitution is very weak in the harbor development, due to the highly specialized nature of the sector. There are little alternatives when it comes to construction equipment or technology involved in harbor development.

### 3. Sub sector: River navigation

#### 3.1 Sector overview

In Colombia there are four main inland waterways. These are the Magdalena, Atrato, Orinoco, and Amazonas waterways (Salin et al.). When analyzing this sector, only 1.5 percent of Colombia’s freight is transported under a multimodal scheme. This is a very low percentage compared to European countries, in which it accounts for 60 percent. Additionally, freight in Colombia accounts for 35 percent of the cost of exported goods. This is really high in comparison with the rest of the world, where the figure is just 6 percent. In 2018, transporting a container from Bogotá to one of Colombia’s ports cost more than double the amount than shipping it from one of the Colombian ports to China (“Colombia”). This example shows how transportation costs in Colombia are significantly higher than in the Netherlands for instance. This is a consequence of the poor connection between the different modes of transport within the country, causing little multimodal transport opportunities.

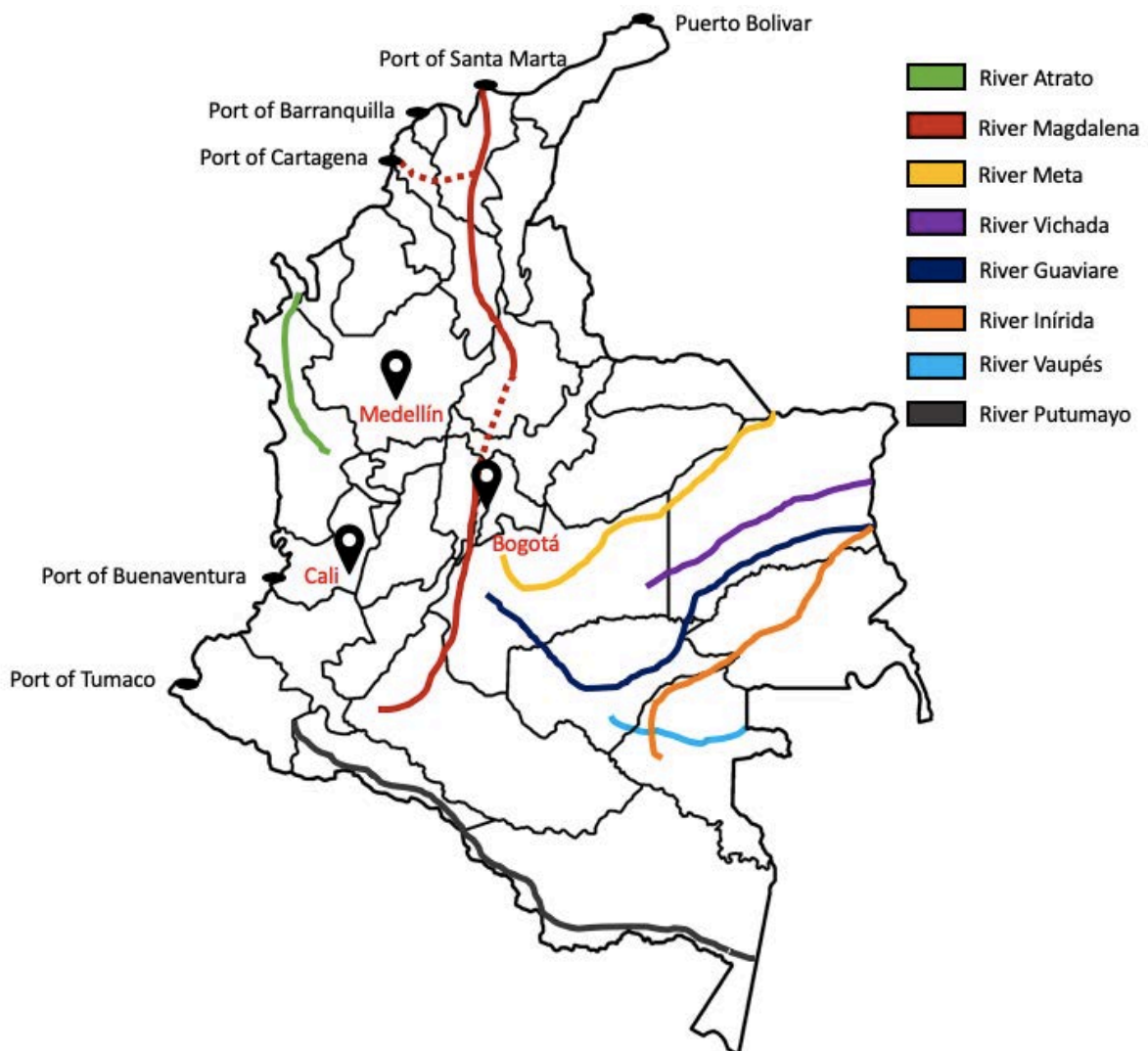


Figure 22- Map showing major inland waterways in Colombia



In Colombia, all projects related to river navigation including the implementation of policies are supervised and controlled by the National River Authority within the Ministry of Transport.

According to Mintransporte, the Dutch minister of Infrastructure and Environment and the Colombian minister of Transport jointly announced a cooperation to strengthen and combine the inland ports and navigational waterways in Colombia with “nature development, flood protection and spatial planning” with the help of Dutch companies involved in integrated water management (“Plan Maestro”, “Ministers”).

Some Dutch companies involved in the development of river navigation are Arcadis, Van Oord, Twynstra Gudde, Hitec, Deltares, IHC Merwede, Damen, Boskalis, Strukton, OMA, Volker Stevin, Royal HaskoningDHV and Witteveen+Bos. These companies provide services such as design and dredging and have expertise in hydraulic, inter-agency co-ordination and long-term planning (“Doing Business”, “Ministers”). The Dutch design and consultancy company Arcadis already made a master plan and climate adaption strategy for the Cauca river in 2015 (“Columbia Masterplan”).

The following will provide an overview of Colombia’s major inland waterways.

### 3.2 Magdalena Waterway



Figure 23- Magdalena River (Source: Revista Makinaria Pesada)

The Magdalena waterway is one of the most important waterways in Colombia as it accounts for 45 percent of cargo movement. The Magdalena waterway is navigable for 1,717 miles and the major affluent is the Magdalena River (Salin et al.). This river is the largest river in Colombia and was once considered the most important passage through Colombia due to it linking the Caribbean ports (e.g. Cartagena and Barranquilla) with areas such as Medellín and Bogotá, which are situated in the interior of the country (Bernal Melgarejo).

The river runs across the largest part of Colombia with about 1,528 km and serves as an economic force of life for many Colombians that live in its basin (Bernal Melgarejo). Even

though the Magdalena river is the largest waterway, it does not connect the major production and consumption centers (e.g. Bogotá and Medellín) directly with the ports in the Caribbean Sea (see figure below). Since there is no direct connection, transshipments are required which do not operate at full capacity due to the lack of investments. Some investments needed are dredging and channel improvements.



Figure 24- Map showing Magdalena Waterway (Source: Stratfor)

Some of the products that are shipped through the Magdalena river are petrochemicals, machinery, cattle, cement, fertilizers, and wood (Salin et al.). The river can be navigable from Barrancabermeja to Barranquilla (see figure above), where it moves between 80-90 percent of hydrocarbons (Bernal Melgarejo). It is also navigable between Barranquilla and Capulco with a depth of 6 feet, which allows for night navigation using satellite navigation systems. However, Canal Del Dique which connects the river with Cartagena cannot be navigable at

night due to its depth problems. The Cauca river joins the Magdalena river near Magangué in the Bolívar department and then flows out into the Caribbean Sea. From Barrancabermeja to Puerto Salgar the navigation is irregular (Salin et al.).

One of the plans is to improve the navigability of Colombia's principal waterway by transforming it into a crucial transportation artery and the backbone of a large logistics network (see figure below). This project was set to be done by the Brazilian company Odebrecht S.A., but due to corruption, the contracts were terminated, and construction is yet to be done by a new contractor (Betancur). For more details regarding the Odebrecht scandal see chapter 1 "Pestel analysis" section "Political environment".

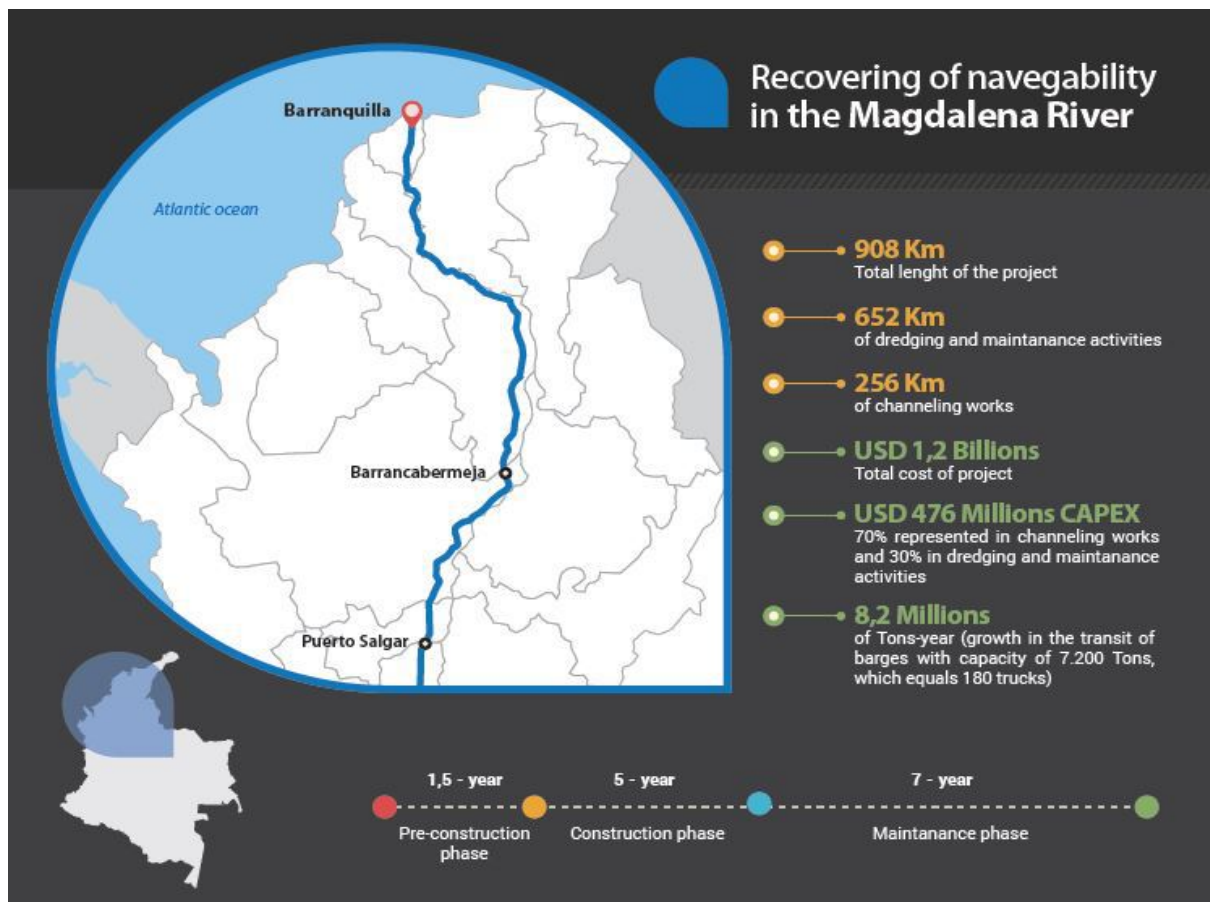


Figure 25- Map showing planned recovery of Magdalena River (Source: Betancur)

### 3.3 Atrato Waterway



*Figure 26- Atrato River (Source: Flickr)*

The Atrato waterway is another important waterway in Colombia and accounts for more than 50 percent of Colombian cargo (Salin et al.). The Atrato river connects the western Cordillera Occidental of the Andes with the Gulf of Urabá. Even though the river is only 670km long, its large discharge of water transport very large quantities of sediment. Some products that are transported along the river are bananas, fertilizer and wood. The river is navigable by small boats (“Atrato”).

When doing projects along this river it is important to be aware of security challenges in the Chocó department, through which the Atrato river runs. Due to rebel groups and paramilitary activity, the Chocó department is rated as a ‘no-travel’ zone by the Dutch Ministry of Foreign Affairs (“Reisadvies”).

### 3.4 Orinoco & Amazonas Waterway



Figure 27- Orinoco River (Source: WWF)

The Orinoco waterway and the Amazonas waterway are very important as well. In the Orinoco waterway, originating from the Orinoco river in Brazil, the major tributaries in Colombia are the Meta, Guaviare, Inírida and Vichada rivers. The main cargo in this waterway is cattle shipments.

In the Amazonas waterway the main river is the Amazon river. This river is the most important affluent and is the only means of transportation between the Amazon region in Colombia and Brazil (Salin et al.).

One of the goals of the Colombo-Dutch Water Alliance is to enable shipping along the River Meta between Puerto López and Puerto Carreño, to enable shipping along the River Putumayo between Puerto Asís and Leticia, to enable shipping along the River Guaviare between San José del Guaviare and Puerto Inírida and to enable shipping along the River Vaupés from Calamar to Mitú (“Colombia”).

However, there are security challenges to be aware of in these regions regarding guerillas and paramilitary groups. These risks have to be considered especially regarding the development of the river Meta towards Puerto Lopéz, regarding river Guaviare towards San José de Guaviare and Puerto Inírida (border to Venezuela) and regarding the development of river Vaupés towards Calamar. Moreover, higher security risks also have to be considered near the border zone to Ecuador regarding the development of river Putumayo, especially towards Puerto Asís (“Reisadvies”).

### 3.5 Porter's 5 forces: River navigation

The largest river in Colombia is the Magdalena River. This river was once considered the most important passage to Colombia because of it linking areas such as Medellín and Bogotá with Caribbean ports such as Cartagena and Barranquilla. However, the river became difficult to navigate and is nowadays scarcely used for freight and passenger transportation. The objective of the river navigation sector is to develop the Magdalena river to connect Colombia's interior with the Atlantic coast. This includes dredging around 256 km of river, constructing dikes to control water flow, and implementing navigation aids. This will provide access to two major ports in Colombia - Cartagena and Barranquilla, thus allowing waterways to be part of multimodal transport.

This poses an opportunity for Dutch companies specialized in integrated water management. However, before entering the Colombian river navigation sector, the competitive environment should be considered. The following analysis according to Porter's five forces will provide an overview of the competitive environment in the Colombia's river navigation sector (DePietro).

#### **Buyer power**

In Colombia 80 percent of international cargo is handled by seaports. Due to the nature of the river navigation segment, the buyers are mostly institutional buyers that use freight transport. These institutional buyers use this method to transport large quantities of raw material such as coal, chemicals and petroleum products. These companies have a bargaining power in price negotiations, for the simple reason that losing one customer can negatively impact a player's revenue. The buyer power in this sector is strong and is strengthened by the limited potential of product differentiation and the absence of a product that is unique. The buyer power can be somewhat weakened since buyers are dependent on the player's services since shifting between different freight methods, could be a damaging move ("Transportation").

#### **Supplier power**

Most companies operating in this sector are dependent on various resources to operate. To determine the suppliers in the river navigating sector it is helpful to know the cost drivers of this sector. For a dry cargo ship the main costs drivers are fuel with 20 percent, personnel with another 20 percent, interest and capital payments with 25 percent and lastly reparations with 10 percent (Jonkeren).

Fuel suppliers in Colombia are Ecopetrol S.A., C&C Energia Ltd. (subsidiary of Canadian company Frontera Energy) or Terpel S.A. Since this input is crucial for the market players, the supplier power is strong. According to MarketLine, Companies dependent on fuel have therefore no control over fluctuations in oil prices.

Secondly, the river navigation sector can be considered as labor intensive. There is a need for highly skilled workers, such as maritime pilots or Helmsman who require specialized training, which can be costly ("Transportation"). According to a study, the average level of the river (inland) navigation sector is poor, which makes the need for training higher (Jonkeren). Nonetheless, union power in Colombia is relatively low since the occurrence of violence

against trade unions in the 1990s (“Transportation”). Therefore, unionization poses little threat to companies operating in the sector.

Moreover, if a company operating in this sector wants to buy a modern ship it may need to loan money from a bank or credit facilitators. Banks and credit facilitators are also a supplier in this industry because the companies operating in this sector are dependent of them, which gives these institutes power (Jonkeren).

Lastly, there is a strong need to work with other logistical parties. Due to river navigation being inland, other logistic parties such as shippers, road hauliers, ports, inland ports and terminal operators are needed for the sector to function. Overall supplier power is moderate (Jonkeren).

### **New entrants**

The demand for private companies specialized in river navigation has increased during recent years in Colombia. This is because of high investment made in the development of river navigation with the goal to improve Colombia’s principal waterway - the Magdalena river. This is an opportunity for Dutch companies such as Witteveen+Bos and Arcadis, which are specialized in this sector. Even though the increased demand may encourage new entrants such as the companies mentioned above to enter the river navigation sector, entry barriers remain high. The reason for this is the specialized nature of the river navigation sector. It requires extensive capital, experience and expertise to operate in this sector which limits the threat of new entrants (“Colombia-Infrastructure”).

### **Threat of substitutes**

One of the advantages of the river navigation sector is the ability to transport high quantities of goods for low cost compared to other transport methods. When using this method to ship, most of the goods are non-perishables products such as electricals and clothing, which suits this type of transportation (“Transportation”). Due to this, the threat of substitutes is weak. Substitutes are other transport modes, mainly rail and road transport and, to a much lower amount small sea-ship. But since river navigation is much cheaper for the type of good transported, threat of substitutes is low (Jonkeren).

### **Degree of rivalry**

Companies from other countries also specialized in the sub sector pose a major competition to Dutch companies trying to enter the Colombian market. The Brazilian company Odebrecht S.A. for instance won the public bid to execute the contract for the Magdalena river. However, after the project was cancelled due to corruption, it was announced that the Chinese company Sinohydro Corporation had shown interest in taking over this project (Andres Abarca). Even though there are some companies trying to enter this sector, the Colombian-Dutch Water Partnership in 2011 opened up more opportunities for Dutch companies in this segment, because of their expertise and their experience (“Colombia”). Overall the degree of rivalry is moderate.

## 4. Sub sector: Maritime technology

### 4.1 Sector overview

In the past years, Colombia has developed as a shipbuilding country. One of the most important organizations in maritime technologies is COTECMAR, one of the largest maritime design agencies of South-America (“Exportbijeenkoms”). The main focus of the organization is the construction of naval vessels, corvettes and patrol vessels for seas and rivers. COTECMAR also offers repair and maintenance services for ships. Additionally, the company specializes in the examination of scientific and technological research on the maritime industry in Colombia. This is due to the fact that the organization is part of the Colombian Ministry of Defense. The organization’s mission for 2030 is to develop further in maritime technology and act as an innovative leader in the sector (“Cotecmar”).



#### Technologies COTECMAR in Colombia specializes in:

- Defense: coastal patrol vessels, landing craft utility, fast riverine patrol boats, offshore patrol vessels, amazon patrol vessels, logistic support and cabotage.
- Work: multi cargo riverine barges, riverine towboats, riverine pusher boats, self-sustaining riverine docks, riverine container vessels, medical platform vessels, river rescue boats.



Figure 28- From top left to bottom left: Riverine Pusher Boat, Riverine Container Vessel, Logistic Support and Cabotage Vessel and Offshore Patrol Vessel by COTECMAR (Source: COTECMAR)



In short, COTECMAR works with the following services: Naval architecture, energy optimization, materials and technologies for producing ships, IT communication and control technologies, design of auxiliary systems and analysis and optimization of forms using Computational Fluid Dynamics (“Cotecmar Science”).

**Some examples of the services COTECMAR provides are (“Cotecmar”):**

- Metalworking
- Painting and welding
- Metrology and calibration
- Refrigeration
- Automation and control
- Dock repair and repairs at drydock

Furthermore, the Colombian company Impala is specialized in offering logistics assets to improve international transfers between countries through deep-sea ports. This company invested large sums of money into a fleet for the Magdalena River. This particular river is important for the foreign supply of systems and technologies (“What We”).



The cooperation between Colombia and the Netherlands concerning the maritime sector started since the ‘Misión Técnica Colombo – Holandesa’. This mission researched the possibilities for the Magdalena River. Especially since the floods in 2011, Colombia and the Netherlands cooperated together and designed the Holland Colombia Water Partnership. The two countries collaborate to support each other, for example with different water projects and developing an equal economic relationship. Focusing more on the maritime sector, in 2017 the Rotterdam partners and the Holland House Colombia organized a trade mission in Bogotá specifically for the maritime sector (“Topsector”).

Colombia is not only developing as a shipbuilding country but the overall economy in the country is growing. Therefore, it is also important to invest in the transportation possibilities and logistics technologies. The government invested 35 million dollars into the infrastructure, which resulted in more chances in the logistic chains for example in road, water and rails. The location of the Colombian ports is beneficial for the maritime trade routes. Next to the positive facts of the developing country, the prices of the transportation are higher than in other countries in Latin America. Secondly, at this moment only one percent of transports are done via the rivers (Heijmans). Most of the transportation is done by road, as described in chapter 1 “Pestel analysis”. Transportation via water and air are the least common forms of transportation in Colombia (Hudson).

### **Dutch Maritime Technology Sector**

The Netherlands has the biggest port capacity and inland shipping fleet in Europe. The Dutch take the lead in the maritime sector regarding complex systems and offshore services. According to Netherlands Maritime Technology, the last years were difficult for the sector, due to decreased turnovers. In the figure below, the decrease in the years of 2015-2017 is shown (“Sectorinformatie”).

Annual turnover Dutch maritime technology industry \*\*



Figure 29- Annual Turnover of Dutch Maritime Technology Industry (Source: Netherlands Maritime Technology)

Since 2017, turnovers have increased again. In 2018, the Dutch launched some record-breaking superyachts and smaller cutter suction dredgers for export. Orders for inland vessels also increased. However, despite this growth in 2017, not all the yards had enough work and only Europe received more orders. For example, China and South Korea had faced some difficulties and lack of work. The total export share in 2017 was 57 percent, in comparison to the total share in 2016 of 79 percent. Thus, there are opportunities to increase more in the following years (“Sectorinformatie”).

#### Technologies Dutch maritime companies specialize in (“Sectorinformatie”):

- Superyacht construction
- Inland shipping
- Fisheries and seagoing vessels
- Tailor made complex ships
- Integrated bridge systems
- Marine propulsion solutions
- New technologies: electric-hydraulic turnkey winches and 3D printed ship propellers

#### Companies in the maritime technology sector, possibly interested in going to Colombia (“Bedrijvengids”):

- Bachman Electronic Nederland
- Arnzt Van Helden
- NMC Maritime technology
- Royal IHC Offshore division
- Concordia Group

These companies all showed their interest in a meeting for a trade mission to Colombia from the Holland House Colombia. This meeting provided more information about the shipbuilding technologies of Colombia. Moreover, the company Scheepswerf Bodewes and De Kaap (Thecla) is already cooperating with Colombia. The Dutch company was asked by the Colombian company Impala to produce a series push boats for the Magdalena river. The low weight and shallow draft make the vessels unique, according to Thecla Bodewes. The boats make it possible to sail on rivers in Colombia, which initially was not possible. The company explains this is important for the country as the transportation by waterways is increasing. The boats were especially designed for the Magdalena River and can deal with the warm temperatures and shallow water. An article of World Maritime further explains that more Dutch companies choose for fast deliveries and high-quality products instead of low prices

from Asian shipyards. Moreover, Colombia has shown an increasing interest in Dutch organizations, particularly in the water industry. Both governments are collaborating for solutions concerning integrated water management in Colombia (Meester).

#### 4.2 Porter's 5 forces: Maritime technology

##### **Threat of new entrants**

As Colombia is developing in the maritime industry, it could be attractive for companies to enter this market. The country already has one of the biggest maritime design agencies and multiple companies specialized in marine supplies and services.

The sector can be considered as a specific sector with multiple and different specializations and technologies. Knowledge and experience in the sector are important to ensure companies will trust the maritime activities. It is also a sector that needs large investment since maritime technologies or reparations are costly. To enter the market as a starting company this could pose a challenge.

The brand loyalty of customers is quite high, because the ships have to transport precious products, so the risks of failure are high. Moreover, competition among existing companies in the maritime sector in Colombia is high. Some names of important companies are Clever Ships Supply SAS, SPS Marine group and Francisco J. Escamilla EU.

Looking into governmental policies or laws, it is stated in the Colombian law that legislation reserves a minimum of 50 percent of all national cargo to Colombian vessels on routes where a Colombian vessel operates. Only approved lines will receive an import or export license. This is because the Colombian government wants to protect their own maritime activities ("An Assessment"). This could make it more difficult to companies from outside Colombia to participate in the shipping or trading industry.

##### **Bargaining power of buyers**

The buyers in this sector are the companies that make use of the maritime technologies and services, for example the reparations or the use of new ships to transfer products over sea. Examples of clients are importers, exporters or freight forwarders.

International trade between different parts of the world is something that is always developing and also increasing. Shipping goods is a common way of importing and exporting products, therefore there are many customers in this sector. All the ship owners or companies that use the ships need new maritime technologies to improve their standards. All companies who need to transport goods benefit from this, as the transportation takes less time and is more efficient.

##### **Threat of substitute products/services**

It is not easy to substitute the services regarding maritime technology as it is a specific type of service. However, the sector is large and there are many companies who offer those services. In Colombia the organization COTECMAR is an important player in the sector. There are more important companies as well, thus Colombian buyers have some choice.

Furthermore, the technologies and knowledge about shipping and cargo regulations for example are not something that can easily be replaced by another company. It also differs from country to country. There are different rules concerning weight for example. In the Netherlands the maritime technology is very advanced as well, especially because of the large port of Rotterdam. Thus, the Dutch are developed in shipping and technologies as well. It could be attractive for Colombian companies to cooperate with these Dutch companies, to learn more about their technologies.

### **Bargaining power of suppliers**

In the maritime sector, the suppliers do not have a high power on bargaining. The suppliers do not make a lot difference to shipping companies. Examples of suppliers are fuel oil, repair services or material for building the ships, like steel. Supplies include everything needed to create new maritime technologies or do research. There are many suppliers and the costs are high, as it sometimes also concerns natural resources like fuel oil. Secondly, the switching costs are high as well. The orders are large and expensive.

### **Competitive rivalry**

Competition is everywhere and in this marine sector as well. The trade amongst countries is increasing, therefore the competition will grow as well. The maritime technologies are specific and therefore customers will not change so quick to another company. For example, the reparation or creation of a new ship is something important and a big responsibility for a company. However, the prices of resources and the process of building ships are expensive. Companies can therefore compete with prices to gain new customers. Companies can distinguish themselves by specializing in specific technologies, for example by building specific types of ships or by offering sustainable ships.

## 5. Consolidated SWOT analysis

<b>Strengths (Dutch companies)</b>	<b>Weaknesses (Colombia)</b>
<p>Expertise in:</p> <ul style="list-style-type: none"> <li>• Sustainable Port Development (“Port of Future concept”)</li> <li>• Environmental protection services for port areas</li> <li>• Port management</li> <li>• Integrated water management/Flood control (“Dutch Delta Approach”)</li> <li>• Hydraulics and dredging</li> <li>• Sustainable river/delta development (“Room for the River” concept)</li> <li>• Inland maritime technologies/shipping fleet</li> <li>• Inter-agency coordination and long-term planning</li> </ul> <p>Dutch knowledge institutes specialized in the sector</p>	<ul style="list-style-type: none"> <li>• Coastal erosion (flooding issues)</li> <li>• Lack of big data systems for communication between different logistical parties</li> <li>• Lack of process automation technology</li> <li>• Lack of river flood protection</li> <li>• Lack of rainwater drainage systems</li> <li>• Poor river ecosystems</li> <li>• Transshipments do not operate at full capacity</li> <li>• Need for educated staff</li> </ul>
<b>Opportunities (for Dutch companies in Colombia)</b>	<b>Threats (Colombian external environment)</b>
<ul style="list-style-type: none"> <li>• Coastal protection of Cartagena</li> <li>• Planned access channel improvement in Cartagena and Buenaventura</li> <li>• CAEB Buenaventura</li> <li>• Dredging activities needed to increase access channel depth in Barranquilla</li> <li>• Reinforcing Canal del Dique/dredging activities needed to increase depth of Canal del Dique</li> <li>• Flood protection for Cauca river/flood early warning systems</li> <li>• Increasing navigability of Magdalena river</li> <li>• Dutch agencies/ministries available for connecting with Colombia (e.g. Holland House)</li> </ul>	<ul style="list-style-type: none"> <li>• Corruption (Concession phenomenon)</li> <li>• High tax rates</li> <li>• Infrastructure deficits (geography)</li> <li>• Challenging weather conditions and ‘El Niño’ phenomenon</li> <li>• Crime and security challenges</li> <li>• Companies from other countries also specialized in (sub)sector as major competition</li> </ul>

## 5.1 Strengths

Dutch companies have extensive knowledge in **sustainable port development** and have established a successful “Port of the Future concept”. They for instance have experience in environmental protection services for port areas, already implemented at the port of Rotterdam (“Colombia”).

Dutch companies also show a high specialization in **integrated water management**, for instance in flood control. This is because the Netherlands has built up years of experience in this area. The “Dutch Delta Approach” is an example of this, focusing on sustainable delta development (“The Delta Approach”). Moreover, the confrontation with a large number of rivers in the Netherlands have led to the development of an artificial drainage system (Romijn). Additionally, Dutch companies have extensive expertise in **hydraulics and dredging**, which helps with flood control (“Colombia”).

The Dutch “Room for the River” program gives Dutch companies a high expertise in **sustainable river development**. This governmental design plan for instance aims at improving environmental conditions in the river’s surroundings. (“Colombia”).

Dutch knowledge institutes have already specialized in the water logistics and transportation sector and existing partnerships programs have been established, e.g. the **Netherlands Water Partnership** (NWP) or the partnership between Dutch company STC and Colombian Universidad del Norte in building a center of excellence (“Colombia”).

## 5.2 Weaknesses

Colombia has in the past been challenged with **coastal erosion**, leading to issues such as flooding (“Colombia”). At the end of 2010, La Niña caused a severe flood at Canal Del Dique. Because of this flooding, the river has deteriorated over time. This is an extremely important shipping route, that now needs to be reinforced (“Colombia”). Moreover, as described before, many cities such as Barranquilla are lacking **rainwater drainage systems**, leading to regular flooding of the city after heavy rainfalls.

The Colombian water logistics and transportation sector lacks **big data systems** for communication between different logistical parties in order to improve logistics (“Doing Business”). Ports are also lacking **process automation technologies** which would help to increase efficiency (Moss). Increasingly modernized and growing ports also pose a **need for educated staff**, e.g. engineers, inspectors, port managers, etc.

The lack of direct connection between Caribbean ports and major production/consumption centers (e.g. Bogotá, Medellín, Cali) via the Magdalena river requires **transshipments**, which do not operate at full capacity due to a lack of investments. Significant **funds** are also needed in order to connect port terminals such as Buenaventura to economic centers (e.g. Bogotá, Medellín, Cali) via highways.

### 5.3 Opportunities

Existing **coastal protection** projects in Cartagena pose an opportunity for Dutch companies (“Doing Business”). Here, a sustainable “Building with Nature Approach” is requested in order to positively impact the coast’s surrounding ecosystems (“Colombia”).

Projects are also in the planning to improve access channels at the ports of Cartagena and Buenaventura to allow bigger ships to enter the ports (“Major Access”). **Access channel improvement** has been prioritized by ANI, Colombia’s National Infrastructure Agency (“Colombia Studying”).

The planning of **CAEB Buenaventura** and expected tender in 2019 also poses an important opportunity for Dutch companies to be involved in further development of infrastructure within and around the port of Buenaventura (“Proyecto”).

During the construction of the new Pumarejo Bridge to be completed in early 2019 (“May 2019”), access channels in the port of Barranquilla have been reduced in depth. In order to increase channel depth again, dredging is planned after completion of the bridge project (Moss), posing an opportunity for Dutch companies specialized in **dredging activities**.

Following the severe floods caused by La Niña in 2010, the need to reinforce **Canal Del Dique** became really important. Reinforcing this canal will bring back to life an important shipping route and also provide protection to the local population, by providing them with a sustainable living environment. (“Colombia”).

Another opportunity is to make the **Magdalena river** navigable and connecting it to the different ports. Dredging activities are needed to make the river more accessible for big transportation boats to cross. Canal del Dique for instance cannot be navigable at night because of its depth problems. This is an opportunity for Dutch companies specialized in this sector. The Netherlands has a high expertise in the field of dredging as well as the Dutch “Room for the river” program. (“Colombia”).

Due to aforementioned river flooding issues in Colombia, there is a need for **flood early warning systems**, which were developed in the Netherlands. This is an opportunity for Dutch companies experienced in this field such as Deltares to share this system (“Colombia”).

There are already a large number of **Dutch agencies and ministries** available for connecting Dutch companies active in the sector with Colombia. Examples are the Holland House Colombia as a “bilateral chamber of commerce” or the Dutch embassy acting as a “match-maker” for instance regarding B2G or B2B operations between Colombia and the Netherlands (“Colombia”).

## 5.4 Threats

Colombian ports and rivers are mostly owned by private concessions, meaning that port operation rights were transferred by the government to private companies. In exchange, concessions are bound to a contract with the Colombian government and have to seek its approval when undergoing projects (“Concession”). However, **corruption** on the bureaucratic level in Colombia is still high, especially when dealing with governmental institutions. Consequently, when working with Colombian port concessions, Dutch companies have to be aware of this threat of corruption.

**Infrastructural deficits** are another threat to be aware of for Dutch companies when entering Colombia. Not only is Colombia around 27 times bigger than the Netherlands, but also showing a complex geography, with the Andean mountain range and Amazonian rainforest acting as natural transport barriers (“Doing Business”). Please see chapter 1 “Pestel analysis”, section “Ecological environment” for more details regarding this aspect.

**Challenging weather conditions** also pose a threat for doing business and are one of the main causes of flooding and landslides. Please see chapter 1 “Pestel analysis”, sub section “Ecological environment” for a more detailed description of weather challenges faced when doing business in Colombia.

**High crime rates** and post-conflict violence in some parts of the country also pose a threat for doing business in these areas, for instance in Buenaventura and Tumaco. Please see chapter 1 “Pestel analysis”, section “Political environment” and chapter 2 “Sub sector: Harbor development” for more details on how crime can affect doing business in specific areas.

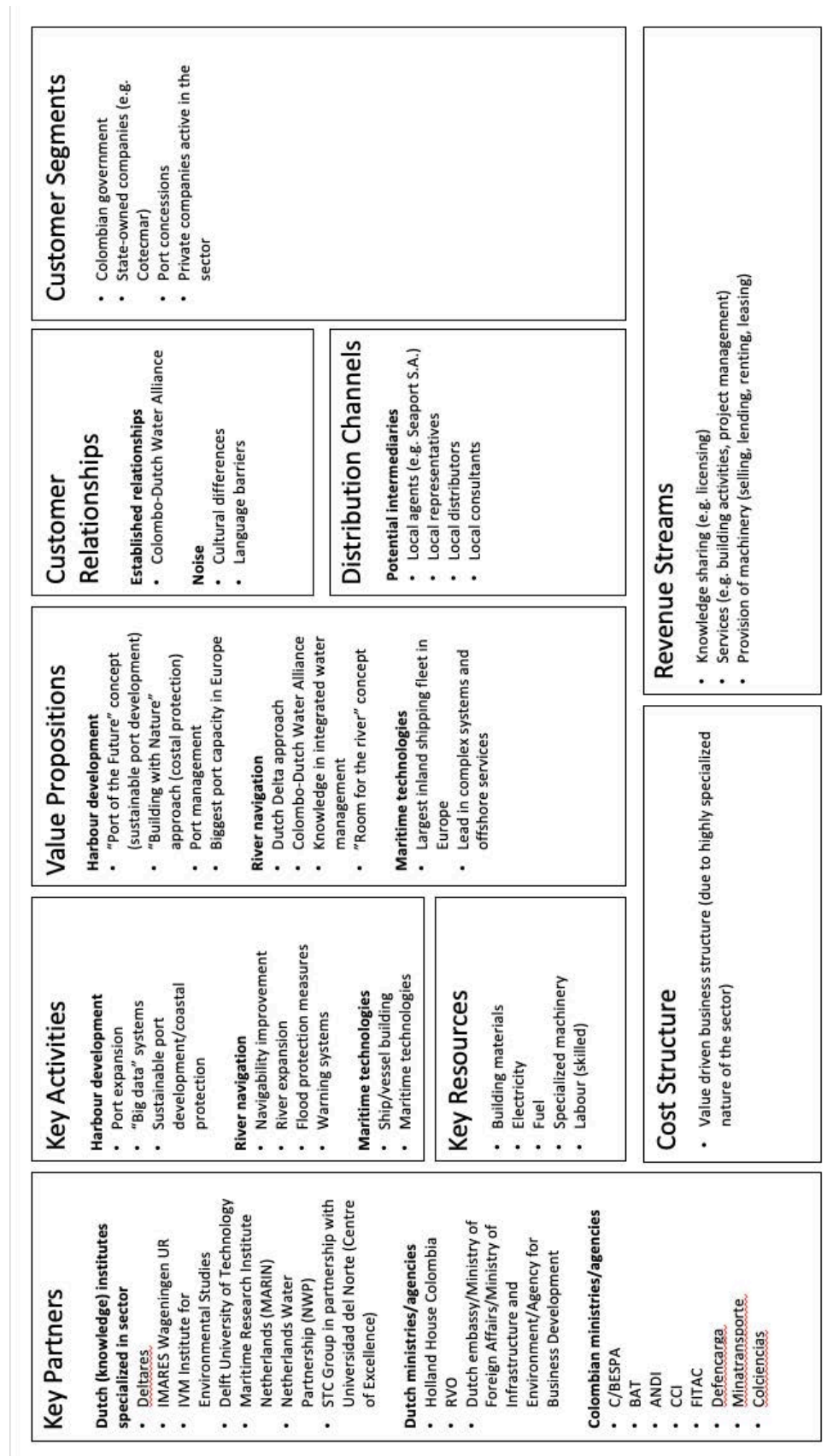
**High tax rates** are another threat to consider. According to the World Economic Forum, in 2016, tax rates were ranked as the number one problematic factor for doing business in Colombia. However, setting up businesses in FTZs can help to avoid this threat. Please see chapter 1 “Pestel analysis”, section “Economic environment” for more details regarding FTZs in Colombia.

Companies from other countries also specialized in the sub sector pose a major **competition** to Dutch companies trying to enter the Colombian market. Terminal Link, a subsidiary of the French company CMA CGM is for instance working together with the Colombian port company PIO SAS on the development of the port of Antioquia. The Spanish infrastructure company Acciona S.A., China Harbour Engineering Ltd, Brazilian Odebrecht S.A., Portuguese Mota-Engil and other engineering, procurement and construction contractors were in the lineup to be contracted for this particular project (“French”). Moreover, Brazilian Odebrecht S.A. won the public bid to execute the contract for the improvement of the navigability of the Magdalena river within the Navalena SAS consortium. However, after the contracts terminated due to the Odebrecht corruption scandal (see chapter 1 “Pestel analysis” for more details) it was announced that the Chinese company Sinohydro Corporation may take over the project (Andres). These examples show how different companies from all over the world are trying to enter the water logistics and transportation sector in Colombia.



## 6. Golden triangle cooperation approach

## 7. Business Model Canvas



## 8. Sector Trends

When looking at trends within the water logistics and transportation sector, it is important to first take a look at general global trends and how these are affecting the particular sector. This is because based on these general global trends, sector-specific trends will arise.

Globalization for instance highly affects the water logistics and transport sector. This is because globalization leads to increased global trade, which poses a need for more and more advanced (water) logistics and transportation infrastructure. Ports need to be able to handle bigger Post-Panamax vessels for example and strong multimodal transport connections are becoming increasingly important. Moreover, global digitalization is providing technologies to optimize logistical processes, e.g. through automation. Sustainability is also becoming more and more important as the global climate crisis poses a need for overthinking the environmental impact of operations. Based on these general global trends, global sector-specific trends can be found. According to Inland Navigation Europe, global trends in the waterway logistics sector are as follows (“Trends”):

- Increase in megaships
- Growing automation
- Bio-economic and renewable materials
- Carbon free logistics

New and more green ways to transport seem to be important for the upcoming years. This also matches the sustainable development goal for climate action. Moreover, each year the Institute for Transportation and Development Policy awards cities with the Sustainable Transport Award for “decreasing greenhouse gas emissions and air pollution”. Past winners include the Colombian cities Medellín and Bogotá, showing best practices in regard to sustainable transport (“Nominate”). This shows how the trend for sustainable transport is also present in Colombia and that cities are actively taking part in making their transport sector more sustainable.

Like most sectors, the water logistics and transportation sector is also impacted by global technological trends. ‘Big data’ systems such as EDI systems are important to be named here. These systems can improve communication between different logistical parties in a supply chain, which is highly relevant to the sector (“EDI”). In Colombia, EDI systems are already offered by certain companies and also implemented to some extent in the sector. Software tools for cargo handling are also becoming more and more implemented, for instance in the port of Cartagena. For more information regarding the current status of aforesaid developments in Colombia see chapter 1 “Pestel Analysis”, sub section “Technological environment”.

Looking at maritime technology, digital trends and technologies are also rapidly involving. Firstly, the term deep learning is important in this trend forecast. Deeper levels of machine learning can be used to gain more insight in the sector (Wingrove). Companies like Google and Amazon for example create neural networks for machine learning. The new technologies offer the companies in the sector more information about their customers, allowing them to develop advanced data.

Further artificial intelligence is important to create vessel computers which can understand the environment of the maritime sector. According to Martyn Wingrove of Maritime Digitalization and Communication, 2018 will be the year that autonomous surface vessels will be demonstrated and trialed (Wingrove). This trend is still new and difficult to realize, as people are still careful with investments since unmanned vessels are something new.

Blockchains will also grow more in the upcoming year in the maritime sector. Digital currencies can be innovative in trading with cargos and obtaining products. This trend could show that blockchain processes can improve cyber security in maritime transactions, especially with upcoming developments in cloud computing and machine learning. Blockchain and digital currencies allow secure computer-to-computer transactions that may diminish the intervention of humans in these processes. Other technologies and new digital opportunities are drones, robotics and virtual reality (Wingrove).

In short, increased technologies and digital opportunities as well as the need for sustainable transport infrastructure are the most important aspects in the trend analysis of the sector. With an increase in global trade and a consequent need to transport even more goods in a shorter time-frame, an increase in demand for megaships as well as automation technologies to decrease lead times will be important to consider. In Colombia, where multimodal transport opportunities and efficiency of transport infrastructure is still lacking, aforesaid trends thus pose a pressure to increase efficiency of the water logistics and transportation sector in the country. This poses an opportunity for Dutch companies, who are already acting on aforementioned industry trends.

## 9. Sector Forecast

Based on the insights gained in previous chapters, a sector forecast can be conducted. Various indicators, especially increased investments in infrastructure projects show, that the water logistics and transportation segment is a very prospect sector in Colombia despite some challenges. Therefore, it can be assumed that the segment will see a growth in new projects in the next five years as well as significant progress on existing projects.

Most important to note here is the **Colombian National Development Plan 2014-2018**, in which the Colombian government has prioritized infrastructural development in the country. This plan forms the backbone of infrastructural development in the country, whereby opportunities in road, river and port development are most relevant to the water logistics and transportation sector. More specifically, the **4G program** for road development, **CONPES directive** for port development and **Colombia Plan Maestro Fluvial** for river navigation pose direct opportunities for PPP investments in the sector (“Doing Business”). Even though these initiatives have led to significant involvement in Colombian infrastructure over the past decade, a strong need for further improvement poses opportunities for Dutch companies specialized in the sector in the coming years.

The following table created by the U.S. Department of Commerce shows a forecast of the Transportation Infrastructure sector until 2027. It is important to note that 2018 marks the beginning of a new growth process for ports, harbors and waterways.

<b>TRANSPORTATION INFRASTRUCTURE INDUSTRY DATA (COLOMBIA 2017-2027) ANNUAL GROWTH</b>											
<b>Indicator</b>	<b>2017e</b>	<b>2018f</b>	<b>2019f</b>	<b>2020f</b>	<b>2021f</b>	<b>2022f</b>	<b>2023f</b>	<b>2024f</b>	<b>2025f</b>	<b>2026f</b>	<b>2027f</b>
Transportation	2.3	5.1	8.6	6.7	5.4	3.8	2.7	3.7	3.6	3.6	3.6
Roads and Bridges	3.9	6.2	8.3	6.9	6.5	5.7	5.0	4.5	4.2	4.1	4.2
Railways	-3.5	2.1	14.3	7.7	0.9	-6.2	-11.1	-0.1	0.8	0.7	0.7
Airports	2.5	3.2	2.6	2.3	2.0	1.5	1.0	0.5	0.0	-0.5	-1.9
Ports, Harbors and Waterways	-2.2	0.7	1.7	2.3	2.4	2.1	1.9	1.7	1.6	1.7	1.5

e/f=BMI estimate/forecast Source National Sources, BMI

Table 2- Annual growth forecast in Colombian Transportation Infrastructure sector (Source: export.gov)

The Magdalena River development project, which was suspended due to the Odebrecht corruption scandal is scheduled to re-open for public tender by the end of this year (2018). It is planned to have a concession with the validity of thirteen years. With this outlook and with the continuous progress on other infrastructure projects, the next years are looking positive for Colombia. Despite the uncertain scenario that the corruption scandal created, the indicators show that the new investors and partners are getting involved again and that they are regaining confidence in Colombia.

Existing cooperation between the Netherlands and Colombia regarding aforementioned developments has strengthened the relationship between companies and institutions on both sides. This includes cooperatively strengthening and combining Colombia's inland ports and navigational waterways with the help of Dutch companies involved in integrated water management ("Plan Maestro", "Ministers"). Therefore, an increased cooperation between Dutch companies and Colombian counterparts will likely be the driver for further developments in the Colombian water logistics and transportation sector.

As Colombia has committed to the United Nation's 2030 Sustainable Development Goals along with its recent membership in the OECD, the country has dedicated itself to a specific roadmap of internal developments in order to comply with OECD membership responsibilities. This includes commitments to **sustainable development** of infrastructure. Therefore, sustainability will play an increased role in the development of the water logistics and transportation sector in Colombia.

To conclude, the next five years will pose multiple opportunities for growth in the sector. The main focus will be on sustainable and innovative activities. Technologies and new digital ideas will play a leading role as well. Therefore, it can be assumed that the existing cooperation between Colombia and the Netherlands will only increase from now on, and the companies will benefit from each other's strengths.

## 10. Conclusion

To conclude, Colombia's water logistics and transportation sector poses many opportunities for Dutch companies specialized in harbor development, river navigation and maritime technologies.

In Colombia, only 1.5 percent of freight is transported under a multimodal scheme, a very low percentage compared to European countries, where it accounts for 60 percent. This is due to poor connections between the country's production/consumption centers in the center of the country (i.e. Bogotá, Cali and Medellín) and major ports along the Pacific and Caribbean coast (i.e. ports of Buenaventura, Cartagena, Barranquilla and Santa Marta).

One of the reasons for this is the poor navigability of the Magdalena river, Colombia's principal waterway, connecting areas such as Medellín and Bogotá with the ports of Cartagena and Barranquilla. The river is currently difficult to navigate between Puerto Salgar and Barrancabermeja as well as at Canal del Dique. Because of this, transshipments are required which do not operate at full capacity due to the lack of investments. Nonetheless, the Magdalena river has the potential to become a key inland waterway again and transport larger numbers of goods. Significant infrastructure and adaptation projects are needed for this, such as dredging activities and channel improvements - an opportunity for Dutch companies specialized in this field.

Moreover, in order to increase efficiency of Colombia's ports, engineering and construction services, specialized equipment and technology are needed, e.g. regarding access channel improvements for handling bigger ships. The most important ports for Dutch companies to consider here are:

- **Port of Cartagena**
  - 57 % international traffic
  - 25 % imports
  - 16% exports (oil, coffee, platinum, petroleum, manufactured goods and coal)
  - Cruise ship terminal
- **Port of Barranquilla**
  - Top export destination to the US and Europe
  - Handles 14% of Colombia's total exports and imports
  - 65 % imports and 30.5 % exports
  - 41% grain shipments, 25% container shipments, 19% loose cargo and 15% coke fuel
  - Efficient refrigerated storage facilities
- **Port of Santa Marta**
  - Increase in rolling cargo throughput - import point for many automotive brands
- **Port of Buenaventura**
  - Export/imports to Asia, U.S. west coast, Ecuador, Peru and Chile

In many ports as well in river navigation, big data systems for interaction and cooperation between logistical parties are still not implemented to a large extent, which could increase efficiency. This again poses an opportunity for Dutch companies, specialized in this field.

Furthermore, coastal erosion and flooding issues along Colombia's rivers and coasts as well as a lack of rainwater drainage systems pose a need for flood protection services, flood early warning systems and coastal protection, posing another opportunity for Dutch companies active in this field.

With their expertise and experience in sustainable river and port development, hydraulics and dredging, integrated water management, flood protection and shipbuilding, Dutch companies have the skills and knowledge to seize aforementioned opportunities in Colombia's water transportation and logistics sector. However, where there are opportunities there are always challenges attached. Corruption, challenging weather conditions as well as crime and security challenges are some of the issues that Dutch companies trying to enter this sector may encounter. Companies from other countries specialized in the sector also pose a major competition for Dutch companies. However, by carefully adapting to these challenges and by making use of existing strengths such as fast deliveries and high-quality products, Dutch companies have the ability to overcome aforesaid challenges.

Based on the previous information it can be concluded that there is a strong need for infrastructure improvement in Colombia. Moreover, challenges such as corruption and insecure areas can be seen as an impasse for investors in the sector. But despite these challenges, Colombia is in need of investments in the water logistics and transportation sector and Dutch companies have expertise in this field, including the focus on innovative activities and sustainable development. Besides that, the Colombian government is showing initiative in improving the country's infrastructure through national development plans and PPP investments. Most importantly, the government and possible local partners show a big interest for international investments and partnerships. Therefore, the Colombian water logistics and transportation sector seems to be a prospect and profitable sector for Dutch companies to invest in, with many opportunities for the Dutch companies to succeed.



## 11. Recommendations

Based on the previous conclusions, the following will provide specific recommendations for Dutch companies aiming to enter the Colombian water logistics and transportation sector.

Firstly, when doing business in Colombia, it will be advisable for Dutch companies to involve a local intermediary such as a local agent, consultant or lawyer when dealing with Colombian business partners. Not only do such intermediaries provide knowledge regarding local regulations, but they can help to speed up negotiations as Colombians prefer to do business with people they know and trust. Therefore, the right local third-party contacts can be crucial for business success in Colombia.

Additionally, it will also be advisable to look into potential corruption history of all parties involved in the project. As stated before, corruption is still very much present in Colombia and can slow down business processes immensely. Furthermore, business partners may be pushing for illegal payments to secure contracts. Choosing the right business partners can thus be a way to avoid this issue.

Due to the long-term nature of projects in the water logistics and transportation sector, involving a Dutch manager in the project is also recommended, because of the tendency of the Dutch to be more long-term oriented in business than Colombians. It is also advisable to combine the Dutch specific knowledge of the sector and the strong work ethic to Colombia and to act on opportunities such as the development of the Magdalena river and the coastal protection in Cartagena. This way, both countries can benefit and learn from each other.

Lastly, it will be strongly advisable to research security conditions in the potential project area, as many parts of the country are still very much unsafe due to guerilla and paramilitary groups. According to the travel advice by the Dutch Ministry of Foreign Affairs, the most risky areas for Dutch companies active in the sector to develop projects in are (“Reisadvies”):

- **Chocó department** e.g. regarding development of Atrato river
- **Meta department** e.g. regarding development of Meta river, especially towards Puerto López in the interior of the country
- **Putumayo department** e.g. regarding development of Putumayo river, especially towards Puerto Asís at the Ecuadorian border
- **Nariño department** e.g. regarding development of port of Tumaco
- **Guaviare department** e.g. regarding development of Guaviare river, especially towards San José de Guaviare and Puerto Inírida (border to Venezuela in Guainía department) and regarding development of river Vaupés, especially towards Calamar

Considering the positive sector outlook and specific business opportunities presented in previous chapters, as well as taking into account the aspects presented above, it can be concluded that it will be strongly recommendable for Dutch companies to enter the Colombian water logistics and transportation sector. By combining the Dutch expertise in the sector with opportunities presented in Colombia, a successful business relationship can arise between both sides.

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