Faculty of Law

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Analysis of the Reverse Logistics of Empty Maritime Containers in the Port of Guayaquil: *CONTECON*

Thesis prior to obtaining the Degree in International Studies with a Bilingualism Mention in Foreign Trade

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Dedication

This thesis project is dedicated to my whole family, especially my parents Freddy and Bernardita for always being there for me. Without them this effort would not have been possible because by virtue of them is that I have managed to be a better person with values and knowledge. That is something I will never forget.

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Summary

In the international logistics arena, there is a branch that is the reverse logistics of empty maritime containers. In order to understand this topic, it is necessary to know what the logistics topic encompasses. Consequently, it will be necessary to address concepts, approaches, elements and worldwide standard definitions in order to facilitate the understanding of the topic. In general, this logistics is based on the handling of the empty container in the maritime terminal; that is, to analyze the costs of storage and means of transportation of an empty container until its due export, with or without cargo, in order to establish a response plan to avoid unnecessary movements and distribution of an empty container. Finding the correct model for the handling of an empty container in a maritime terminal is what this logistics is all about; and overall with the analysis made of the maritime terminal in *Valencia* (Spain), where a model of optimization of the empty container movements was studied, the progress level of the international terminal of *Contecon* (Ecuador), place on which the investigation will be carried out, will be determined.

Introduction

Foreign trade logistics is a science which main purpose is to strengthen the efficiency and the competitive profile of the company that implements it in its commercial activities. The container management can be used for different means of transport such as ships, trains and trucks, among others. Millions of containers are stored empty in different terminals around the world and with it, many businesses generate losses since the management or distribution of these unused containers is their responsibility.

In foreign trade and transactions between markets there is a constant imbalance, which can become a serious problem to be solved at a certain point. This imbalance is due to the dominant economy that is mostly dedicated to imports due to the fact that developed countries tend to accumulate empty containers since they import more merchandise than they export in comparison to underdeveloped countries that export more than they import. This is the main reason for the existing imbalance between exports and imports with containers and even more with the type of container used in the international physical distribution.

The objective of the analysis proceeds to establish the structural problems of worldwide containerization and with it, a correct management of the container in the marine terminals. Being able to count on a modern structure in port terminals for a better management of the container in its totality and determining the gaps between international terminals will allow to find the necessary recommendations to the established objectives in the investigation.

CHAPTER 1: INTERNATIONAL PORT LOGISTICS

This chapter focuses on the logistics of foreign trade in all its forms of transportation with a primary focus on the maritime, its theoretical concepts, components, and analysis. The importance of the application of a correct port logistics in the marine terminals is detailed, and with it the hiring of a qualified logistics corridor/broker. In this way, being able to reach the correct use of the container leads to, through an analysis, determine the most common errors within the commercial operation.

1.1. Port logistics

Port logistics is a complex science that is based on the monitoring of several determined steps; these, in turn, have the objective of caring for the merchandise as well as the container that transports it. This makes way for a planning that avoids any possible error within the supply chain management[1] (LOGÍSTICA, 2019). This logistics in ports not only corresponds to the work of the marine terminal but also of private companies that participate in the process of packaging, treatment and distribution of goods.

1.1.1. Logistics corridor/brokerage concept

Logistics brokerage is a broad concept in terms of business and even more when speaking internationally. It oversees the entire product flow from its creation until it is delivered to the final consumer. It is a fundamental pillar in the activities of the company because of its contribution in reducing unnecessary setbacks in all stages of the supply chain management. To the previous considerations Orestes Martínez Sosa (2015) published an article in the magazine known as "*Catálogo de Logística*", where he points out many definitions of the logistics corridor/broker,

[1] It is known as the set of all necessary activities in the process of selling merchandise both nationally and internationally.

whom is the person or group in charge of this operation previously explained. In general, it was obtained that:

> A logistics corridor/broker is the one who establishes a plan of action in order to provide competitive physical facilities and services, in which the technology of telecommunications and information are combined with basic transportation. With it, creating an increased and improved serviceability (pág. 1).

Within the logistics brokerage, there are other concepts that author Sosa (2015) points out which are:

A) Transport corridors

These are the people or legal entities that offer the service of transportation. They count with the infrastructure and necessary equipment for the administrative and commercial operations of the products they carry

B) Multimodal corridors

People or legal entities who have the transport infrastructure and facilities for a cargo movement on the go. They provide all the necessary services for the user during the transport of their merchandise both nationally and internationally

C) Green corridors

People or legal entities who are responsible for sustainable logistical solutions in which true environmental impact reductions can be documented. This without disfavoring the company that hired them

(págs. 1-2)

According to "*Empresa & Desarrollo*" (2014), for the development of an effective and efficient logistics brokerage it is required an integration and joint work of all the parties involved.

There will exist a temporary sacrifice, but it will end with a common benefit for the company. The "Meso Logistics" is a term to consider in this study because it implies an investment in a shared infrastructure, routes in optimal conditions, airports interconnected with railways, and highways for an agile and quick access. With all of this, the logistics corridor investigates the best possible solutions for a greater dynamic in the movement of merchandise transportation from its origin until its destination.

1.1.2. Phases of international logistics

International logistics is made up from a series of activities that, when together, lead to an efficient operation of the company responsible for delivering the product or optimal service to the final customer. There must always be an adequate management in each of the logistical activities, in addition to the accompanying technological support. These stages or worldwide known phases, according to "*Zonalogística*" (2019), are 5 which will be described below.

1.1.2.1. Purchases

It is based on the provisioning stage in general; here it is determined the necessary raw materials needed for the manufacture of goods that are planned to be commercialized, or the purchase of final products to be sold in local stores. In addition, it comprises who will be the providers of the services offered by the company. Besides being the first stage of international logistics, it is considered to be the most important one due to the fact that here is where everything begins for the company. Furthermore, it is important to note that in this phase is when the price criterion is set, which is a process that will help keep control of the costs of the business.

This purchasing phase is a cycle in which, once completed, it is proceeded to verify that all the data emitted by the company's warehouse accords with the inflow of the materials or products, and thus proceed to generate a new purchase order once the market uptake has been made

according to plan. In general, here lies the key for the profitability of the business. This phase has the following functions which are:

A) Plan purchases

The purchase planning is registered in a document called "Annual Plan of Purchases", in which the annual budget of the company is covered in its total. This registry includes the quantity of purchased material and that to be acquired in addition to its dates in order to keep track

B) Supplier selection

All commercial societies with the possibility of doing business with the interested company are selected. At the same time, all necessary commercial terms are agreed at that moment

C) Ordering

Prior to a quantitative-qualitative investigation, the necessary purchase orders are made for the production or sale of merchandise

D) Purchase control

There must always be a real-time control of the movement of the merchandise. All this to prevent certain anomalies in reference to the products

1.1.2.2. Customer service

It is defined as one of the most important areas within what commercial logistics comprises and even more internationally. These are all the activities that are found to be interconnected in order to offer the customer all their orders at the time and place previously agreed on. This phase is quite like Marketing, because it is based on the theory that a well-served consumer will be a future loyal consumer. It is manifested that within the customer service there are some essential elements that are:

1) Quick and smooth contact

2) A quick and effective acquisition of the order

3) Delivery of the merchandise in the established times

4) Necessary infrastructure for logistical operations

5) Handling of complains and compliments

These five elements help obtain transparent orders, or in other words an existence of fluidity. No errors or stops throughout the chronological order -within the supply chain management- as a process of customer service, which ends with the delivery of the product or offered service. In order to guarantee this, billing errors must be solved, and inconsistent reworks must be eliminated, among other services. Having to attract new consumers will be around six times more expensive (as well as difficult) than keeping the same customer. Customer service represents the advertisement with which the company makes itself known worldwide.

1.1.2.3. Inventory management

Inventory management is based on the control and handling of the products that are soon to be sold. Profitable methods or strategies are applied during the possession of these products in the warehouse so that it does not prejudice the company that owns it. Simultaneously, it grants the company an evaluation of the entry and exit procedures for such products. In the inventory management there are three fundamental operations that will be explained below:

A) Stocks custody: These are the necessary processes to consolidate the data that is related to the physical existence of the goods

B) Inventory analysis: Refers to all analyses and calculations previously drawn up in order to determine whether the existence of the products match those that were planned to be in the premises, always taking into consideration the profitability that these products are going to

generate. Some methods such as the “Just in Time” and the “Formula of Wilson” are the most used in these operations

C) Production planning: It is defined as the logistics area in which it is established when and/or how much amount of product to buy and later sell, thus being able to obtain profit. Some methods such as the “Master Production Plan” and the “Resource Manufacturing Planning” are the most used in these operations

1.1.2.4. Storage

Storage is the phase that is responsible for keeping all the merchandise under protection. Here an inventory control and custody process are requested, which is something mandatory and necessary, so that all the goods that are in the inventory are physically controlled at all time. According to the magazine “*Zonalogística*”, there are some storage functions that are:

-Keeping all goods protected from deterioration, theft and fire

-Allowing authorized personnel to access the materials and finished products that are stored

-Constantly informing the purchasing area about the actual stock of materials

-Carrying out thoroughly the controls of the materials (outbounds and inbounds)

-Checking that these materials do not run out (minimum-maximum)

-Reducing costs, thereby achieving a greater efficiency for the company

-Constantly moving items that are in the warehouse, covering entry and exit

-Supervising, controlling and valuing the internal tasks of administrative and physical movements

It is essential to keep in mind that the warehouse is an isolated entity and therefore separated from the other tasks of the company, but without forgetting that it is equally integrated in the company plans in order to fulfill all the established goals. An important point to take into

account will be that storage costs should always be as minimal as possible because it is where less movements of personnel exists (the available transportation should be used for the movement of only full loads, those that are for a ready to exit or enter the warehouse) but without leaving aside the higher service levels that this must encourage the company to have.

1.1.2.5. Transportation

Transportation in international commercial logistics is based on the service that covers all the means and infrastructures involved in the movement of materials or products, including the services of delivery, handling and reception. Everything to be at the service of the consumers. Within transportation there exists:

-Road

-Air

-Rail

-Aquatic

-Maritime

-Multimodal

1.1.3. Components of international logistics cost

In every international company, in addition to the sales of the product or service that it offers, its correct functioning and performance will depend to a great extent on the management of the expenses that will appear such as administrative, production, customs, etc. These elements are also known as business costs and represent a necessary outlay that every company exporter or importer must manage and, in the same way, control those flows of materials and information associated with it. According to the author Anaya Tejero (2011), logistical costs are summarized in 5 activities that are as follows:

- Storage and handling
- Stocks
- Transportation
- Packaging
- Information processing

(pág. 39)

Logistical costs can be quantified in the R.O.I (*Retorno de la inversión* - Investment return). The formula is as follows:

$$R.O.I. = \frac{PROFIT}{SALES} \times \frac{SALES}{STOCKS}$$

(Anaya Tejero , pág. 40)

Profit over sales represents the profit margin of the company, which in turn is the minimum operational costs. In addition, sales over stocks refers to the stock rotation or also known as "The speed of material flow". In summary, it can be pointed out that the objective with this indicator is to designate the time that it would take the company to recover the investment and generate profits based on the invested stocks.

1.1.4. Types of logistics corridors/brokerage

Due to the steady evolution of international trade in recent years; nowadays, greater speed and agility are required in the negotiations between its actors. Therefore, logistics corridors are found to be in a constant adjustment to the international market in order to find the appropriate response for efficiency demands and the correct coordination in the supply chain management. Consequently, Castellanos (2015) manifests the different levels of logistics corridors for a correct choice and elaboration of these activities at the international level:

- 1PL - First Party Logistics (*Logística Autosuficiente*): Manages the function called self-sufficient logistics. It is a basic corridor that is limited to only buying and selling in the same place or area of residence. Only transportation is subcontracted
- 2PL - Second Party Logistics (*Logística de Segundos*): Known as providers of capacity because here the organization begins to expand its area of influence. With it, small transportation companies and some storage providers are included. Also, they are known for managing low income and a high investment of assets
- 3PL - Third Party Logistics (*Logística de Terceros*): This logistics corridor is based on providing external logistical services and in turn seeks the appropriate logistical solutions in order to optimize the available resources. They have a distribution center and small transportation fleets. At this level, the logistics corridor is considered to be as a commercial trading partner
- 4PL - Fourth Party Logistics (*Logística de Cuartos*): Here the services of integrated logistics are provided, which consists of a logistics consultancy. This makes it more lucrative and allows it to have a much closer relationship with the customers
- 5PL - Fifth Party Logistics (*Logística de Quintos*): They are the main administrators of the supply chain management and, it is their duty to provide logistical solutions for it in the event of any failure. In general, this last level is focused on coordinating the demand of the product with its supply from its beginning until it reaches the hands of the final consumer

(págs. 292-294)

1.1.5. Specific objectives in the international port logistics

The specific objectives in the international port logistics are based on 2 main points. The first objective is to guarantee the purposes of the company (private or public) that has hired the port system service for the transport of merchandise. In each marine terminal there is a labor technician, who is in charge of the activities of dispatch and receipt of goods. It is also that person in charge of a whole department because he/she manages the processes of storage and distribution of the merchandise, handling of the corresponding port documents, support in the export and import activities, implementation of logistical techniques and administration of the entire merchandise transportation process (Instituto de Formación para el Trabajo, 2019).

The second objective is based on port security, which is dedicated to ensuring that the process can be carried out under optimal security conditions. This refers to both the security of people and goods in the terminal; that is, it seeks to avoid drug trafficking, criminal acts of any kind, terrorism and the most common of all, which is the theft of goods that will further on be marketed. In view of this, Romero (2016) states the following in order to prevent threats that may arise in the different cases cited above:

> Carrying out an adequate evaluation of these risks or threats; subsequently, developing a program to prevent, detect, deter and minimize security risks. This requires an adequate coordination with the law enforcement agencies and security departments of shipping companies that use the port services. Therefore, the security port departments must adopt a proactive attitude toward threats, as well as practicing drills and developing safety plans (págs. 28-29).

1.2. International physical distribution

The International Physical Distribution or IPD is considered to be as the set of all those necessary operations to move a cargo from its origin until its destination, in addition it will always be located in the international market complying with the negotiated terms between the buyer and the seller (Castro R. , 2019).

1.2.1. Functions of the international physical distribution

IPD's functions are based on a series of process related activities in the management of purchased orders, and in turn the fulfillment and validation of these. According to author Castro (2019), the following appears in the chain of international physical distribution:

-Preparation: Based on the packaging and labeling

-Unitarization: Includes palletizing and containerization

-Handling: Applies within terminals and warehouses

-Storage: Applies within private or public warehouses and depots

-Transportation: It is applied throughout the whole chain of distribution

-Cargo Insurance: In case of alleged risks to come

-Documentation: Commercial invoices, certificates, payment documents, etc

-Distribution Management: Includes the operative and administrative personnel of the company

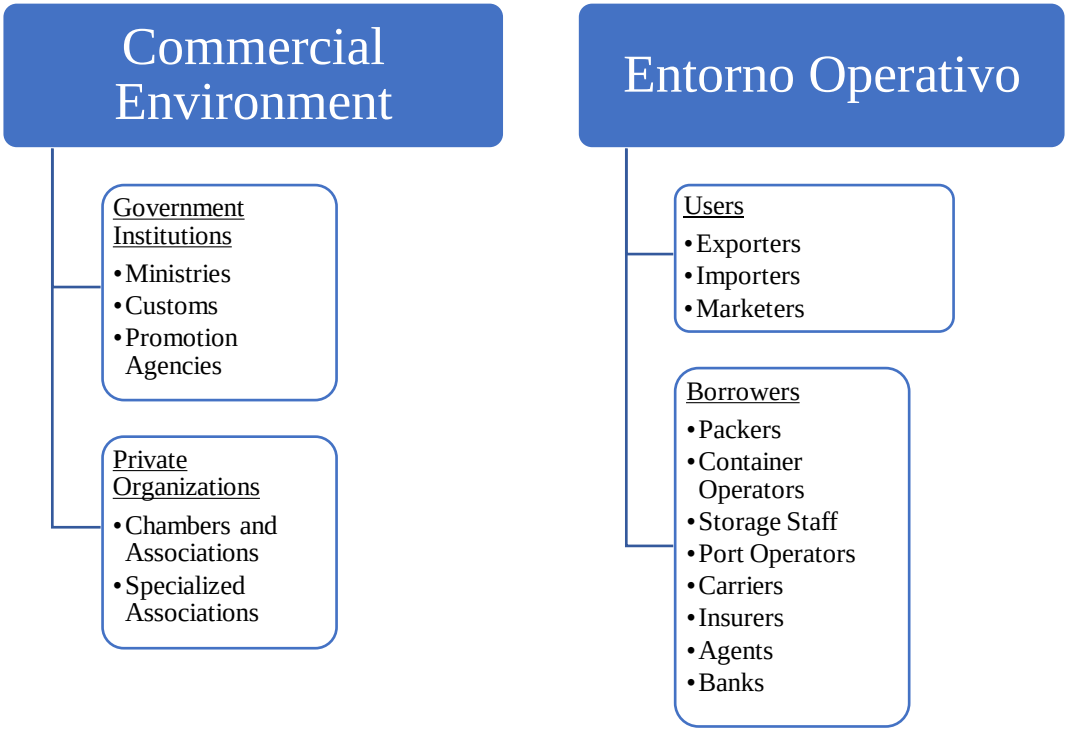
(págs. 1-2)

1.2.2. Environment in the operations of international physical distribution

The operations in the international physical distribution in theory, are of easy application, but in praxis this area requires the participation of various actors who in turn facilitate the

commercialization between the parties. According to the author Castellanos Ramírez (2015), all who operate in the international physical distribution are the following detailed in figure N°1.

Figure 1. ***Actors in the international physical distribution***



Source: Castellanos Ramírez , Logística Comercial Internacional , 2015
Made by: Freddy Guerrón

1.3. International transport

International transport is defined as the activity of transporting merchandise between countries, in this process there is an origin and a destination. All this by virtue of the international commercial relationships that were previously established between a buyer and a seller. Nowadays, a well-developed and competitive product transport system is offered which also features speed and security for the final consumer. Also, in the logistical aspect, there are companies of transport and logistics that assist in the transportation process of goods throughout its journey. Among some of the elements of international transport provided by the international magazine "Stocklogistic" (2017), the following stand out:

-International transport travels a greater distance in comparison to national transport

-There are many intermediaries in the logistics chain of international transport

-Procedures of export and import customs are carried out

-It is necessary to comply with the packaging standards of the different international markets

-Always keep in mind the regulations of the agreed international transport contracts

(pág. 1)

1.3.1. International transportation methods

Transportation is the set of all those necessary means in order to move a product from one place to another, by which the exchange of goods between countries is made possible. All operations focused on transportation lie in the study of material and informational flow, it starts with the supplier of the company until the merchandise reaches the consumer. A correct planification must be carried out in order to reduce unnecessary transport costs. A firm could hire a low-cost transportation company, but at the same time be distinguished from the competition because of its high-quality service; for this the right means of transportation that corresponds all needs must be chosen. The author Mora (2014) , explains the methods of international transportation that are road, air, water, rail and river, respectively.

1.3.1.1. Road

All transport functions are directly or indirectly related to the need of locating merchandise at the corresponding destination points, taking into account the previously established elements that are security, service and cost. Road transportation in considered to be the simplest and most common method due to the use of a universal road, which refers to in being able to access almost any place from the origin of the cargo and transport it to the final destination (without the need for transshipments). In other words, it counts with a versatility advantage by having a quick access to

the premises of the dispatchers, shippers or recipients. No other method of transportation has the capacity to do so.

In terms of security and promptness, these routes also stand out due to the smaller dimensions in matters of capacity that always allows the driver to exert a greater control over the merchandise. But it also has disadvantages in reference to the maximum capacity of transportation, which is not relatively large. Additionally, there are issues of vehicular congestion when it comes to driving in urban points or places with a high traffic flow, for which road transportation loses its preeminence in the aspects of agility and maneuverability. Users who hire road transportation must take into account the following requirements to their drivers:

- Check that the value rate per unit of load is correct
- Verify what type of vehicle will be used to transport the merchandise
- Check what kind of insurance the transport company uses
- In case of inconvenience in the delivery of the merchandise. What kind of surcharges will be handled?
- Verify the documentation before staring the movement of the merchandise in case of any mistakes

1.3.1.2. Air

The modus operandi of air transportation is globalized because it involves a dynamic activity that allows it to reach international markets. It is the fastest and most effective way in delivery and distribution of merchandise. It is most commonly used in perishable or high added value products. In this type of transportation, the characteristic of paying a high freight is due to the nature of time and security that it offers. The advantages of air transportation are as follows:

A) Advantages

- Speed: It is the fastest method of transportation currently available, hence its great importance for courier transport
- Competitiveness: This transportation mode offers a reduction in general expenses, more specifically in bulk cargoes
- Documentation: The necessary formalities for this method are quick and of easy access. This simplifies the time needed for negotiation between the parties
- Coverage: It has a huge amount of worldwide connections and routes, thus transport any kind of merchandise

B) Disadvantages

- Capacity: The airplane's modus operandi is not competitive in terms of available space for transportation in comparison to the rail or also water transportation
- Costs: This method has the highest-cost fees in international transportation
- External factors: It is the only transportation mode that can be found limited on some occasions due to unexpected bad weather conditions, therefore generating delays in the transportation schedule
- Limitations: Regardless of the company or situation that generates the documentation of the transporting merchandise, air transportation has a list of materials considered as dangerous and that under no circumstances can it be transported through this mode of transportation

1.3.1.3. Water

It is the best known and worldwide used method in foreign trade operations. It is an oceanic transportation of merchandise that is different from the aquatic or fluvial movements, which uses

inland roads such as canals, lakes and rivers. Nowadays, shipping by sea has been relegated to only international or inter-island transportation. The reason of this is due to the fact that, even though its costs are low, it is a slow trading system and very little reliable to count on. There are quite a few contingencies in marine traffic that have made it the last resource of many international companies; therefore, it is considered a good option only for the transportation of goods on large scales. An excellent example is coal.

Water transportation counts on the advantage of loading capacity as previously mentioned because ships are the means of transportation that enable the possibility for a higher scale and tonnage of merchandise, in comparison to other international transportation modes. In addition, international ocean freights are the cheapest in foreign trade currently. Relatively, although weather conditions may delay both the entry and exit of merchant ships, this method generates a greater stability than air transportation under the same circumstances.

The disadvantages for water transportation are some, whereas the most important one is the lack of accessibility. Some countries do not have a good port infrastructure, which sometimes are the cause for limited merchandise traffic. Also, the speed of the cargo vessels are the slowest in all means of international transport; sometimes rating speeds of 25 km/h when talking about the largest ships. Maritime transport, by type of cargo ships, are divided into 9 categories:

- Container ships
- General cargo ships
- Reefer ships
- Bulk carrier ships
- Oil tankers
- Roll on/roll off ships

- Chemical tankers
- Tugs
- Gas carrier ships

In relation to the present work that is focused on the management of containers, the following list of generations of container ships is presented:

A) Cargo Ships and Tankers

It has a length[2] from 135 to 200 meters, along with a draft[3] of less than 9 meters. It has a capacity that goes from 500 to 800 TEU's[4]

B) Cellular Container Ships

It has a length of 215 meters and a draft of 10 meters. It has a capacity that goes from 1000 to 2500 TEU's

C) Panamax

It has a length from 250 to 280 meters, in addition to a draft from 11 to 12 meters. It has a capacity that goes from 3000 to 4000 TEU's

D) Post Panamax

It has a length from 275 to 305 meters, in addition to a draft from 11 to 13 meters. It has a capacity that goes from 4000 to 6000 TEU's

E) Post Panamax Plus

It has a length from 320 to 380 meters, in addition to a draft from 13 to 16 meters. It has a capacity that goes from 6000 to 12000 TEU's

[2] Taking into account the length of a ship from the bow to the stern.

[3] Depth of the submerged part of a vessel in the water.

[4] Acronym of a unit of cargo equivalent to twenty feet of length. Worldwide term used in containers.

F) Ultra-Container

It has a length from 380 to 400 meters, in addition to a draft from 16 to 19 meters. It has a capacity that goes from 12000 to 14000 TEU's

1.3.1.4. Rail

It is a long-distance transportation mode in which many countries continue building new rails until today, all this because it facilitates the movement of containers and with it a better integration of this mode of transportation with other transport methods over the course of the trip. The cost depends entirely on the distance traveled, starting from the place of departure of the container on the railway, and with it the time that it will take for the proposed trip. The railway has the following advantages:

- Capacity: It has a similarity with road and air transportation in its cargo capacity, in terms of weight and volume
- Joint: It has a system that can easily be modified, by which it can be integrated with other means of transportation during the trip
- Speed: This method allows goods to be transported at high speeds which shortens the waiting time in foreign trade
- Documentation: The documentation used here is similar to that used in road transportation

In like manner, this transportation mode has disadvantages such as:

- Flexibility: This type of transportation is limited due to the characteristics of the network and the width of the tracks, in other words, the existing rails that prejudice in international traffic by not being standardized

- Transshipments: In most cases, the merchandise transported on the trains have already previously been passed by other means of transport, which increases the possibility of damage to the merchandise
- Looting: Like transshipments, the possibility of theft of the merchandise due to its constant manipulation

1.3.1.5. River

The river mode of transport is considered to be the most suitable and economic method in cargo freights, because it sails through the rivers that interrelate with borders and therefore within the destination countries. This method presents a transportation with low-cost fees and it is also a good option to help the environment because it generates less impact in comparison to rail and road transportation. In spite of all of this, it presents an enormous disadvantage, as the same as in water transportation, regarding the shipping speed and time. It should also be taken into account that the protection of the merchandise at the time of packaging is a strict and stern subject in manner because it transports goods through spontaneous climate changes and other circumstances that could end up damaging it.

(págs. 21-62)

1.3.2. Transport classification

Currently, for global exports and imports, two or more means of transport are used for shipping merchandise. Therefore, according to the author Anaya Tejero (2011), in international transportation there are 3 variables of this which are:

- Uni-modal Shipping: Only one method of transportation is used throughout the journey of the merchandise. Here there exists the single intervention between the shipper and the carrier

- Inter-modal Shipping: At least 2 means of transport intervene and there will always be one transportation mode that is the main one. As an example, a long distance transportation by rail, for the final delivery, hired a road transportation company because by itself it does not have an available access point to do so, but the rail transportation shipped almost entirely the route via which the merchandise was to be delivered
- Multi-modal Shipping: Several means of transport are used and there is a transport operator (part of the logistics brokerage) who is in charge of looking for the exact combination of transportation and thus being able to offer an excellent service to all the parties of the negotiation

(pág. 123)

1.3.3. International payment

According to the author Castellanos (2015), for all international commercial transactions a purchase-sale contract is used, which is the starting point in the field of world trade. In like manner, this merchandise commercialization gives place to other agreements that arise such as agency, distribution and representation contracts. There are contracts known as Joint Venture, which are best known because they represent a strategic alliance between two or more legal entities and carry out a production of goods for its subsequent sale in international territory. All purchase-sale contracts are governed by the United Nations Convention on Contracts for the International Sale of Goods, which has been in force since its approval on April 11, 1980.

1.3.3.1. Transportation contracts

In any international contract for the transaction of goods, the most important issue to consider is the transport contract agreed between the parties, which oversees taking the

merchandise to its destination. The author Andrés Castellanos Ramírez (2015) defines the transport contract as follows:

> It is a contract under which one is obliged for a certain price to drive from one place to another, by road, canals, lakes or even rivers; passengers or goods, and deliver these to the people to whom they are addressed (pág. 199).

1.3.3.2. Actors in the transportation contract

International transport is based on the movement of merchandise by the means of transportation previously designated between the parties. In theory, the operation is of easy enforcement, but it requires the participation of various intervening parties who carry out the entire process of international traffic. Within this, according to the author Castellanos Ramírez (2015) there are:

A) Carrier, Transporter, Driver (road) / Skipper, Shipowner (water): Person who accepts the obligation, that is to receive the merchandise and protect it throughout the trip until the cargo is delivered to the consignee

B) Loader, Forwarder, Sender, Shipper or Consignor: Person who on their own or with the help of others is in charge of putting in the carriers hands the cargo and provides he/she with the respective documents

C) Consignee or Recipient: It is to whom the merchandise is sent to (the same consignor may end up being the consignee) and must comply with the respective payments to the carrier for the freight and any extra expenses if there were

(pág. 200)

1.3.3.3. International transport packaging

According to Mora (2014), packaging is the receptacle or wrapper that serves to stow and transport merchandise. It is not only used to arrange the products to be transported but also to protect the content itself, inform about the handling conditions of the products, legal requirements, composition, etc. Sometimes the same package in which the goods are stored are used to promote the product when in the store, as in the case of cardboard boxes or pallets. In addition, packaging seeks to minimize the risks of the merchandise throughout the distribution cycle and, in the same way, not cause any danger to whoever transports it; this when transporting chemical or mechanical goods.

The most common packaging types currently used in international trade are detailed below in table N˚1.

Table 1. ***Types of packaging***

Cage or Mexican basket: Made of reed or palm tree in order to transport food.	
Cardboard boxes or Packages: Complete rectangular or polygonal faces, made of metal, wood, plywood, reconstituted wood, plastic, or any other materials that does not contain any holes.	

Pallet: It is a structure made of wood (in most cases), which allows it to be handled and moved around as a single unit by mechanical means. It is used to stow the packages that contains products or even goods that are not packaged.	
Container: It is designed to transport cargo by air, sea or road. The containers are usually made mainly of corten steel, but there are also some made from aluminum and others from plywood, reinforced with fiberglass. Generally, the floor is made of wood, although there are already some made from bamboo.	
Cans: Cylindrical receptacles with flat or cambered bottoms, made of metal, cardboard, plastic, plywood or any other appropriate materials. This definition encompasses metal or plastic receptacles that have other shapes, for example the round ones with conical caps or those in the shape of a bucket.	
Van: Metal box used for general cargo transportation.	

Kegs (Jerrycan): Metal or plastic receptacles, rectangular or polygonal shaped, and that comes with one or more holes on it.	
Sacks: Flexible receptacles made of paper, plastic sheeting, textile, woven fabric or any other appropriate materials.	

Source: Mora , Logística del transporte y distribución de carga , 2014
Author: Luis Aníbal Mora

1.3.3.4. Incoterms

Incoterms (2020) are the terms that both sides of the negotiation must agree in before filling out the respective international payment documents. Here, certain topics are clarified such as the place of delivery of the merchandise, the time and place where the risks of the transported goods become responsibility of the buyer or seller, to whom it belongs to cover the transportation-insurance expenses and until what extent of the trip, among others. In 2020 there occurred a change in the incoterms list, more in terms of security and the obtaining of the official documents. The official list is as follows:

A) E Terms: These refer to the incoterms that start with the letter "E"; here the seller only has to make sure that the merchandise is available for the buyer at the company's premises on the agreed date between both parties, and the buyer takes care of the rest. The incoterm within this category is:

- **EXW Ex Works**

B) F Terms: These refer to the incoterms that start with the letter "F"; here the seller must arrange the transportation within his/her own country and deliver the merchandise at the agreed departure place. The main carrier (who transports internationally) is hired by the buyer. The incoterms within this category are the following:

- **FCA Free Carrier**
- **FAS Free Alongside Ship**
- **FOB Free on Board**

C) C Terms: These refer to the incoterms that start with the letter "C"; here the seller contracts the carriage and assumes all costs until the entry of the destination country. The main transport in included, but in terms of merchandise insurance only CIP and CIF incoterms oblige the seller to cover this expense. The incoterms within this category are the following:

- **CFR Cost and Freight**
- **CIF Cost, Insurance and Freight**
- **CPT Carriage Paid To**
- **CIP Carriage and Insurance Paid To**

D) D Terms: These refer to the incoterms that start with the letter "D"; here the seller assumes the cost of transport and insurance of the merchandise until the agreed place, previously established between both parties, in the destination country. The new incoterm in this section is the DPU that replaces the DAT because of the existence of certain merchandise considered to be very delicate and that requires a greater control throughout the international physical distribution. The incoterms within this category are the following:

- **DAP Delivery at Place**

- **DPU Delivery at Place Unloaded**
- **DDP Delivery Duty Paid**

1.3.3.5. International payment documents

The documents that are used at the international level arose from international conventions which in turn are from a supranational order, that is, these replace any national regulation and become the only base element for trade between forwarders and carriers. In addition, these are the only trusted documents that are delivered to the recipient and that he/she must receive in order to avoid future legal problems. The following conventions with its international transportation documents that have been registered throughout history are detailed in table N˚2.

Table 2. ***Transportation documents***

CONVENTION	DOCUMENT NAME (SPANISH)	DOCUMENT ACRONYMS	DOCUMENT NAME
GENEVA, 1956 ***ROAD***	*Conocimiento de Embarque por Carretera*	CMR	International Road Consignment Note
WARSAW, 1929 ***AIR***	*Guía Aérea*	AWB	Air Way Bill
HAMBURG, 1978 ***WATER***	*Conocimiento de Embarque*	BL	Bill of Lading
ROME, 1924 ***RAIL***	*Conocimiento de Embarque por Ferrocarril*	CIM	International Rail Consignment Note
(AGREEMENT BETWEEN THE PARTIES APPROVED BY RIPARIAN STATES) ***RIVER***	*Conocimiento de Embarque Fluvial*	/	River Bill of Lading

GENEVA, 1980 ***MULTIMODAL***	*Documento de Transporte Multimodal*	MTD	Multimodal Transport Document

Source: Castellanos Ramírez , Logística Comercial Internacional , 2015
Made by: Freddy Guerrón

1.4. Reverse logistics of empty maritime containers

The reverse logistics of empty maritime containers is based on a process to find the fundamental reason for the accumulation or shortage of empty containers that are used for raw material transportation; and then, apply the solution that the logistics operator believes to be convenient. All this occurs due to an imbalance in international trade and the transactions between individual markets. As a deduction, the reverse logistics of empty maritime containers seek a solution plan for the unnecessary costs that unused empty containers cause at the port terminals.

1.4.1. Application levels of the logistics

The reverse logistics of empty maritime containers oversees all the movements and distribution that the container has during its preparation phase. It starts when the container is emptied/deconsolidated at the destination terminal or facility and in turn ends with the beginning, that is, when the container is reloaded or consolidated for its subsequent trip. According to Engineer Eslava Sarmiento (2019), there are two fundamental levels in this logistics that are:

- Local: Refers to the road/land movement of the containers between terminals, depots and premises of the senders or recipients. The costs of this is generally charged to the client, which can be the exporter or importer
- International: It is based on the movement of containers internationally, due to the existing imbalance in the main trading routes; that is, a lack of containers in the exporting country. The cost of this is generally charged to the shipping company that is responsible for the provision of its equipment, the containers

(págs. 1-2)

1.4.2. Container definition and logistics

A container is a receptacle used for transporting cargo by road, water and air; both in national as well as in international lands. The size and function of each container varies depending on the cargo that it is going to transport. All containers are regulated by the ISO-6685[5] standard, which in turn facilitates the manipulation and adaptation of this for its worldwide use by any means of transport (MAITSA "Customs Brokerage", 2019).

As defined in the International Convention for Safe Containers (2019), a container is known as a transportation element that:

- Is permanent, therefore resistant enough to allow its repeated use
- Is constructed in a way that it can be easily attached and/or manipulated, through the existing corner castings
- Is specially designed to facilitate the transportation of goods, by one or more means of transport, without an intermediate cargo handling

The convention includes an explanation of its use, which highlights that all the new and existing containers will be used for international transportation. The containers that are specially built for air transportation have different characteristics for its manipulation in world trade. In conclusion, every new and existing container must comply with the provisions generated by the convention, without the possibility that any other contracting party may impose other rules or structural safety tests for their own comfort. Nowadays, security controls are applied by duly authorized officials of the convention in order to ensure the adequate transport activity.

[5] ISO abbreviation for the -International Organization for Standardization-, where code 668 refers to the management of containers, its classification and dimensions that are approved worldwide.

1.4.2.1. Container classification

In analysis of what was written by author Mora (2014) , containers are classified based on its size and presentation of the merchandise; that is, by the kind of products being transported so that there is no damage to it. The measures of the containers are of 20 and 40 feet respectively, worldwide known by the acronyms TEU (Twenty-Foot Equivalent Unit) and FEU (Forty-Foot Equivalent Unit). This measurement refers to the length of the containers. In addition to these 2, there exists the 40 feet HC (High Cube) container that is only used when the merchandise needs of a container with a height that is higher than normal; it is represented only in FEU's. Containers are 7.8 feet wide and 7.6 feet high, except the High Cube containers which as previously explained have a height of 9.6 feet.

The current universal container types are detailed in table N˚3 and are found in TEU's, FEU's and FEU's HC respectively.

Table 3. ***Types of containers***

NAME	DESCRIPTION	CONTAINER
Dry Van	Standard containers that are used to transport and store general cargo. Hermetically closed and without any refrigeration or ventilation.	
One Top	Uncovered at the top and has a removable canvas. Generally used to carry oversized cargo.	

Reefer	Has a cold or heat conservation system and a thermostat. Especially used for the transportation of food that needs to be kept at certain degrees of temperature. These containers go connected to the ship or in the terminal, and in some cases count with an external generator that is specifically for the container.	
Flat Rack	Lacks side walls and even, in some cases, front and rear walls. Used for the transportation of special non-uniform cargoes, that is, machinery and sometimes even train wagons. Its handling requires front equipment supported by chains.	
Platform	Only used for heavy and oversized cargo, therefore not suitable for internal transportation.	
Isotank	Specialized container for the transportation of liquid food, and in some cases liquid chemicals. As an example, there is fuel, oil, beer, milk and drinking water.	

Source: Mora , Logística del transporte y distribución de carga , 2014
Made by: Freddy Guerrón

1.4.2.2. Container identification

All containers that are transported on the international terrain must have a globally recognized identification, which has been assigned by the *Bureau International des Containers et du Transport Intermodal (BIC)*. This identification is a set of codes that is regulated by the ISO-

2716[6] standard (Alvarez , 2013); which consists of several codes that when formed together allows to recognize its origin, owner data, type of container, etc.

Figures N˚2 and N˚3 show in detail the identification characteristics previously commented.

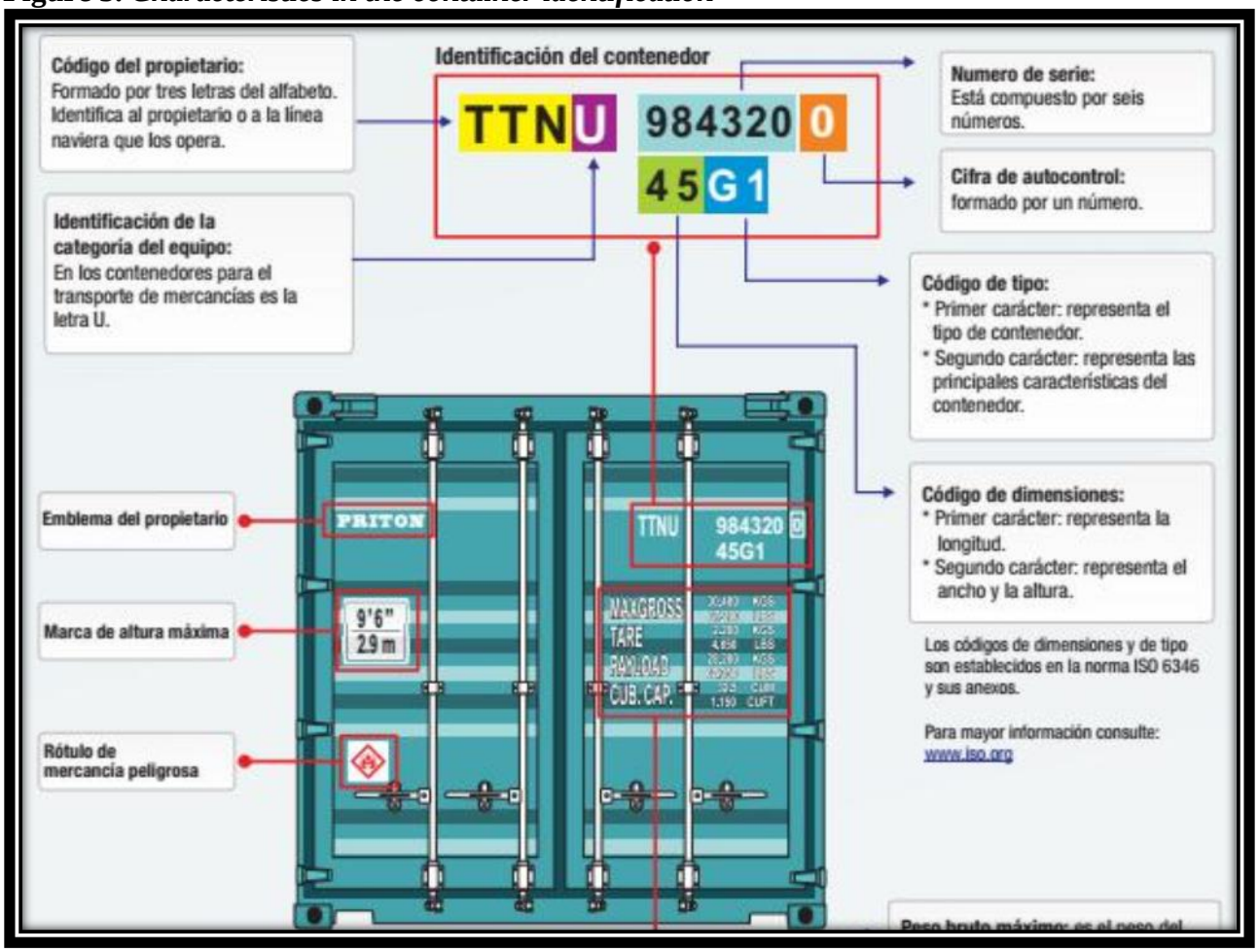
Figure 2. ***Container identification***

Source: Alvarez , Encaja "Embalajes y Trading" , 2013
Author: Jesús Alvarez

***-Número de identificación*:** Identification number

[6] ISO abbreviation for the -International Organization for Standardization-, where code 2716 refers to the encryption and coding system used for the goods transported in the container.

Figure 3. ***Characteristics in the container identification***



Source: Gómez , Infografia sobre Contenedores , 2010
Author: Julián Gómez

-***Código del propietario*:** *Formado por tres letras del alfabeto. Identifica al propietario o a la línea naviera que los opera.*
-Owner´s code: Made by three letters of the alphabet. Identifies the owner or the shipping company that operates.

***-Identificación de la categoría del equipo*:** *En los contenedores para el transporte de mercancías es la letra U.*
-Equipment category identification: For the transport of merchandise in containers the letter U.

-Emblema del propietario
-Owner's emblem

-Marca de altura máxima
-Maximum height mark

-Rotulo de mercancía peligrosa
-Label of dangerous merchandise

***-Número de serie*:** *Está compuesto por seis números.*
-Serial number: It comprises six numbers.

***-Cifra de autocontrol*:** *Formado por un número.*
-Self-control digit: Formed by one number.

***-Código de tipo*:** *Primer carácter: Representa el tipo de contenedor.*
Segundo carácter: Representa las principales características del contenedor.
-Type code: First character: Represents the type of container.
Second character: Represents the main characteristics of the container.

***-Código de dimensiones*:** *Primer carácter: Representa la longitud.*
Segundo carácter: Representa el ancho y la altura.
-Dimensions code: First character: Represents the length.
Second character: Represents width and height.

1.4.2.3. Container packaging

Containers are specially designed to carry different types of cargo and thus the existence of the great variety of containers globally used by international companies. Each one has a different structure that facilitates the handling, manipulation and security of the cargo. According to Castellanos (2015), these facilities are as follows:

- Containers have slatted or plywood floors which allows to anchor blocks, tie rods, and wedges with nails or screws
- The internal walls of the container, including the door and roof serve only to support light load, because these are made of a thin protective metal sheet that does not support heavy weight
- Containers have corner castings that are suitable for shoring up with timbers
- Each container has lashing rings, which are located on the floor and in the ceiling; these have tie rods that secures solid merchandise with ropes, chains and wires

(pág. 112)

This entire packaging process is a technical action because any type of error that may harm or prejudice both the merchandise and the carrier (that will be in charge of the national or international route) should be avoided. There are important aspects in the packaging process, within these, two will be taken into account.

1) Ensure that there are no empty spaces in the container. Supposing the merchandise does not completely cover up the entire space of the container, it must be filled with airbags, wooden pallets or any other stowage material that generates confidence

2) It is based on securing the load, that is, to wedge and tie the cargo. This is achieved due to the placement of a wooden beam that fits in the corrugated part of the container walls and by using the respective lashing rings. In some cases, to give a greater security, a double beam is placed in the grooves of the container corner castings and filling this space between beams with even more beams in order to not leave any empty space

(pág. 113)

1.4.2.4. Logistics management of the containers inside the marine terminal

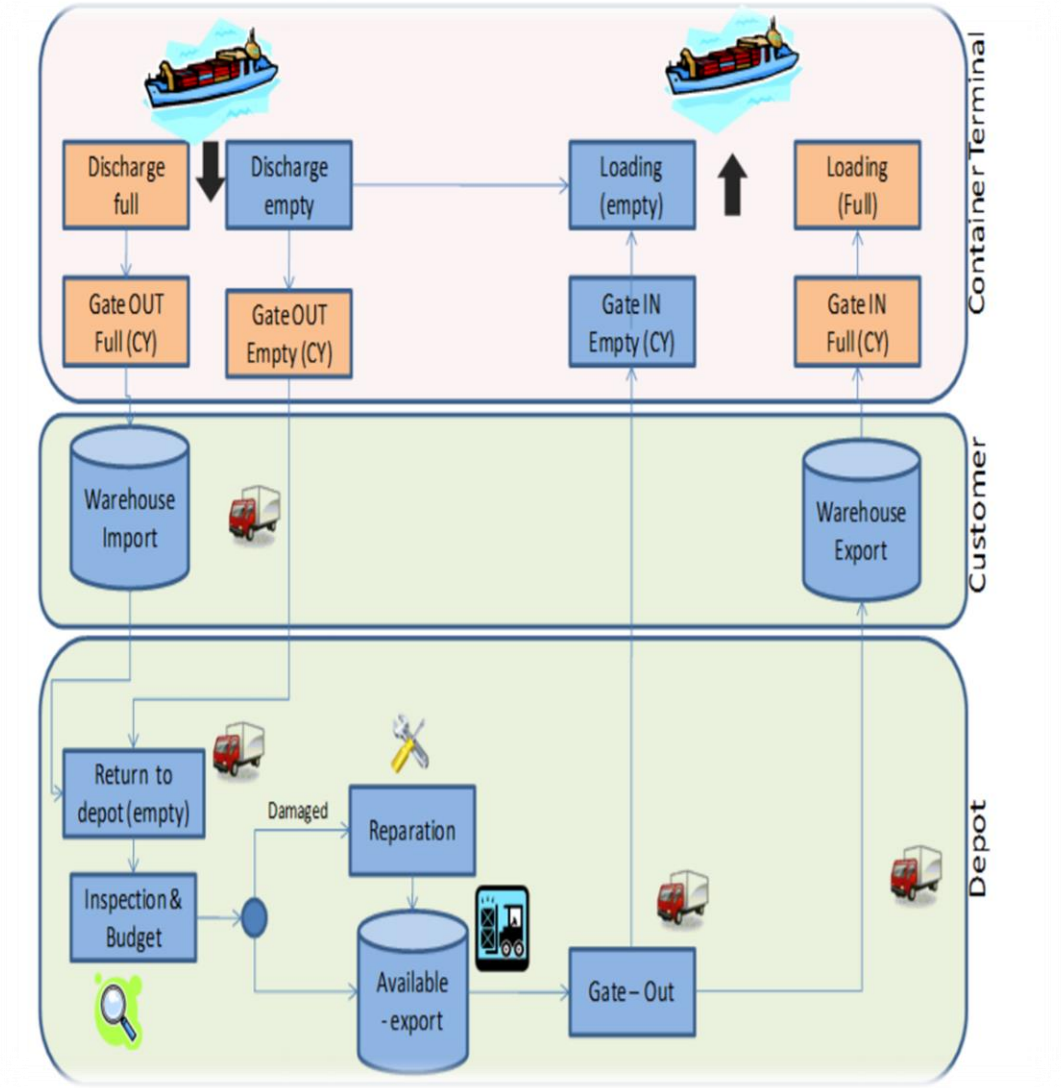
According to Martínez Marín (2013), the container goes through a considerable simple movement, but at the same time complicated in terms of time-security inside the marine terminal until the moment in which it is reloaded and transported to a new destination. The customer receives an empty container coming from a foreign or national port terminal, or also from an empty container depot. It is loaded with new merchandise and immediately transported to the port terminal where it is next to be shipped. The same occurs at the destination port where the container is unloaded, or a road carrier transports it to the warehouse of the recipient where it is emptied.

Finally, the empty container is transported to a new depot or port terminal awaiting to be used again. In some cases, when an empty container arrives to the recipient, it must:

- Go straight to the shipper to be loaded right away
- Be sent to the depot for inspections/repairs
- Get back on board the ship as an empty repositioning case in order to meet the demands in another destination

This can be represented in figure N˚4.

Figure 4. ***Logistics management of the container inside the marine terminal***



Source: Martínez Marín & Eguren , Analitical Review of the Empty Container Cycle , 2009
Author: Martínez & Eguren

The illustration presents a basic case of the container management in the marine terminal, considering that there is only one straight movement of it. Furthermore, with the use of only full containers or also known as Full Container Load (FCL). In FCL containers all the merchandise belongs to only one customer and has a single destination. In the case of a consolidation for a subsequent deconsolidation of the cargo in a container, one would be talking about groupage containers that carry merchandise belonging to different owners and in turn has a lower freight cost, this operation is known as Less than Container Load (LCL) (Martínez Marín , 2013).

1.4.2.5. Main challenges in the logistics management of the container

The main challenges found in a poorly planned reverse logistics of empty maritime containers are diverse. According to the author Castro (2014), in her work titled "Optimization model for movements of empty maritime containers applied to the port of Valencia"; the challenges found were the following:

- It takes a large initial capital investment to start transporting in containers (construction of containers, specific equipment in terminals, etc.)
- It is required a large-scale use to harmonize investments
- Some merchandise is not suitable, or its container transportation is just not economical
- Containers do not always travel full, which in turn reduces profitability
- In some ports there are no adequate handling means

(pág. 26)

In conjunction with the aforementioned challenges for the implementation of a correct container logistics in ports, the most important one is added to this list, which is the problem of the empty container flows at the macroeconomic level. This occurs because some shipping companies tend to accumulate large numbers of empty containers in various ports where these

were imported, therefore those same containers must be quickly repositioned in various ports for its respective exportation (Castro S. P., 2014).

1.4.2.6. Definitions within container logistics

Author Martínez (2013) considers the following definitions as the most important ones within the shipping logistics:

A) Fleet Management: Analyzes the entries and exits of the containers from the fleet/terminal

B) Park Management: Person in charge of the containers that are physically inside the area of responsibility of the consignee agent or shipping/shipowner manager

C) Rental-Fee: It is the cost for rental or financing of the container

D) Per-Diem: It is the total daily cost estimated of the container. It is a calculation that contemplates the Rental-Fee plus the average cost of maintenance, repair, storage, approvals and taxes, among others. It represents the unit cost of the containers fleet

E) FI-FO: It represents the acronym for First In - First Out, which means that the first empty container to enter the depot or terminal area will be the first to exit. Thus, minimizing storage costs and, in turn, Per-Diem

F) Overdue or Long-staying: It refers to the containers, whether empty or full, that spend more time than normal in the depot or terminal

(págs. 48-49)

1.4.2.7. Agents involved in container logistics functions

Author Martínez (2013) refers to the following agents that operate inside the marine terminal:

A) Shipping Operations Manager: Person in charge of the fleet or terminal, and of all the movements that occur in the park from the moment containers arrive until its departure. They establish the inspection and repair criteria. Furthermore, the people that are in this position determine which containers should be destined for disposal and which ones for refurbishing. There is also the shipowner manager who is responsible of the ship management in all its aspects

B) Port/Shipping Agent: In the event that the position of shipping/shipowner manager is already taken, the port/shipping agent will be that person second in command. In other words, he/she will verify that the damaged containers are repaired according to the approved budget and will collect the information of the other containers in order to deliver it to the respective shipping/shipowner manager

C) Inspector: Frequently checks the physical status of the containers and thus gives an estimate cost for repair if it were necessary. It is the one who gives notice to the repairman about the situation of the stored containers

D) Repairman: Person in charge of checking/repairing the containers that the shipping or shipowner manager and inspector have considered concerning

E) Other transport and handling providers: Terminals and depots workers issue and sign E.I.R's (Equipment Interchange & Condition Report) documents, which is the only legal proof that manifests the entry or exit of a container in case it were to be damaged. It is an indispensable and mandatory document. Its importance is seen in the Reefer containers usage, which is a container that must remain with a permanent monitoring service of the displayed temperatures, hence being the most common to break down

F) Carriers: They provide the service of transporting containers from one place to another, which in turn is under the responsibility of the port/shipping agent in charge. This is covered with contracts directly made with the shipping/shipowner manager or port/shipping agent

(págs. 61-64)

1.4.3. Demand and operation in the reverse logistics of empty maritime containers

Logistics corridors, within the different areas of operation in the supply chain management and the international physical distribution, seek efficiency in the operations and to apply correct managing movements of the merchandise from its origin until the end. Based on the management of containers since its arrival at the marine terminal until its departure into international lands again, author Moya (2016) considers certain fundamental factors for its correct operation such as:

- Having a respective calculation of the current demand. This is done in conjunction with the commercial department who provides the estimated sales volume for a determined period
- Knowing not only the empty containers that will arrive at the port terminal but also the full containers in order to be able to verify if that quantity would satisfy the demand
- In reference to the containers arrived, it should not be taken into account those that transship in the terminal and those that make inland transportation to another location
- In the event that there is a quantity of empty containers that exceeds those predicted, it is considered as a surplus and the designated logistics corridor must evacuate the exceeded empty containers to another location where it could be required
- In the event that there is a quantity of empty containers that are less than those predicted, it is considered as a deficit and the designated logistics corridor must bring the empty containers that are immediately required for the next exportation

(págs. 1-2)

1.5. Conclusions

The reverse logistics of empty maritime containers is a fundamental branch of the international port logistics, where there have commonly been quite a few flaws throughout its application. Being able to count on a propitious port infrastructure and a correct planning established by professional logistics corridors/brokers will help solve any problem in matter of unnecessary logistical costs generated by having empty maritime containers without being used. In like manner, it will allow international companies a greater amount of exported and imported merchandise without a major waste of time and, in turn, obtain higher profits using the minimum possible resources in the port terminal.

Once the logistics corridor has been informed to carry out the solution process in the port terminals, the analysis of what kind a container is the mostly used and its life cycle in the depot or terminal will be the last point to sort out. Having knowledge of all this, the investigation of the structure and management of the maritime ports of Ecuador will begin.

CHAPTER 2: HISTORY AND LOGISTICAL PROFILE OF THE ECUADORIAN PORTS

Ecuadorian ports have allowed the country an open to world trade because of merchandise exchange increasing every year. In addition, at the state level the logistics infrastructure always plays a fundamental role in the international physical distribution process and, therefore, this chapter collects information from various sources in order to determine and know the infrastructure and history of each maritime port in Ecuador. Consequently, in conjunction with the information of containers, inbound and outbound, in each Ecuadorian marine terminal, achieve a general approach of the country. All this for a quantitative study of the territorial administration in each international port terminal of Ecuador.

2.1. *Autoridad Portuaria del puerto de Guayaquil*

2.1.1. Geographic location

The *Autoridad Portuaria de Guayaquil* is located on the western coast of South America (Pacific Ocean); exactly in an arm of the sea known as the "*Estero Salado*" inside the province of *Guayas-Ecuador*, and comes across at a latitude of 2º 16' 51" South and a longitude of 79º 54' 49" West (Autoridad Portuaria de Guayaquil, 2019). Its climatic conditions are of hot tropical or humid tropical type, and with temperatures ranging between 23-27 degrees Celsius. Through the marine terminal, cold and warm air currents are detected due to the currents of "*Humboldt*" and "*El Niño*" respectively (Zonalogística , 2019). Although access to *APG*[7] is one of the most difficult in *Ecuador*, this has not impeded so that it can currently occupy a high position within the best marine terminals in the world. In the year 2014 it ranked second place in marine terminals belonging to

[7] Abbreviation of the -*Autoridad Portuaria de Guayaquil*-.

the ACN (Andean Community of Nations) with the most outbound containers in that year (América Economía , 2014).

Table N˚4 details the characteristics of the dock with its access channel.

Table 4. ***Characteristics of the -Autoridad Portuaria de Guayaquil- dock***

INFRAESTRUCTURA PUERTO DE GUAYAQUIL	
Superficie total	1,133,800 m2
Longitud de muelle	1,625 m
Calado máximo	10,97 m
Calado máximo en canal	13,11 m
Sitios de atraque	10
	4 sitios para buques portacontenedores (700 m)
	5 sitios para carga multipropósito (925 m)
	1 sitio para embarcaciones auxiliares (90 m)
Tomas reefer	3,789 (460 voltios trifásico)

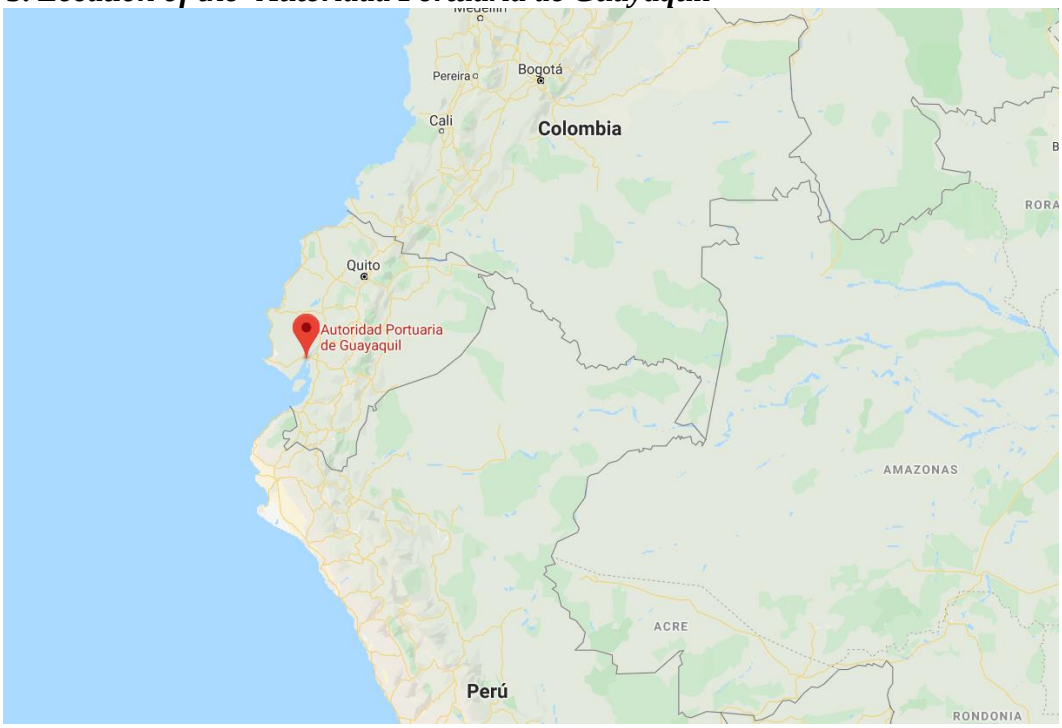
Source: Instituto de Promoción de Exportaciones e Inversiones, 2019
Author: Pro Ecuador

According to the *APG* (2019), its access channel has a length of 51 nautical miles and a width of 122 meters. Also, it is always under the action of tides, as an average there are 2 high tides and 2 low tides daily; this varies depending on the time of the year and also of the section in which the respective vessel is located on the channel. The access to the arm of sea in which this port terminal is located has a permissible draft of 9,75 meters for navigation, sometimes it can reach 10,97 meters depending on the width of the area at high tide. Additionally, this dock counts with help systems all around its navigation in the channel such as beacons, buoys, line-up materials and lighthouses, which are strategically located throughout the entire length of it. Furthermore, the operational control of the channel is guaranteed by means of a contract with the "Oceanographic Institute of the Naval Forces (INOCAR). In general, the channel waters are almost always calm

and does not present any problem for the vessel wishing to navigate it (as long as it complies with the respective metric characteristics) which guarantees its operation throughout the entire year without any failure.

As shown below, figure N˚5 illustrates the location and territorial limits respectively.

Figure 5. ***Location of the -Autoridad Portuaria de Guayaquil-***



Source: Google Maps , 2019

2.1.2. Historical review

According to the official page of the *APG* (2019), the maritime port of the city of *Guayaquil*, since colonial times, has been considered one of the most important marine and fluvial terminals in all South America. This is due to its privileged location, to the commerce that has been growing in the city and the naval shipyards built in the place. In the beginning, the port of *Guayaquil* was built and established on the shorelines of the *Guayas* river, near *Las Peñas* neighborhood. It had docks that allowed the arrival of vessels of any size in that time, and a shipment/landing system of merchandise at the pier. However, over the years, the phenomenon of

sedimentation affected the entire navigable route of the *Guayas* river until the point when the ships of that time could no longer transit through it. There used to be a transshipment of the cargo in small barges in *Puná* in order to transfer the merchandise to the pier. All this caused a more expensive freight payment and international trade was constantly decreasing.

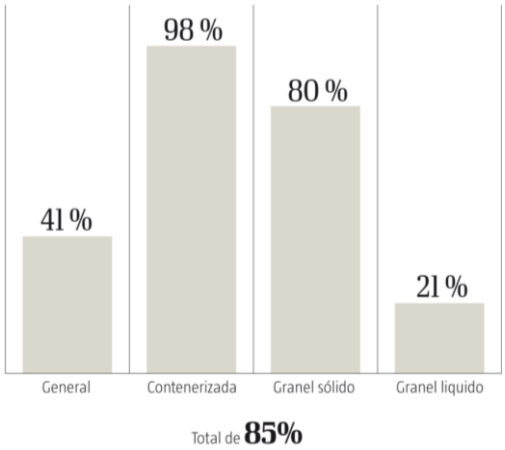
In the year 1950, the plan to build a new maritime port at the south of the city of *Guayaquil* was presented by Captain Luis. E. Jarrín. However, 8 years later, in 1958 the president of Ecuador Camilo Ponce Enríquez implemented the Decree "Emergency Law" for the immediate construction of the new maritime port of *Guayaquil*; in addition, it would be under the command of the new *Autoridad Portuaria de Guayaquil*. This new legal entity had and currently has specific purposes such as planning, financing, execution, operation, services and facilitation throughout the whole port for those who wish to hire the maritime trade services. Palmer company was contracted by the *APG* for the study of a new port construction and, as a result, foreign construction companies were invited to present their offers for the modernization plan. The selected company was Raymond International, which has never stopped incorporating new areas and equipment into the port even with the passing of the years; even after the new port was inaugurated in 1963. On January 31st of that year, the first ship entitled "*Ciudad de Guayaquil*" arrived at the new maritime port of *Guayaquil*.

2.1.3. Most marketed products by the -*Autoridad Portuaria de Guayaquil*-

Guayaquil specializes in the export of bananas and containerized cargo, its marine terminals transport around 85% of all private cargos in all of Ecuador. In the *Contecon* concessionaire the export of bananas, shrimp and fish stands out; also, there is the main import of compost, fertilizer, coils, steel plates and paper (El Telégrafo, 2017). In general, all solid merchandise that can be mostly transported by Dry Van containers. According to the newspaper

"*EL TELEGRAFO*", in 2017 the following percentages were obtained: 41% of general cargo, 98% of containerized cargo, 80% of solid bulk cargo and 21% of liquid bulk cargo. This, in reference to the transported cargo by *Guayaquil* in relation to the national total by type of cargo.

Figure 6. ***Percentage of cargo movement from Guayaquil in 2017***



Source: Humboldt Management
Author: El Telégrafo

2.1.4. Index of exported and imported empty containers

For the analysis of the reverse logistics of empty maritime containers, the empty containers, TEU's[8] and FEU's[9], exported and imported respectively, by the *Autoridad Portuaria de Guayaquil* are taken into account. These are detailed below in table N˚5 and figure N˚7. *Contecon Guayaquil S.A.*is the terminal in charge of handling containerized cargo in the *APG*, by which this company is given in concession and is a private entity (Cortes Torres & Vergara Coronel , 2020).

[8] Acronym of a unit of cargo equivalent to twenty feet of length. Worldwide term used in containers.

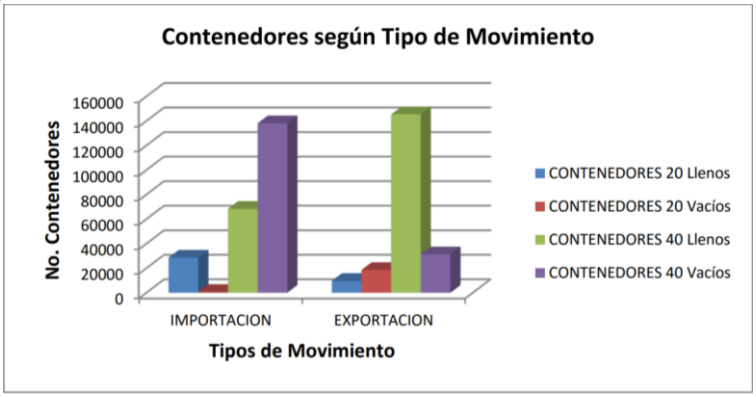
[9] Acronym of a unit of cargo equivalent to forty feet of length. Worldwide term used in containers.

Table 5. ***Full and empty containers. Exported and imported by the -Autoridad Portuaria de Guayaquil- in the year 2019***

	CONTENEDORES				TOTAL CONTENEDORES	TEUS
	20		40			
	Llenos	Vacíos	Llenos	Vacíos		
IMPORTACION	28.681	658	68.403	138.143	235.885	442.431
EXPORTACION	9.645	18.571	145.368	31.284	204.868	381.520
TOTAL	**38.326**	**19.229**	**213.771**	**169.427**	**440.753**	**823.951**

Source: Autoridad Portuaria de Guayaquil, 2019
Author: Autoridad Portuaria de Guayaquil

Figure 7. ***Full and empty containers. Exported and imported by the -Autoridad Portuaria de Guayaquil- in the year 2019***



Source: Autoridad Portuaria de Guayaquil, 2019
Author: Autoridad Portuaria de Guayaquil

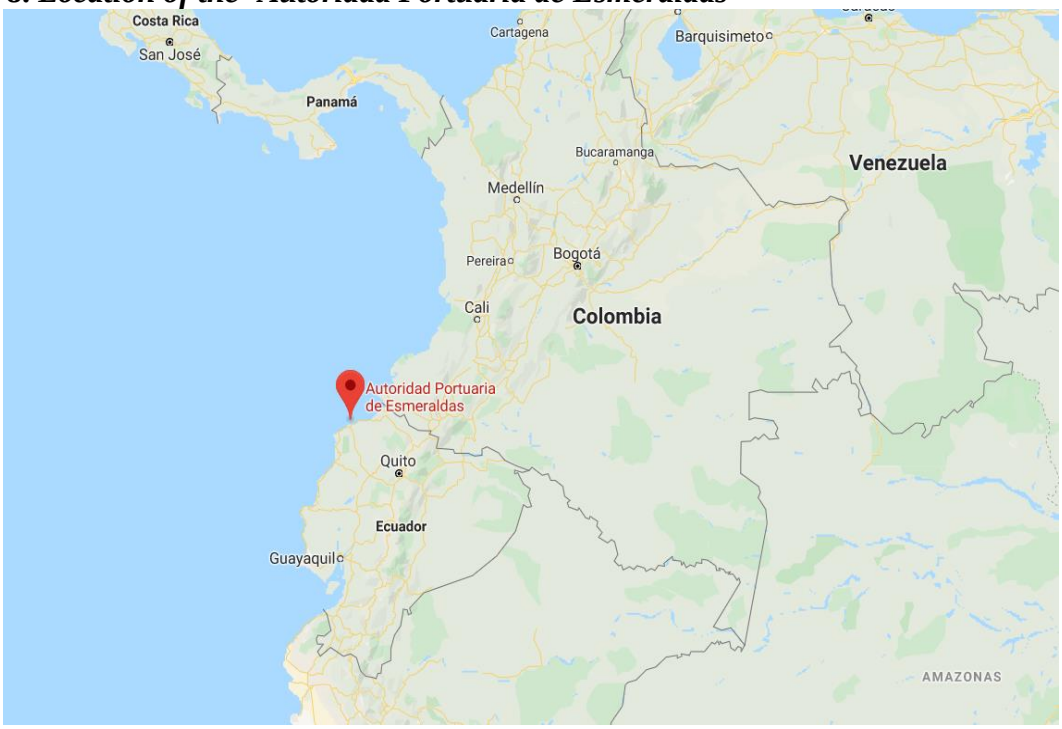
2.2. *Autoridad Portuaria del puerto de Esmeraldas*

2.2.1. Geographic location

The *Autoridad Portuaria de Esmeraldas* is located on the north-western coast of Ecuador. It borders north with Colombia, south with *Manabí* and *Pichincha*, east with *Carchi* and *Imbabura*, and west with the Pacific Ocean. Being settled at the shores of the Pacific Ocean, it has a direct access to it; therefore, it is in a strategic location being also the Ecuadorian seaport closest to the Panama Canal. This constitutes as a great benefit for all shipping companies that operate in this port because transportation time is optimized to a minimum and costs are heavily reduced. The maritime port is located at a latitude of 01° 01' 45" North and a longitude of 79° 39' 6" West

(Autoridad Portuaria de Esmeraldas , 2019). Figure N˚8 illustrates its location and territorial limits respectively.

Figure 8. ***Location of the -Autoridad Portuaria de Esmeraldas-***



Source: Google Maps , 2019

The entrance channel to the port is 11,5 meters deep, sometimes even deeper, but having on a basis this measurement to avoid future problems. On some occasions, there has been frequent rains in the port due to its proximity to the equator and it has caused delays in transportation (Coronel, 2012). As a general reference in Ecuador, this port ranks second place in the most important maritime ports of the country, just below the *APG*.

2.2.2. Historical review

According to the official page of *APE*[10] (2020), the commercial port of the city of *Esmeraldas* has been under the command of it since 1970, which in turn is in charge of and

[10] Abbreviation of the -*Autoridad Portuaria de Esmeraldas*-.

responsible for the administration, maintenance, operation and development of the maritime port in general. However, in the year 2004, it was given in concession. The *Consorcio Puerto Nuevo Milenium* took over, occupying its facilities and everything that entailed managing the administrative part of it. Although there was contract with a duration of 25 years with *Puerto Nuevo Milenium*, in 2007 the former president of Ecuador, Rafael Correa, put an end to that contract with a mutual termination between both parties and the *Autoridad Portuaria de Esmeraldas* returned to office in 2010. Over the years, the image of the *Esmeraldas* maritime port has been constantly changing, and since 2013 it completely renewed its institutional image, which is the most striking and modern so far.

2.2.3. Most marketed products by the -*Autoridad Portuaria de Esmeraldas*-

In relation to a report published by the author Coronel (2012), the *Autoridad Portuaria de Esmeraldas* main exports are wood and splinters; including this, there are also bananas and other agricultural products. In importation issues there are compost and fertilizers, as well as cement and construction materials. Including this list is cotton, vehicles, machinery, chemicals, iron and steel among the most imported products by this port. The city of *Esmeraldas* also has the marine terminal of *Balao*, which is the oil port of Ecuador. In addition, it is worth highlighting the Ecuadorian handicrafts, internationally recognized as the most outstanding product exported by this maritime port.

2.2.4. Index of exported and imported empty containers

For the analysis of the reverse logistics of empty maritime containers, the empty containers, TEU's and FEU's, exported and imported respectively, by the *Autoridad Portuaria de Esmeraldas* are taken into account. These are detailed below in table N˚6.

Table 6. ***Full and empty containers. Exported and imported by the -Autoridad Portuaria de Esmeraldas- in the year 2019***

	CONTAINERS		TOTAL CONTAINERS
	20 y 40 feet		
	Full	Empty	
IMPORTATION	5.312	0	5.312
EXPORTATION	76	4.436	4.512
TOTAL	5.388	4.436	9.824

Source: Autoridad Portuaria de Esmeraldas , 2019
Made by: Freddy Guerrón

2.3. *Autoridad Portuaria de Puerto Bolívar*

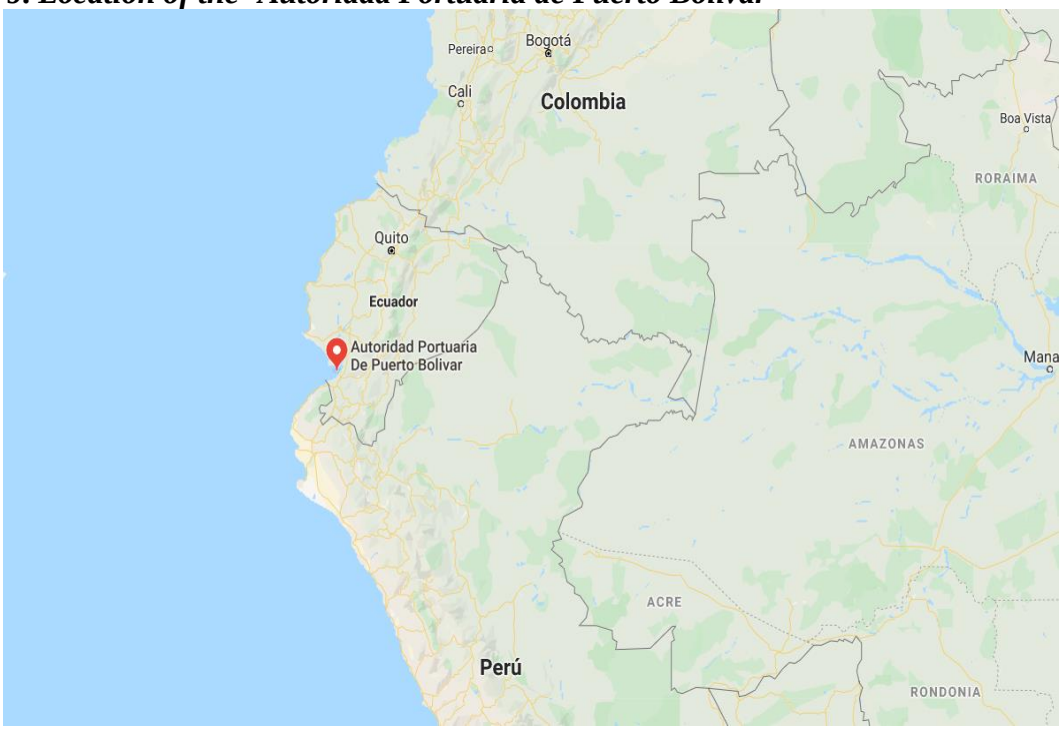
2.3.1 Geographic location

The *Autoridad Portuaria de Puerto Bolívar* is the third most important port of Ecuador, located in the province of *El Oro*, it borders north with *Guayas* and *Azuay*, south and east with *Loja*, and finally west with Peru. As for what is detailed by *APPB*[11] (2020), its coordinates are at a latitude of 3° 15' 55" South and at a longitude of 80° 00' 01" West. It is located in a strategic position being only 13 miles away from international routes and is also close to the Panama Canal which makes it a fundamental port for commerce with the rest of the world. The vessel entry to the docks is carried out by a short access channel of only 4,5 nautical miles and with a draft of 10,5 meters; it is always found in calm sea due to the natural breakwater of the *Jambelí* Island that is located in front of the maritime port.

Figure N˚9 illustrates its location and territorial limits respectively.

[11] Abbreviation of the -Autoridad Portuaria de Puerto Bolívar-.

Figure 9. ***Location of the -Autoridad Portuaria de Puerto Bolívar-***



Source: Google Maps , 2020

2.3.2. Historical review

According to the official website of the *APPB* (2020), its history began between the years of 1783 and 1860. There used to be the *Puerto Machala* that served as a berth for vessels and, in turn, united the first merchants between *Machala* and *Guayaquil*. However, during the epoch of cacao in Ecuador, the country had to find another place to build its maritime port due to the increasing movement of both passengers and merchandise from *Puná* Island and *Guayaquil*. At the end of the 19th century it was decided to build a new seaport in front of *Jambelí* Island, and it was called *Puerto Huaylá*. In the year 1887 the port was enabled as *Puerto Mayor de la República del Ecuador* and the construction of a pier of iron with a railway terminal began; in the year 1902 (once the construction was finished) it was inaugurated as the *Muelle Municipal de Cabotaje*. The railway established in it made possible for the first inter-modal transport between the provinces of *El Oro* and *Guayas*.

Years passed and, in 1970, the *Autoridad Portuaria de Puerto Bolívar* was created, which would oversee all port operations. This, in turn, also ceased in being known as *Puerto Huaylá* and became *Puerto Bolívar* only. In 1984, the marginal wharf was created with new mooring lines. Currently, the port is in a modernization process because of the concession signed with the Turkish company Yilport that will expand and modernize the port terminal of *Puerto Bolívar*; it will have new gantry crane equipment and the arrival of vessels with a draft up to 14 meters at low tide will be allowed.

2.3.3. Most marketed products by the -*Autoridad Portuaria de Puerto Bolívar*-

The *Autoridad Portuaria de Puerto Bolívar* mainly exports bananas and its derivatives, followed by cacao, and shrimp and prawns (Autoridad Portuaria Puerto Bolívar, 2020). In import issues, compost and fertilizers are the main arrived products, followed by cars and chassis, and finally ammonia (Autoridad Portuaria Puerto Bolívar, 2020).

2.3.4. Index of exported and imported empty containers

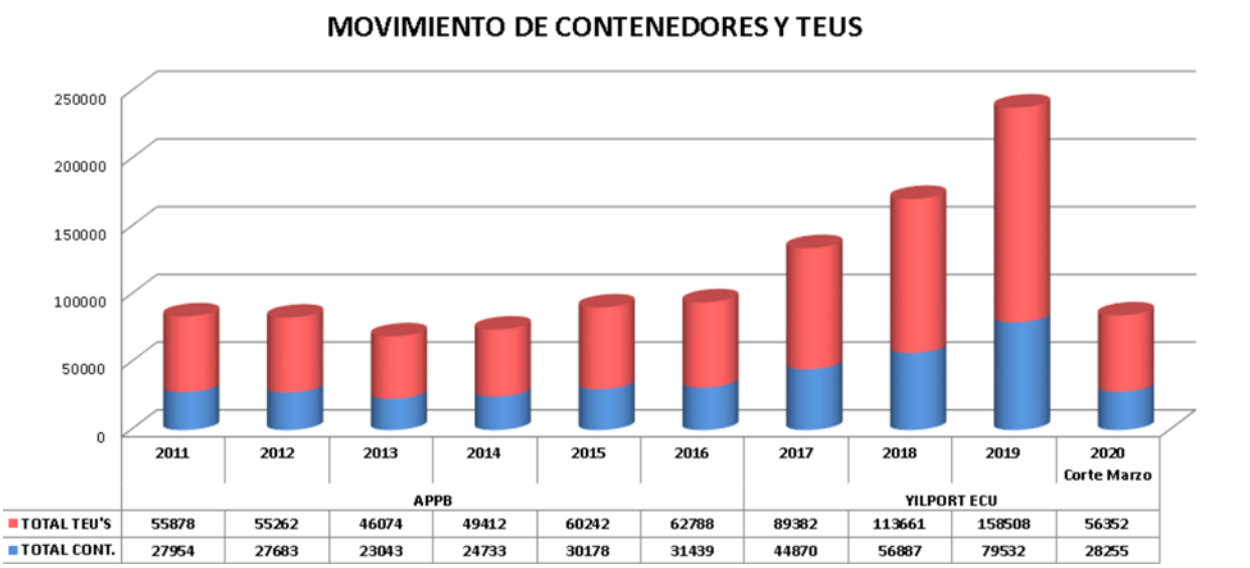
For the analysis of the reverse logistics of empty maritime containers, the empty containers, TEU's and FEU's, exported and imported respectively, by the *Autoridad Portuaria de Esmeraldas* are taken into account. These are detailed below in table N˚7 and figure N˚10. The company Yilport works in concession by *APPB* since 2017 in a public-private partnership and therefore is in charge of managing the terminal.

Table 7. ***Full and empty containers. Exported and imported by the -Autoridad Portuaria de Puerto Bolívar-***

			MOVIMIENTO DE CONTENEDORES Y TEUS									
			APPB						YILPORTECU			
			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020 Corte Marzo
IMPORTACIÓN	LLENO	20	2	53	6	1	4	0	0	0	0	0
		40	1033	933	509	388	373	186	410	514	1185	780
	VACÍO	20	10	0	0	26	0	45	175	97	277	0
		40	11745	12909	11210	11857	14803	15126	20532	27635	37965	13260
EXPORTACIÓN	LLENO	20	1	2	6	13	100	0	144	5	212	153
		40	10431	10206	8972	8169	10186	8830	14123	23652	35450	12825
	VACÍO	20	8	49	0	14	7	45	39	11	63	5
		40	3752	3307	2314	4099	4686	7081	9338	4900	4372	1232
TRANSFERENCIA	LLENO	20	9	0	0	0	3	0	0	0	0	0
		40	963	224	26	166	16	126	109	73	4	0
	VACÍO	20	0	0	0	0	0	0	0	0	0	0
		40	0	0	0	0	0	0	0	0	0	0
TOTAL CONTENEDORES			27954	27683	23043	24733	30178	31439	44870	56887	79532	28255

Source: Autoridad Portuaria Puerto Bolívar, 2020
Author: Autoridad Portuaria Puerto Bolívar

Figure 10. ***Full and empty containers. Exported and imported by the -Autoridad Portuaria de Puerto Bolívar-***



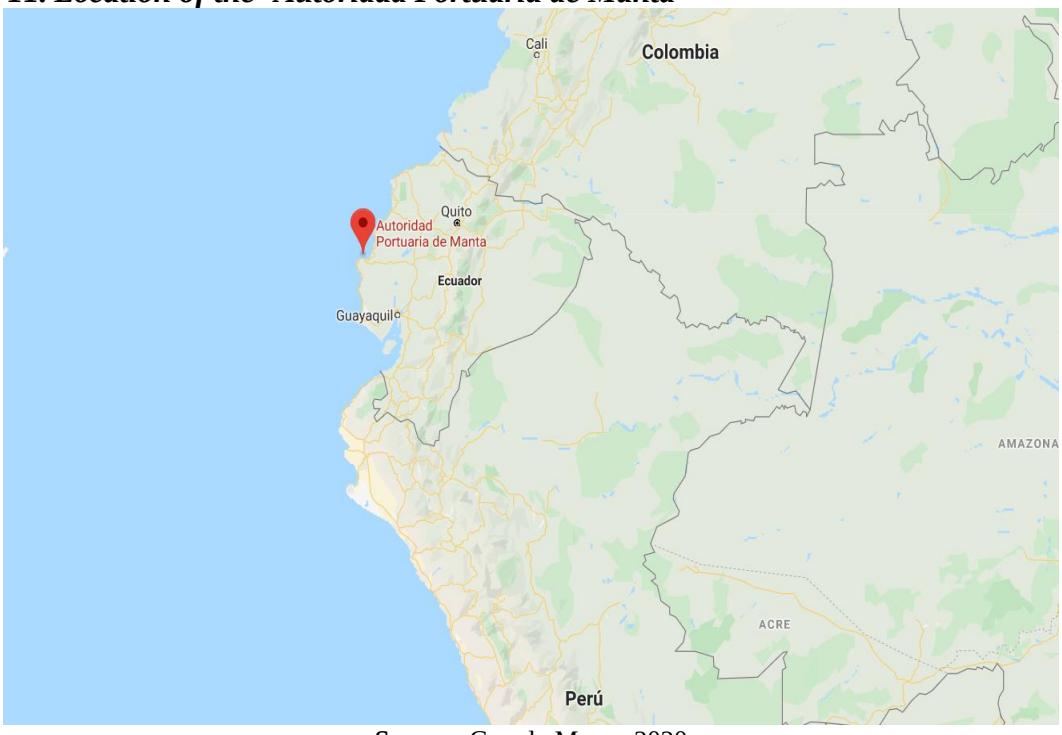
Source: Autoridad Portuaria Puerto Bolívar, 2020
Author: Autoridad Portuaria Puerto Bolívar

2.4. *Autoridad Portuaria de Manta*

2.4.1. Geographic location

The port of *Manta* is an open marine terminal without access channels and has a natural draft of 12 meters in its piers. It is located in the province of *Manabí* at a latitude of 0º 57' South and a longitude of 80º 43' West (Autoridad Portuaria de Manta). The port has two docks with the capacity to berth up to 4 ships at the same time, this in reference to the container ships, bulk carrier ships, fishing vessels, and even cruisers since it is also a touristic port and the first one in Ecuador. The terminal has a 110-hectare dock that is protected by a jetty which allows a greater fluidity in arrivals, embarking and disembarking vessels (Cámara Marítima del Ecuador, 2020). Figure N˚11 illustrates its location and territorial limits respectively.

Figure 11. ***Location of the -Autoridad Portuaria de Manta-***



Source: Google Maps , 2020

2.4.2. Historical review

According to the official page of the *Terminal Portuario de Manta* (2020), the *Autoridad Portuaria de Manta*, which is in charge of the operation and general control of the maritime port, was created in 1966. Years later, in 2016 more specifically, due to a private initiative, the AGUNSA group took over the marine terminal and presented the operation "*Terminal International del Puerto de Manta*" with a projection for 40 years. Currently, it continues to develop a solid investment project in search of an improvement in the port of *Manta*. This company, of Chilean origin, has presence in around 22 countries and has been worldwide known for presenting solutions on diverse issues such as services, transport and infrastructure.

2.4.3. Most marketed products by the -*Autoridad Portuaria de Manta*-

In relation to the latest data published by the *Autoridad Portuaria de Manta* (2019), wheat and frozen tuna represent around 75% of the cargo's movement in the city's port. These appear in the first and second place respectively, of the main products imported by the marine terminal. Following are oils and fats in conjunction with machinery and vehicles. In exportation issues, there are vegetable oils and hydrocarbons as main products, followed by other merchandise in general, and in last place is machinery.

2.4.4. Index of exported and imported empty containers

For the analysis of the reverse logistics of empty maritime containers, the empty containers, TEU's and FEU's, exported and imported respectively, by the *Autoridad Portuaria de Manta* are taken into account. However, in the *APM*[12], container traffic has just been resumed; the CMA-CGM shipping company, of French origin, made it official the start of containerized cargo traffic in the port since July 15, 2019 (Autoridad Portuaria de Manta, 2020). For that reason, there has

[12] Abbreviation of the -*Autoridad Portuaria de Manta*-.

not been any movement of containers in the first semester of the year 2019 in the maritime port, nor in the previous years; and the additional information from the second semester of the year 2019 onwards remains unpublished due to problems in the *Autoridad Portuaria de Manta* at the time this thesis is being written.

2.5. Conclusions

Once the 4 international maritime ports of Ecuador have been analyzed, it can be deduced that each of them has built its infrastructure and management in relation to its geographic and territorial administration reality. A notorious example is the *Autoridad Portuaria de Guayaquil*, which despite having a difficult access for vessels to the terminal and a relatively low draft compared to other marine terminals, it is the most important one and presents the highest amount of merchandise movement nationwide.

Guayaquil was forced to have an international marine terminal and has succeeded, turning out to be the most modern and with the highest container transport rate in the ACN. *Contecon* has led *APG* into a new era of foreign trade with its handling of containerized cargo, but this in turn has made it the main destination of many shipping companies which has caused the collapse of the shipping logistical system that is entailed in the terminal. This is due to the high demand for containers to be handled; therefore, the existence of the enormous number of empty containers stored in it during the last periods of time.

The *Autoridades Portuarias de Puerto Bolívar* and *Manta* have taken the same path of concessioning its terminals in order to achieve an improvement in its image internationally by offering a high operational performance in conjunction with a modern infrastructure. The *APM* recently delegated its operations to a foreign company, ergo the movement of containers in its port has not yet been registered. On the other hand, the *APE* is the second most important maritime port

in Ecuador and has not concessioned its functions to a third party; an interesting point to take into account.

Finally, the use of containers in international commercialization is the best option for cross-border trade; a port terminal must have an excellent infrastructure and containerized cargo handling. The marine terminals of Ecuador have evolved throughout the years, and today these are internationally recognized because of the logistics management used for cargo and modernized infrastructure, thereby increasing the country's economy. These marine terminals have managed to be considered by several international shipping agencies, which in turn increases the productivity of national exporting and importing companies; and, in the same way, the work in the country's port sector.

CHAPTER 3: ANALYSIS OF THE REVERSE LOGISTICS OF EMPTY MARITIME CONTAINERS PERFORMANCE IN THE PORT TERMINAL "*CONTECON*" OF *GUAYAQUIL*

The disorder in world trade has caused an accumulation of empty containers scattered around the world. In order to deal with this situation, marine terminals must have a solid logistics management and modern infrastructure. This chapter focuses on analyzing the costs in the processing of a full and empty container inside the *Terminal Portuaria Contecon Guayaquil S.A*. Once having clarified the data, the study proceeds to evaluate which logistics management of the container inside the marine terminal is the most recommended. In addition, a generalized comparative study will be included between the necessary processes and required costs to pay for the cross-border trade of the *Contecon-Ecuador* and the marine terminal of *Valencia-España*; in order to have a clear approach of the logistics development in international trade that Ecuador globally has.

3.1. *Terminal de Contenedores y Multipropósito -Contecon Guayaquil S.A.-*

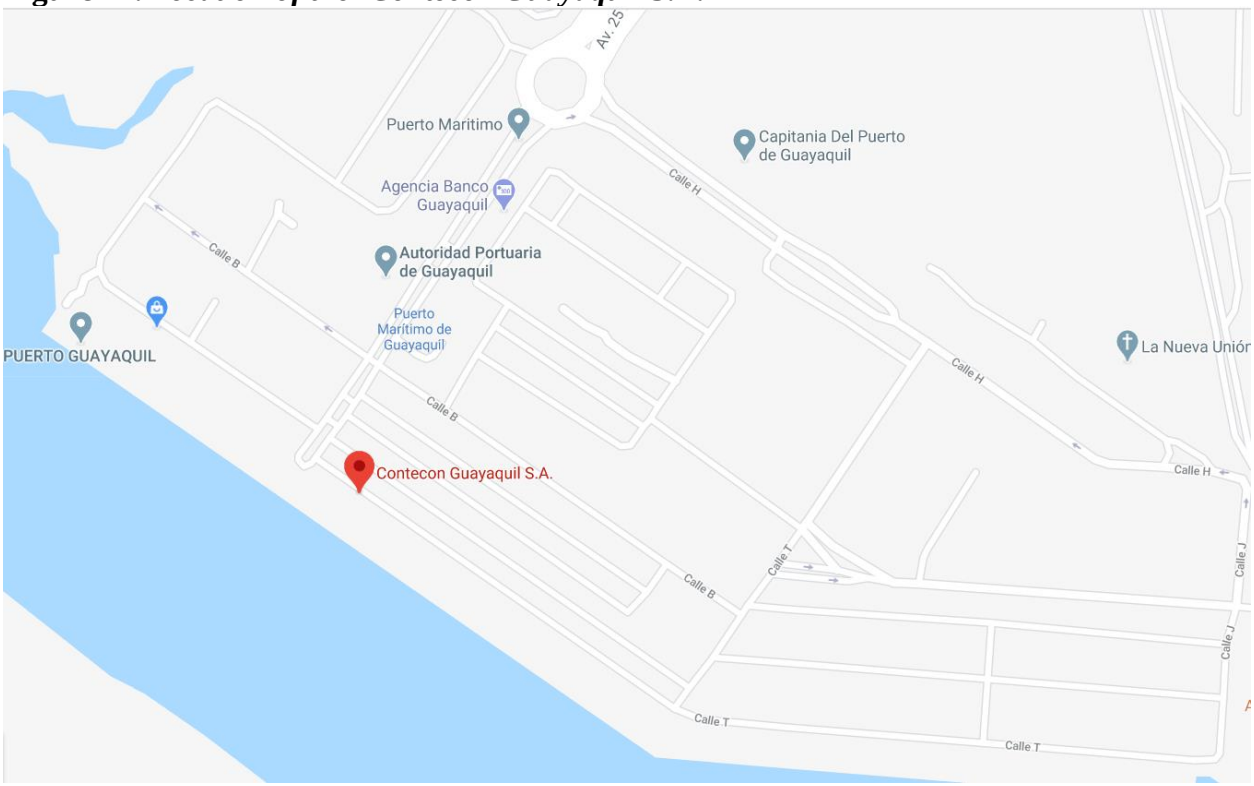
According to the official website of *Contecon* (2020), *CGSA*[13] is an Ecuadorian company that belongs to the city of *Guayaquil* and was established in 2007; it is part of the multinational group ICTSI (International Council for Scientific and Technical Information). This group operates in quite a few ports worldwide, in Latin America the following are:

- *Manzanillo (México)*
- *Aguadulce (Buenaventura/Colombia)*
- *Puerto de Buenos Aires (Argentina)*

[13] Abbreviation of the -*Contecon Guayaquil S.A.*-.

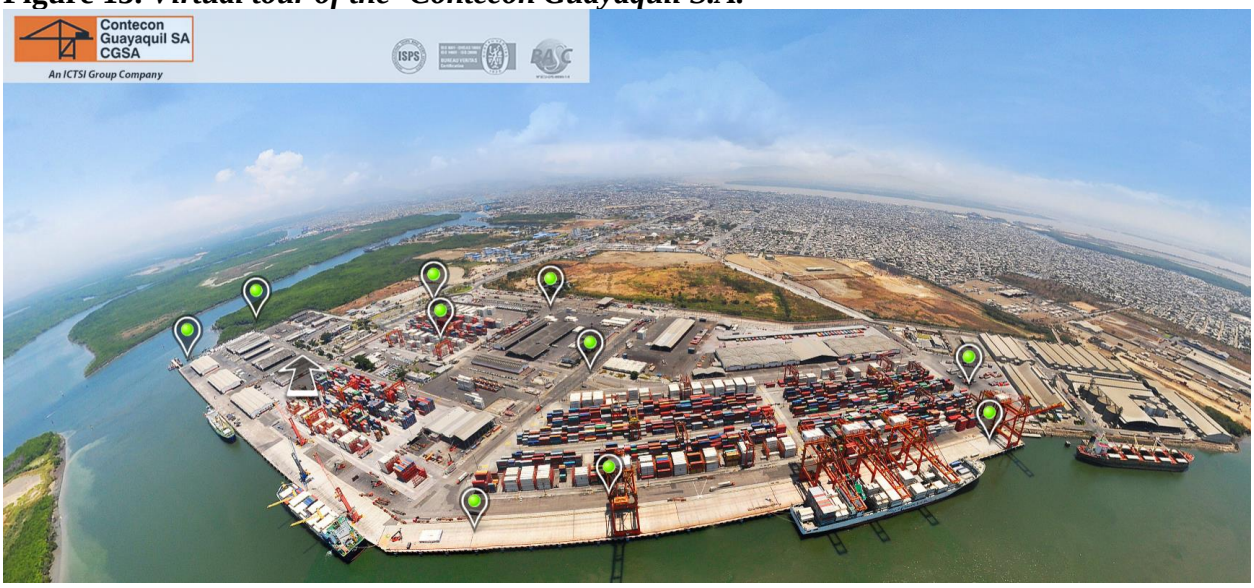
The company *Contecon Guayaquil S.A.* had its beginnings after the process, adjudication and award of concession in the *Terminales de Contenedores y Multipropósito del Puerto de Guayaquil "Libertador Simón Bolívar"*. A contract with a duration of 20 years was signed and on August 1st of the year 2007 operations and provision of services began in the port. The marine terminal is located at a latitude of 2° 16' 51" South and a longitude of 79º 54' 49" West. Currently, this port handles around 70% of Ecuadorian foreign trade according to the data provided by the National Port System. In figures N˚12 and N˚13, it is detailed its corresponding location inside the *Autoridad Portuaria de Guayaquil*.

Figure 12. ***Location of the -Contecon Guayaquil S.A.-***



Source: Google Maps , 2020

Figure 13. ***Virtual tour of the -Contecon Guayaquil S.A.-***



Source: Contecon Guayaquil S.A., Tour Virtual, 2020
Author: Contecon Guayaquil

3.2. Mathematical analysis

The *Contecon* port marine terminal is considered to be the connecting door of Ecuador with the rest of the world. This multipurpose container terminal is one of the most moderns of the country and the tools used in the operational decisions, that is, decisions taken by logistics operators must always be correct. Within the processes that the *Contecon* handles, there is the reverse logistics of empty maritime containers; which is in charge of managing the completely empty containers. Having the equipment (container) available at all times for its immediate reuse and in turn minimizing the movement or transfer of empty containers inside the marine terminal, will allow for more agile processes and efficiency within the terminal.

The mathematical analysis that will be carried out in the *Contecon* will serve as a basis for the following objectives:

1. Ensure the availability of the container for immediate export needs

2. Minimize the handling of empty containers in the marine terminal, to avoid difficulties in the operations

3. Minimize unnecessary costs for handling empty containers that are without use

The objectives will be carried out through an analysis of the *Contecon* port facilities map. Possible causes of the inevitable increase in empty containers in the terminal will be analyzed, and with it the study of solution variables. The solution proposals will reduce unnecessary expenses and thereby achieve an executable container route inside the marine terminal. The general objective of minimizing transport journeys and days of storage will be linked for a further help in the logistics corridor's decision-making process. In general terms, it will be investigated how this situation has been handled in the Contecon.

The information that will be used for the analysis is based on the arrival of container ships to the marine terminal; this, in conjunction with the arrival information of empty containers throughout the year 2019, data provided by the *Autoridad Portuaria de Guayaquil*. In addition, the following services will be taken into account for the mathematical analysis; according to those presented by the official website of the *Contecon Guayaquil S.A.* (2020):

- Transfer of empty and full containers to all places inside the marine terminal
- Storage rate/fee for empty and full containers inside the marine terminal
- Consolidation and inspection of containers to be exported
- Payment for cargo documentation

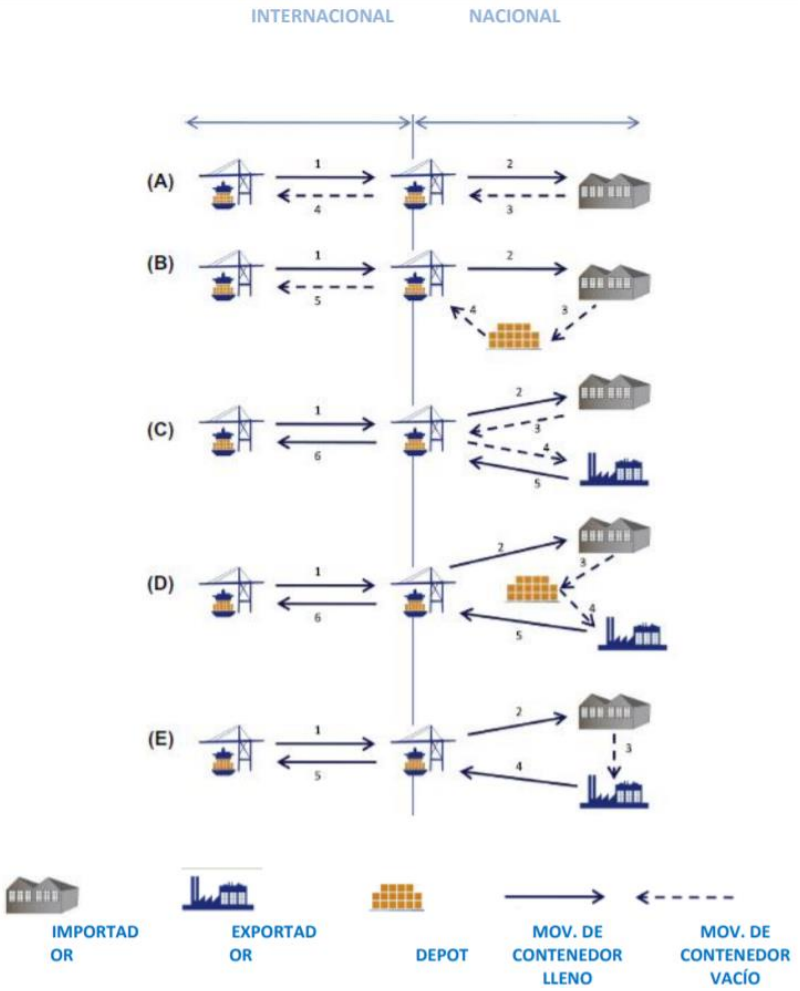
3.3. Container cycle

The container goes through a series of road/land movements once arrived at the respective marine terminal. These different movement patterns are the ones that will be analyzed later on, in conjunction with the information that is studied in the mathematical model, in order to achieve the

written objectives. Usually, empty containers could be in depots both outside and inside the terminal, but for the analysis the second option will be used only.

In figure N˚14 the movement patterns to be studied are detailed.

Figure 14. ***Movement patterns of the container***



Source: Furió, Carlos , Adenso-Díaz , & Lozano , Computers & Industrial Engineering , 2013
Author: Furió, Carlos , Adenso-Díaz , & Lozano

There are 5 movements patterns that will be analyzed in the reverse logistics of empty maritime containers model; Sandra Piccolo de Castro (2014), details them below:

A. **EMPTY REPOSITIONING 1.** The vessel arrives at the terminal and the container is transferred to the importer's premises to be unloaded. Once the container is emptied, it is returned to the port terminal where it can be stored (generally 5 days or less) or transferred

for pre-shipment. At the end, in this pattern, the empty container is shipped in the respective vessel and repositioned to its place of origin. Generally, Empty Repositioning 1 of the container is for immediate export without storage

B. EMPTY REPOSITIONING 2. The vessel arrives at the terminal and the container is transferred to the importer's premises to be unloaded. Subsequently, the empty container is transferred directly to a depot of empty containers (whether or not it is inside the port terminal); where it awaits for the scheduled time to be embarked on a ship and repositioned to its place of origin

C. MATCH BACK 1. The vessel arrives at the terminal and the container is transferred to the importer's premises to be unloaded. The empty container is transferred to the port terminal again, and the possibility for two export cases open which are:

1. Immediately, the container is transported to the exporter's premises which is outside of the port terminal and loaded for a new exportation. Later on, it is transferred again back to the marine terminal to be exported
2. The container is consolidated/loaded inside the terminal, which would avoid the withdrawal and return trip from the exporter's premises. Once packaging and loading is finished, the container is ready for exportation

In this movement pattern, the export coincides with the import, that is, there is no empty repositioning of the container. In the event of delays in the exportation, the container can be stored at the terminal (generally 5 days or less) until the time of its scheduled export. Usually, Match Back 1 of the container is for immediate export without storage

D. MATCH BACK 2. The vessel arrives at the terminal and the container is transferred to the importer's premises to be unloaded. In Match Back 2, in the same way, the two

possibilities of export cases are repeated which were explained previously in Match Back 1; however, the difference is that, in this pattern, once the empty container has returned to the marine terminal, it is stored in a depot of empty containers (whether or not it is inside the port terminal). Arrived the scheduled date, the container can be transferred to the premises of the exporter in order to be loaded, or consolidated/loaded with new merchandise inside the terminal. In both cases to be exported in the respective vessel as established

E. STREET TURN. It is also known as a special Match Back operation. The vessel arrives at the terminal and the container is transferred to the importer's facilities to be unloaded. Once the container is emptied in the premises of the importer, this is transported to the premises of the shipper (also known as exporter) for its process of merchandise loading and immediate transportation to the marine terminal for its exportation. It is the best option to be considered by large shipping companies due to the lower amount of movements that are generated and therefore less costs; nevertheless, because of the high level of coordination that must exist between all parties, this movement pattern is considered to be the most complex and least used

(pág. 47)

3.4. Operationalization of variables

The information of the variables is based on the 5 patterns of the container cycle; the inbound of full containers and outbound of both empty and full containers are studied. The data to be analyzed will be from a standard container, that is, Dry Van and of the international measurement TEU. In addition, the container will be available for immediate use; it will not be taken into account the maintenance service offered by the repairman and inspector of the marine

terminal in the Empty Repositioning and Match Back parameters. The starting point is the arrival of the full container to the marine terminal of the *Contecon*; and with the study of the port facilities map, as well as the costs of the respective services, the application of the reverse logistics of empty maritime containers shall be reviewed.

3.4.1. Empty Repositioning 1

In reference to the *Contecon* port services manual (2017), the following container process is established in the *Contecon* port terminal.

The full containers arrive at the *Contecon* port terminal; at that moment, the shipping manager or port agent (depending on the case) takes control of the park management and disembarks the containers. Here, the Full Container Load containers are transferred to the importer's premises (for this analysis, the existence of a single person or company as the owner of the imported container is taken into account). For the withdrawal of the imported cargo, the *CGSA* requires the following documents to be presented at the access checkpoints of the terminal by the authorized carrier when entry:

-Information of the transportation company or the name of the driver and license plate of the vehicle that will make the withdrawal of the container. This documentation is known as a "Gate Pass"[14] and is validated at the access checkpoints of the terminal. The "Gate Pass" is delivered to the Customs Agent/Assistant or person authorized by the importer, who in turn grants it to the carrier on the scheduled delivery day and shift assignment; this document is provided by the *CGSA*

-Credential issued by *CGSA*

[14] Only document that enables the withdrawal of the imported cargo.

Once the container has been secured in a means of land transportation, the Billing Department of the *Contecon* verifies electronically or physically the following documentation prior to the departure of it:

-Cargo Number duly authorized by *SENAE*[15]

-A copy of the document for proceedings requiring *SENAE* authorizations

-Letter of Authorization of Exit (CAS -*Carta de Autorización de Salida*-)

-Bill of Lading

Inside the premises of the importer, the container is unloaded, and it is transferred to the port facilities again. At the access checkpoints, the carrier presents the following documentation:

-Reception/Dispatch document (EIR[16])

-Driver's License

-The pre-warning of empty containers[17], which in turn, the terminal checks in the system the respective electronic document sent by the corresponding shipping company or agency

At the time these documents are verified, by measures of internal security regulations of the *CGSA*, a security seal is placed on the container for its entry. For the shipment authorization of the empty container once it has been transported and placed alongside the ship, the Billing Department verifies electronically or physically the following information:

-Booking number or containers to be shipped

[15] Abbreviation of the -*Servicio Nacional de Aduana del Ecuador*-.

[16] Abbreviation of -Equipment interchange receipt- exchange document for reception and dispatching of containers. Here the physical observations (damages or dents) are detailed if any.

[17] Notification prior to the date of entry, which must be made by the shipping company or agency to the Contecon. Here are listed in the booking the empty export containers.

-Payment made for the shipment of goods or containers only. It must be done with a maximum of 12 hours before the berth of the ship

-A copy of the document for the procedures with *SENAE* authorizations

(págs. 6-30)

For reasons of logistical failures, there is the possibility that the empty container may be stored in the terminal until the moment of shipment, but generally it does not exceed 5 days; which according to the *Contecon* rules are free for the exporter. In like manner, all merchandise must be duly authorized by *SENAE* and *PNA*[18] prior to its shipment. The services rendered by the *Contecon* (2020), that will be used in the mathematical analysis are as follows:

1.-Full Container Transfer (Ship to Gate): $204.04 (Box[19])

2.-Container Reception/Dispatch (Services to Shipper): $40.19 (Box)

3.-Seal Provision and Placing: $10.90 (Seal)

4.-Container Handling in Terminal: $34.07 (Box)

5.-Empty Container Transfer: $136.28 (Box)

6.-Operation for Validation/Inspection of the Container (Services to Shipper): $120.56 (Box)

7.-Empty Container Transfer (Ship to Yard/Yard to Ship): $95.40 (Box)

Description of each service rendered by the *Contecon*:

1.-The movement of the container begins with the full container transfer (Ship to Gate), this service comprises the set of all activities of loading/unloading, lashing/unlashing,

[18] Abbreviation of the -*Policía Nacional Antinarcóticos*- or Antinarcotics Police.

[19] Term used for TEU's and FEU's containers.

embarking/disembarking, storage and drayage[20] or internal transport in the *Contecon* marine terminal until the exit checkpoints of the port terminal. It also includes the issuance of all the respective documents for the dispatch of containers

2.-The container is unloaded and emptied in order to return to the port terminal, the container reception service is based on the control of documents, in addition to the issuance of the documentation that establishes the conditions in which the empty container is received (EIR). Subsequently, to be transferred to its place of storage or depot

3.-At the end of the inspection at the terminal access checkpoints, the seal provision and placing, as its name indicates, provisions the container with the security seal and places it on it

4.-The container handling service in the terminal is in charge of taking the cargo/container from its storage or depot and placing it on a means of land transportation belonging to the *CGSA*

5.-The empty container transfer service enters, which is based on the transfer of empty containers only, anywhere inside the *Contecon* marine terminal, and takes special care that no illegal material may be loaded or that the container suffers any damage during its transportation

6.-The container is transferred and placed alongside the ship where it must go through the operation for validation/inspection of the container service, prior to shipment. It is a requirement requested by *SENAE* and *PNA*, and includes drayage services, in addition to loading/unloading and latching/unlatching (of the cargo accommodated inside the container),

[20] Term that refers to any kind of transfer or transportation, of cargo or container, inside the terminals.

and the accounting in conjunction with the verification of the container. This operation is conducted in presence of the shipping agency's representative

7.-Finally, the empty container transfer (Yard to Ship) comprises the activities of lashing/unlashing, loading/unloading, drayage and embarking/disembarking for the placement of the container on the ship once the inspection has been completed. Furthermore, this service includes all the respective documentation

3.4.1.1. Mathematical analysis

Service abbreviations:

Full Cntr[21] Transfer -Ship to Gate- (*FCTSG*)

Cntr Reception/Dispatch (*CRD*)

Seal Provision and Placing (*SPP*)

Cntr Handling in Terminal (*CHT*)

Empty Cntr Transfer (*ECT*)

Validation/Inspection of the Cntr (*VIC*)

Empty Cntr Transfer -Yard to Ship- (*ECTYS*)

Symbols and literals used in the formula:

Dollars ($)

Container Management

The total cost in the management of Empty Repositioning 1, of a container arrived at the *Contecon* marine terminal is $718.41 (seven hundred and eighteen dollars with forty-one cents). This container is used for an import process of merchandise only, therefore, the last option to be considered by many shipping agencies and only in extreme cases.

[21] Abbreviation of -Containers-.

$$\boldsymbol{SUBTOTAL\ COST\ CNTRS} = FCTSG + CRD + SPP + CHT + ECT + VIC + ECTYS$$
$$= \$204.04 + \$40.19 + \$10.90 + \$34.07 + \$136.28 + \$120.56 + \$95.40$$
$$= \$641.44$$
$$\boldsymbol{VAT\ 12\%} = \$76.97$$
$$\underline{\boldsymbol{TOTAL\ COST\ CNTRS} = \$718.41}$$

Empty Container Management

The total cost in Empty Repositioning 1, of an empty container in the *Contecon* is $489.88 (four hundred and eighty-nine dollars with eighty-eight cents). This is the price that is paid for the management of the empty container only, that is, from the moment that it returns to the port terminal and the payment begins from the reception of the empty container in the access checkpoints until the moment that it is embarked on the respective ship.

$$\boldsymbol{SUBTOTAL\ COST\ EMPTY\ CNTRS} = CRD + SPP + CHT + ECT + VIC + ECTYS$$
$$= \$40.19 + \$10.90 + \$34.07 + \$136.28 + \$120.56 + \$95.40$$
$$= \$437.40$$
$$\boldsymbol{VAT\ 12\%} = \$52.48$$
$$\underline{\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS} = \$489.88}$$

Observations

Empty Repositioning occurs when an imbalance appears in world trade; in other words, there are a large number of empty containers in a marine terminal or depot without being used, and in the other marine terminal or depot the exporter does not have the container required for exportation. Consequently, the shipowner manager or shipping agent must carry empty containers back to the terminal of origin or, in some cases, to the terminal in need of the respective container.

3.4.2. Empty Repositioning 2

Following the movement parameter of Empty Repositioning 1 until the full container exits the *CGSA* facilities, and in reference to the port services manual of the *Contecon* (2017), the process continues as follows.

Inside the premises of the importer, the container is unloaded, and it is transferred to the port facilities again to be stored until the date of the scheduled export. At the access checkpoints, the carrier presents the following documentation:

-Reception/Dispatch document (EIR)

-Letter of departure from the shipping company or agency with current date

-Driver's license

A security seal is placed on the container once the inspection has completed for its free access to the marine terminal. After the container has passed a few days stored inside the *Contecon* facilities, it is embarked and shipped to its place of origin for its respective repositioning. For the shipment authorization of the empty container, the Billing Department verifies electronically or physically the following information:

-Booking number or containers to be shipped

-Payment made for the shipment of goods or containers only

-A copy of the document for the procedures with *SENAE* authorizations

(págs. 6-30)

In like manner, all merchandise must be duly authorized by *SENAE* and *PNA* prior to its shipment. The services rendered by the *Contecon* (2020), that will be used in the mathematical analysis are as follows:

1.-Full Container Transfer (Ship to Gate): $204.04 (Box)

2.-Container Reception/Dispatch (Services to Shipper): $40.19 (Box)

3.-Seal Provision and Placing: $10.90 (Seal)

4.-Empty Container Storage: $3.41 (TEU/day) Up to 10 days

$4.09 (TEU/day) 11-20 days

$5.45 (TEU/day) More than 20 days

5.-Container Handling in Terminal: $34.07 (Box)

6.-Operation for Validation/Inspection of the Container (Services to Shipper): $120.56 (Box)

7.-Empty Container Transfer (Ship to Yard/Yard to Ship): $95.40 (Box)

Description of each service rendered by the *Contecon*:

The first 3 processes are the same as those explained in Empty Repositioning 1. Differences that appear from procedure N˚4 are described below.

4.-The container reception/dispatch service transfers the receptacle to the empty container storage, which consists in the stay of the container under the complete custody of the *CGSA*. To this effect, *Contecon* is fully responsible for any damage that may occur to the empty container during the time it is in this depot

5.-When the shipping date arrives, the container handling service in the terminal will be in charge of taking the cargo/container from its storage or depot and placing it on a means of land transportation belonging to the *CGSA*

6.-The container is transferred and placed alongside the ship by virtue of the drayage service that is included in the operation for validation/inspection of the container service, prior to shipment. It is a requirement requested by *SENAE* and *PNA*, and includes the services of drayage, in addition to loading/unloading and latching/unlatching (of the cargo accommodated inside the container), and the accounting in conjunction with the verification of the container. This operation is conducted in presence of the shipping agency's representative

7.-Finally, the empty container transfer (Yard to Ship) comprises the activities of lashing/unlashing, loading/unloading, drayage and embarking/disembarking for the placement of the container on the ship once the inspection has been completed. Furthermore, this service includes all the respective documentation

3.4.2.1 Mathematical analysis

Service abbreviations:

Full Cntr Transfer -Ship to Gate- (*FCTSG*)

Cntr Reception/Dispatch (*CRD*)

Seal Provision and Placing (*SPP*)

Empty Cntr Storage (*ECS*)

Cntr Handling in Terminal (*CHT*)

Validation/Inspection of the Cntr (*VIC*)

Empty Cntr Transfer -Yard to Ship- (*ECTYS*)

Symbols and literals used in the formula:

Dollars ($)

Days (*d*)

Container Management

The total cost in the management of Empty Repositioning 2, of a container arrived at the *Contecon* marine terminal and stored in it for 10 days (the *CGSA* offers a total of 5 free storage days for container exports) is $584.87 (five hundred and eighty-four dollars with eighty-seven cents). This container is used for a merchandise import process only; therefore, being returned empty to its place of origin is the last option to be considered by many shipping agencies. Also,

the costs to bear with rises as the storage payment increases according to the days in the terminal prior to shipment.

$$\boldsymbol{SUBTOTAL\ COST\ CNTRS} = FCTSG + CRD + SPP + ECS + CHT + VIC + ECTYS$$
$$= \$204.04 + \$40.19 + \$10.90 + (\$3.41 \times 5d) + \$34.07 + \$120.56 + \$95.40$$
$$= \$522.21$$
$$\boldsymbol{VAT}\ \mathbf{12}\% = \$62.66$$
$$\underline{\boldsymbol{TOTAL\ COST\ CNTRS} = \$584.87}$$

The total cost in the management of Empty Repositioning 2, of a container arrived at the *Contecon* marine terminal and stored in it for 20 days (the *CGSA* offers a total of 5 free storage days for container exports) is $630.68 (six hundred and thirty dollars with sixty-eight cents).

$$= \$204.04 + \$40.19 + \$10.90 + (\$3.41 \times 5d) + (\$4.09 \times 10d) + \$34.07 + \$120.56 + \$95.40$$
$$= \$563.11$$
$$\boldsymbol{VAT}\ \mathbf{12}\% = \$67.57$$
$$\underline{\boldsymbol{TOTAL\ COST\ CNTRS} = \$630.68}$$

The total cost in the management of Empty Repositioning 2, of a container arrived at the *Contecon* marine terminal and stored in it for 30 days (the *CGSA* offers a total of 5 free storage days for container exports) is $691.72 (six hundred and ninety-one dollars with seventy-two cents).

$$= \$204.04 + \$40.19 + \$10.90 + (\$3.41 \times 5d) + (\$4.09 \times 10d) + (\$5.45 \times 10d) + \$34.07 + \$120.56 + \$95.40$$
$$= \$617.61$$
$$\boldsymbol{VAT}\ \mathbf{12}\% = \$74.11$$
$$\underline{\boldsymbol{TOTAL\ COST\ CNTRS} = \$691.72}$$

Empty Container Management

The total cost in Empty Repositioning 2, of an empty container stored in the *Contecon* for 10 days (the *CGSA* offers a total of 5 free storage days for container exports) is $356.35 (three hundred and fifty-six dollars with thirty-five cents). This is the price that is paid for the empty container only, that is, from the moment that the empty container returns to the port terminal.

Therefore, the payment is done from the reception of the empty container in the access checkpoints, passes through the respective storage and then shipped on the vessel.

$$\boldsymbol{SUBTOTAL\ COST\ EMPTY\ CNTRS} = CRD + SPP + ECS + CHT + VIC + ECTYS$$
$$= \$40.19 + \$10.90 + (\$3.41 \times 5d) + \$34.07 + \$120.56 + \$95.40$$
$$= \$318.17$$
$$\boldsymbol{VAT\ 12\%} = \$38.18$$
$$\underline{\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS} = \$356.35}$$

The total cost in Empty Repositioning 2, of an empty container stored in the *Contecon* for 20 days (the *CGSA* offers a total of 5 free storage days for container exports) is $402.15 (four hundred and two dollars with fifteen cents).

$$= \$40.19 + \$10.90 + (\$3.41 \times 5d) + (\$4.09 \times 10d) + \$34.07 + \$120.56 + \$95.40$$
$$= \$359.07$$
$$\boldsymbol{VAT\ 12\%} = \$43.08$$
$$\underline{\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS} = \$402.15}$$

The total cost in Empty Repositioning 2, of an empty container stored in the *Contecon* for 30 days (the *CGSA* offers a total of 5 free storage days for container exports) is $463.19 (four hundred and sixty-three dollars with nineteen cents).

$$= \$40.19 + \$10.90 + (\$3.41 \times 5d) + (\$4.09 \times 10d) + (\$5.45 \times 10d) + \$34.07 + \$120.56 + \$95.40$$
$$= \$413.57$$
$$\boldsymbol{VAT\ 12\%} = \$49.62$$
$$\underline{\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS} = \$463.19}$$

Observations

For a better understanding of the services used, Eng. Mario Cortes and Eng. Julio Vergara (high executives of the *Contecon Guayaquil S.A.*) were interviewed (2020). It was obtained that in Empty Repositioning 2 it is not necessary to hire the empty container transfer service which has a value of $136.28, the same used in Empty Repositioning 1; this due to the drayage service

included in the operation for validation and inspection of the container in the second movement pattern. By virtue of the fact that for a greater security it is advisable to employ the empty container transfer service, and thus it was used in Empty Repositioning 1 in view of the long path that must be covered in the terminal until pre-shipment; in Empty Repositioning 2 there is a similar transfer but from its place of storage where *Contecon* itself is fully responsible for the empty container during its stay in it, ergo there are fewer risks for the container.

3.4.3. Match Back 1

Following the movement parameter of Empty Repositioning 1 until the full container exits the *CGSA* facilities, and in reference to the port services manual of the *Contecon* (2017), the process continues as follows.

Inside the premises of the importer, the container is unloaded, and it is transferred to the port facilities again. The carrier enters the empty container to the *Contecon* marine terminal which must be pre-warned by the corresponding shipping company or agency. In addition, the driver must present the driver's license and an EIR document at the access checkpoints of the *CGSA*. There are two cases for exporting the full container by the *Contecon* which are:

1) The container is withdrawn from the terminal by the exporter (presenting the required documentation for the exit of empty containers) for its corresponding cargo load at its premises and then sent back to the marine terminal for its respective exportation. At the access checkpoints, the carrier presents the following documentation:

-AISV document[22]

-Driver's license

-Customs document authorizing entry of cargo

[22] Authorization document for entry of export loads.

-In case of a refrigerated load, a temperature chart of the container must be disclosed in order to prevent any possible damage to the cargo

-In case of transporting dangerous cargo (IMO), all the information presented in the label must be complete. The customer or person in charge of the container will be solely responsible in case there were any accident or damage in the terminal, which occurred due to falsification or omission of relevant information of the IMO container

-VGM certificate[23]

2) The exporter does not withdraw the container from the terminal for its respective load, but several exporters occupy the container for a Less than Container Load shipment; that is, the *CGSA* is in charge of the consolidation of merchandise belonging to different owners in a single container for export. As soon as the empty container enters for consolidation, in addition to the EIR document-driver's license-pre-warning of the empty container detailed above, the carrier must present at the access checkpoints the consolidation booking number of the empty container. Containers entering for consolidation in the *Contecon* marine terminal must enter completely empty and without any material inside, this includes absorbent materials used for stowage such as airbags or corrugated paper

It should be noted that, each time all documents are verified, in export cases 1 or 2, security seals are placed on the containers at the access checkpoints for its respective entry to the *CGSA*. For the shipment authorization of the full container, once it has been transported and placed alongside the ship, the Billing Department verifies electronically or physically the following information:

-Booking number or containers to be shipped

[23] Document that certifies the gross weight of the container to be exported.

-Payment made for the shipment of goods

-A copy of the document for the procedures with *SENAE* authorizations

(págs. 6-30)

There is the possibility that the container may be stored in the terminal until the moment of leaving the facilities for cargo loading at the exporter's premises or consolidation at the terminal, this could happen due to logistical failures, but generally it does not exceed the 5 free days offered by the *Contecon* to the exporter. In like manner, all merchandise must be duly authorized by *SENAE* and *PNA* prior to its shipment. The services rendered by the *Contecon* (2020), that will be used in the mathematical analysis are as follows:

First case of services rendered by the *Contecon*:

1.-Full Container Transfer (Ship to Gate): $204.04 (Box)

2.-Container Reception/Dispatch (Services to Shipper): $40.19 (Box)

3.-Seal Provision and Placing: $10.90 (Seal)

4.-Container Reception/Dispatch (Services to Shipper): $40.19 (Box)

5.-Container Reception/Dispatch (Services to Shipper): $40.19 (Box)

6.-VGM Certificate: $5.00 (Box)

7.-Seal Provision and Placing: $10.90 (Seal)

8.-Container Handling in Terminal: $34.07 (Box)

9.-Container Drayage: $46.88 (Box)

10.-Operation for Validation/Inspection of the Container (Services to Shipper): $120.56 (Box)

11.-Full Container Transfer (Ship to Yard/Yard to Ship): $156.96 (Box)

Second case of services rendered by the *Contecon*:

1.-Full Container Transfer (Ship to Gate): $204.04 (Box)

2.-Container Reception/Dispatch (Services to Shipper): $40.19 (Box)

3.-Seal Provision and Placing: $10.90 (Seal)

4.-Container Handling in Terminal: $34.07 (Box)

5.-Empty Container Transfer: $136.28 (Box)

6.-Container Consolidation (Services to Shipper): $148.21 (TEU)

7.-Container Handling in Terminal: $34.07 (Box)

8.-Operation for Validation/Inspection of the Container (Services to Shipper): $120.56 (Box)

9.-Full Container Transfer (Ship to Yard/Yard to Ship): $156.96 (Box)

First case description of each service rendered by the *Contecon*:

1.-The movement of the container begins with the full container transfer (Ship to Gate), this service comprises the set of all activities of loading/unloading, lashing/unlashing, embarking/disembarking, storage and drayage or internal transport in the *Contecon* marine terminal until the exit checkpoints of the port terminal. It also includes the issuance of all the respective documents for the dispatch of containers

2.-The container is unloaded and emptied in order to return to the port terminal, the container reception service is based on the control of documents, in addition to the issuance of the documentation that establishes the conditions in which the empty container is received (EIR). Subsequently, to be transferred to its place of storage or depot

3.-At the end of the inspection at the terminal access checkpoints, the seal provision and placing, as its name indicates, provisions the container with the security seal and places it on it

4.-When the carrier arrives to withdraw the empty container in order to transport it to the exporter's premises and load it with merchandise, the container dispatch service consists in securing the receptacle in the respective means of transport and delivering it to the access checkpoint of the terminal where it was picked up at the beginning

5.-The container returns to the marine terminal completely loaded with merchandise and the container reception service is used once more

6.-In addition, the VGM certificate is presented and it informs the gross weight of the container to be exported

7.-After the inspection, the container is once again provided with the security seal and placed on it

8.-The container handling service in the terminal is in charge of taking the cargo/container from its storage or depot and placing it on a means of land transportation belonging to the *CGSA*

9.-The container drayage service is used, which includes any transfer or transport, stowage/removal, loading/unloading of general or containerized cargo that is completed inside the marine terminal. Consequently, the container is transferred and placed alongside the ship to be embarked

10.-Once the container has been transported and placed alongside the ship to be embarked, it must go through the operation for validation/inspection of the container service prior to shipment. This is a requirement requested by *SENAE* and *PNA*, and includes drayage services, in addition to loading/unloading and latching/unlatching (of the cargo accommodated inside the container), and the accounting in conjunction with the verification of the container. This operation is conducted in presence of the shipping agency's representative

11.-Finally, the full container transfer (Yard to Ship) comprises the activities of lashing/unlashing, loading/unloading, drayage and embarking/disembarking for the placement of the container on the ship once the inspection has been completed. Furthermore, this service includes all the respective documentation

Second case description of each service rendered by the *Contecon*:

The first 3 processes are the same as those explained above in the first case description of each service rendered by the *Contecon* in Match Back 1. Differences that appear from procedure N˚4 are described below.

4.-The container handling service in the terminal is in charge of taking the cargo/container from its storage or depot and placing it on a means of land transportation belonging to the *CGSA*

5.-The empty container transfer service enters, which is based on the transfer of empty containers only, anywhere inside the *Contecon* marine terminal, and takes special care that no illegal material may be loaded or that the container suffers any damage during its transportation

6.-The container is transferred to the area within the port where the container consolidation service is conducted, which consists of arranging the operational actions and necessary resources for the filling, stowage and latching, of any type of cargo in a container (used in cases of Less than Container Load). Furthermore, the consolidation service issues the respective documents of the merchandise

7.-Later on, using the container handling service again, it is secured in a means of internal land transportation of the terminal

8.-The full container is transferred and placed alongside the ship by virtue of the drayage service that is included in the operation for validation/inspection of the container, prior to shipment. It is a requirement requested by *SENAE* and *PNA*, and includes the services of drayage, in addition to loading/unloading and latching/unlatching (of the cargo accommodated inside the container), and the accounting in conjunction with the verification of the container. This operation is conducted in presence of the shipping agency's representative

9.-Finally, the full container transfer (Yard to Ship) comprises the activities of lashing/unlashing, loading/unloading, drayage and embarking/disembarking for the placement of the container on the ship once the inspection has been completed. Furthermore, this service includes all the respective documentation

3.4.3.1. Mathematical analysis

Service abbreviations:

Full Cntr Transfer -Ship to Gate- (*FCTSG*)

Cntr Reception/Dispatch (*CRD*)

VGM Certificate (*VGMC*)

Seal Provision and Placing (*SPP*)

Cntr Handling in Terminal (*CHT*)

Empty Cntr Transfer (*ECT*)

Cntr Drayage (*CD*)

Cntr Consolidation (*CC*)

Validation/Inspection of the Cntr (*VIC*)

Full Cntr Transfer -Yard to Ship- (*FCTYS*)

Symbols and literals used in the formula:

Dollars ($)

Number of times the service is used (*t*)

The two container managements for the respective exportation are analyzed below:

Container Management #1

The total cost in the management of Match Back 1 and first export case of a container arrived at the *Contecon* marine terminal is $795.06 (seven hundred and ninety-five dollars with six cents). The container reception/dispatch service is used three times for the entry, exit and entry again of the container (the full container transfer service of the just arrived container at the terminal includes the payment of the first dispatch service of it). In like manner, the seal provision and placing service is charged twice due to the two container entries, the first time empty and the second time full, respectively.

$$\boldsymbol{SUBTOTAL\ COST\ CNTRS\ \#1}$$
$$= FCTSG + CRD + SPP + CRD + CRD + VGMC + SPP + CHT + CD + VIC + FCTYS$$
$$= \$204.04 + (\$40.19 \times 3t) + (\$10.90 \times 2t) + \$5 + \$34.07 + \$46.88 + \$120.56 + \$156.96$$
$$= \$709.88$$
$$\boldsymbol{VAT\ 12\%} = \$85.18$$
$$\boldsymbol{TOTAL\ COST\ CNTRS\ \#1} = \$795.06$$

Container Management #2

The total cost in the management of Match Back 1 and second export case of a container arrived at the *Contecon* marine terminal is $991.51 (nine hundred and ninety-one dollars with fifty-one cents). Since a case of Less than Container Load is analyzed, the full payment of the container process will be based on the agreement reached between the customers and the port terminal.

$$\boldsymbol{SUBTOTAL\ COST\ CNTRS\ \#2} = FCTSG + CRD + SPP + CHT + ECT + CC + CHT + VIC + FCTYS$$
$$= \$204.04 + \$40.19 + \$10.90 + (\$34.07 \times 2t) + \$136.28 + \$148.21 + \$120.56 + \$156.96$$
$$= \$885.28$$
$$\boldsymbol{VAT\ 12\%} = \$106.23$$
$$\underline{\boldsymbol{TOTAL\ COST\ CNTRS\ \#2} = \$991.51}$$

Empty Container Management #1

The total cost in Match Back 1 and first export case, of an empty container in the *Contecon* is $102.23 (one hundred and two dollars with twenty-three cents). This is the price that is paid for the empty container only, that is, the costs for entering and withdrawing the empty container from the terminal before loading it with merchandise are considered. In addition, the cost for the placing of the security seal at the first container entry.

$$\boldsymbol{SUBTOTAL\ COST\ EMPTY\ CNTRS\ \#1} = CRD + CRD + SPP$$
$$= (\$40.19 \times 2t) + \$10.90$$
$$= \$91.28$$
$$\boldsymbol{VAT\ 12\%} = \$10.95$$
$$\underline{\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS\ \#1} = \$102.23}$$

Empty Container Management #2

The total cost in Match Back 1 and second export case, of an empty container in the *Contecon* is $248.01 (two hundred and forty-eight dollars with 1 cent). This is the price that is paid for the empty container only, that is, the entry costs are taken into account with the placing of the respective security seal and the container handling of it prior to being consolidated with merchandise.

$$\boldsymbol{SUBTOTAL\ COST\ EMPTY\ CNTRS\ \#2} = CRD + SPP + CHT + ECT$$
$$= \$40.19 + \$10.90 + \$34.07 + \$136.28$$
$$= \$221.44$$
$$\boldsymbol{VAT\ 12\%} = \$26.57$$
$$\underline{\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS\ \#2} = \$248.01}$$

Observations

Match Back consists in reusing the imported container; therefore, it is a better option than Empty Repositioning because the container will always be in use and loaded. Despite the additional container movements generated when exiting and re-entering the terminal or the empty container transfer for consolidation, Match Back presents an advantage in quality of service and of the product to be exported. All this because it will always go through a storage or temporary depot where there is enough time for the container to be checked by the inspector of the marine terminal, and thus ensure the use of the container for an exportation without problems.

3.4.4. Match Back 2

Following the movement parameter of Empty Repositioning 1 until the full container exits the *CGSA* facilities, and in reference to the port services manual of the *Contecon* (2017), the process continues as follows.

Inside the premises of the importer the container is unloaded, and it is transferred to the port facilities again. The empty container is considered for storage because it will not be loaded or consolidated with merchandise immediately as in Match Back 1. For this the carrier presents the following documentation at the access checkpoints of the *CGSA*:

-Reception/Dispatch document (EIR)

-Letter of departure from the shipping company or agency with current date

-Driver's license

In like manner, as in Match Back 1, there are two cases for exporting the full container by the Contecon which are:

1) When the scheduled shipping date arrives, the container is withdrawn from the terminal by the exporter (presenting the required documentation for the exit of empty containers) for its

corresponding cargo load at its premises and then sent back to the marine terminal for its respective exportation. At the access checkpoints, the carrier presents the following documentation:

-AISV document

-Driver's license

-Customs document authorizing the entry of cargo

-In case of a refrigerated load, a temperature chart of the container must be disclosed in order to prevent any possible damage to the cargo

-In case of transporting dangerous cargo (IMO), all the information presented in the label must be complete. The customer or person in charge of the container will be solely responsible in case there were any accident or damage in the terminal, which occurred due to falsification or omission of relevant information of the IMO container

-VGM certificate

2) When the scheduled shipping date arrives, several exporters occupy the container for a Less than container Load shipment; that is, the *CGSA* is in charge of the consolidation of merchandise belonging to different owners in a single container for export. Since the container enters the terminal for storage, the documents presented by the carrier at the access checkpoints are the same as detailed above. Regardless of that, later on, the container will be used for consolidation

It should be noted that, each time all documents are verified, in export cases 1 or 2, security seals are placed on the containers at the access checkpoints for its respective entry to the *CGSA*. For the shipment authorization of the full container, once it has been transported and placed

alongside the ship, the Billing Department verifies electronically or physically the following information:

-Booking number or container to be shipped

-Payment made for the shipment of goods

-A copy of the document for the procedures with SENAE authorizations

(págs. 6-30)

All the merchandise must be duly authorized by *SENAE* and *PNA* for its shipment. The services rendered by the *Contecon* (2020), that will be used in the mathematical analysis are as follows:

First case of services rendered by the *Contecon*:

1.-Full Container Transfer (Ship to Gate): $204.02 (Box)

2.-Container Reception/Dispatch (Services to Shipper): $40.19 (Box)

3.-Seal Provision and Placing: $10.90 (Seal)

4.-Empty Container Storage: $3.41 (TEU/day) Up to 10 days

$4.09 (TEU/day) 11-20 days

$5.45 (TEU/day) More than 20 days

5.-Container Reception/Dispatch (Services to Shipper): $40.19 (Box)

6.-Container Reception/Dispatch (Services to Shipper): $40.19 (Box)

7.-VGM Certificate: $5.00 (Box)

8.-Seal Provision and Placing: $10.90 (Seal)

9.-Container Handling in Terminal: $34.07 (Box)

10.-Container Drayage: $46.88 (Box)

11.-Operation for Validation/Inspection of the Container (Services to Shipper): $120.56 (Box)

12.-Full Container Transfer (Ship to Yard/Yard to Ship): $156.96 (Box)

Second case of services rendered by the *Contecon*:

1.-Full Container Transfer (Ship to Gate): $204.04 (Box)

2.-Container Reception/Dispatch (Services to Shipper): $40.19 (Box)

3.-Seal Provision and Placing: $10.90 (Seal)

4.-Empty Container Storage: $3.41 (TEU/day) Up to 10 days

$4.09 (TEU/day) 11-20 days

$5.45 (TEU/day) More than 20 days

5.-Container Handling in Terminal: $34.07 (Box)

6.-Empty Container Transfer: $136.28 (Box)

7.-Container Consolidation (Services to Shipper): $148.21 (TEU)

8.-Container Handling in Terminal: $34.07 (Box)

9.-Operation for Validation/Inspection of the Container (Services to Shipper): $120.56 (Box)

10.-Full Container Transfer (Ship to Yard/Yard to Ship): $156.96 (Box)

First case description of each service rendered by the *Contecon*:

1.-The movement of the container begins with the full container transfer (Ship to Gate), this services comprises the set of all activities of loading/unloading, lashing/unlashing, embarking/disembarking, storage and drayage or internal transport in the *Contecon* marine terminal until the exit checkpoints of the port terminal. It also includes the issuance of all the respective documents for the dispatch of containers

2.-The container is unloaded and emptied in order to return to the port terminal, the container reception service is based on the control of documents, in addition to the issuance of the

documentation that establishes the conditions in which the empty container is received (EIR). Subsequently, to be transferred to its place of storage or depot

3.-At the end of the inspection at the terminal access checkpoints, the seal provision and placing, as its name indicates, provisions the container with the security seal and places it on it

4.-The container reception/dispatch service transfers the receptacle to the empty container storage, which consists in the stay of the container under the complete custody of the *CGSA*. To this effect, *Contecon* is fully responsible for any damage that may occur to the empty container during the time it is in this depot

5.-When the shipping date arrives, the dispatch service secures the receptacle in the respective means of transportation and delivers it to the exporter's carrier at the access checkpoint of the terminal where it was picked up at the beginning

6.-The container returns to the marine terminal completely loaded with merchandise and the container reception service is used once more

7.-In addition, The VGM certificate is presented and it informs the gross weight of the container to be exported

8.-After the inspection, the container is once again provided with the security seal and placed on it

9.-The container handling service in the terminal is in charge of taking the cargo/container from its storage or depot and placing it on a means of land transportation belonging to the *CGSA*

10.-The container drayage service is used, which includes any transfer or transport, stowage/removal, loading/unloading of general or containerized cargo that is completed inside

the marine terminal. Consequently, the container is transferred and placed alongside the ship to be embarked

11.-Once the container has been transported and placed alongside the ship to be embarked, it must go through the operation for validation/inspection of the container service prior to shipment. This is a requirement requested by *SENAE* and *PNA*, and includes drayage services, in addition to loading/unloading and latching/unlatching (of the cargo accommodated inside the container), and the accounting in conjunction with the verification of the container. This operation is conducted in presence of the shipping agency's representative

12.-Finally, the full container transfer (Yard to Ship) comprises the activities of lashing/unlashing, loading/unloading, drayage and embarking/disembarking for the placement of the container on the ship once the inspection has been completed. Furthermore, this service includes all the respective documentation

Second case description of each service rendered by the *Contecon*:

The first 4 processes are the same as those explained above in the first case description of each service rendered by the *Contecon* in Match Back 2. Differences that appear from procedure N˚5 are described below.

5.-When the shipping date arrives, the container handling service in the terminal is in charge of taking the cargo/container from its storage or depot and placing it on a means of land transportation belonging to the *CGSA*

6.-The empty container transfer service enters, which is based on the transfer of empty containers only, anywhere inside the *Contecon* marine terminal, and takes special care that no illegal material may be loaded or that the container suffers any damage during its transportation

7.-The container is transferred to the area within the port where the container consolidation service is conducted, which consists of arranging the operational actions and necessary resources for the filling, stowage and latching, of any type of cargo in a container (used in cases of Less than Container Load). Furthermore, the consolidation service issues the respective documents of the merchandise

8.-Later on, using the container handling service again, it is secured in a means of internal land transportation of the terminal

9.-The full container is transferred and placed alongside the ship by virtue of the drayage service that is included in the operation for validation/inspection of the container, prior to shipment. It is a requirement requested by *SENAE* and *PNA*, and includes the services of drayage, in addition to loading/unloading and latching/unlatching (of the cargo accommodated inside the container), and the accounting in conjunction with the verification of the container. This operation is conducted in presence of the shipping agency's representative

10.-Finally, the full container transfer (Yard to Ship) comprises the activities of lashing/unlashing, loading/unloading, drayage and embarking/disembarking for the placement of the container on the ship once the inspection has been completed. Furthermore, this service includes all the respective documentation

3.4.4.1. Mathematical analysis

Service abbreviations:

Full Cntr Transfer -Ship to Gate- (*FCTSG*)

Cntr Reception/Dispatch (*CRD*)

VGM Certificate (*VGMC*)

Seal Provision and Placing (*SPP*)

Empty Cntr Storage (*ECS*)

Cntr Handling in Terminal (*CHT*)

Empty Cntr Transfer (*ECT*)

Cntr Drayage (*CD*)

Cntr Consolidation (*CC*)

Validation/Inspection of the Cntr (*VIC*)

Full Cntr Transfer -Yard to Ship- (*FCTYS*)

Symbols and literals used in the formula:

Dollars ($)

Number of times the service is used (*t*)

Days (*d*)

The two container managements for the respective exportation are analyzed below:

Container Management #1

The total cost in the management of Match Back 2 and first export case of a container arrived at the *Contecon* marine terminal, and stored in it for 10 days (the *CGSA* offers a total of 5 free storage days for container exports) is $814.16 (eight hundred and fourteen dollars with sixteen cents). The container reception/dispatch service is used three times for the entry, storage, exit and entry again of the container (the full container transfer service, of the container just arrived at the terminal, includes the payment for the first dispatch of it). In like manner, the seal provision and placing service is charged twice by the terminal due to the two container entries, the first time empty and the second time full, respectively.

$$\boldsymbol{SUBTOTAL\ COST\ CNTRS\ \#1}$$
$$= FCTSG + CRD + SPP + ECS + CRD + CRD + VGMC + SPP + CHT + CD + VIC + FCTYS$$
$$= \$204.04 + (\$40.19 \times 3t) + (\$10.90 \times 2t) + (\$3.41 \times 5d) + \$5 + \$34.07 + \$46.88 + \$120.56 + \$156.96$$
$$= \$726.93$$
$$\boldsymbol{VAT\ 12\%} = \$87.23$$
$$\underline{\boldsymbol{TOTAL\ COST\ CNTRS} = \$814.16}$$

The total cost in the management of Match Back 2 and first export case of a container arrived at the *Contecon* marine terminal, and stored in it for <u>20 days</u> (the *CGSA* offers a total of 5 free storage days for container exports) is $859.96 (eight hundred and fifty-nine dollars with ninety-six cents).

$$= \$204.04 + (\$40.19 \times 3t) + (10.90 \times 2t) + (\$3.41 \times 5d) + (\$4.09 \times 10d) + \$5 + \$34.07 + \$46.88 + \$120.56 + \$156.96$$
$$= \$767.83$$
$$\boldsymbol{VAT\ 12\%} = \$92.13$$
$$\underline{\boldsymbol{TOTAL\ COST\ CNTRS} = \$859.96}$$

The total cost in the management of Match Back 2 and first export case of a container arrived at the *Contecon* marine terminal, and stored in it for <u>30 days</u> (the *CGSA* offers a total of 5 free storage days for container exports) is $921 (nine hundred and twenty-one dollars).

$$= \$204.04 + (\$40.19 \times 3t) + (\$10.90 \times 2t) + (\$3.41 \times 5d) + (\$4.09 \times 10d) + (\$5.45 \times 10d) + \$5 + \$34.07 + \$46.88 + \$120.56 + \$156.96$$
$$= \$822.33$$
$$\boldsymbol{VAT\ 12\%} = \$98.67$$
$$\underline{\boldsymbol{TOTAL\ COST\ CNTRS} = \$921.00}$$

<u>Container Management #2</u>

The total cost in the management of Match Back 2 and second export case of a container arrived at the *Contecon* marine terminal, and stored in it for <u>10 days</u> (the *CGSA* offers a total of 5 free storage days for container exports) is $1010.60 (one thousand and ten dollars with sixty cents).

Since a case of Less than Container Load is analyzed, the full payment of the container process will be based on the agreement reached between the customers and the terminal.

$$\boldsymbol{SUBTOTAL\ COST\ CNTRS\ \#2}$$
$$= FCTSG + CRD + SPP + ECS + CHT + ECT + CC + CHT + VIC + FCTYS$$
$$= \$204.04 + \$40.19 + \$10.90 + (\$3.41 \times 5d) + (\$34.07 \times 2t) + \$136.28 + \$148.21 + \$120.56 + \$156.96$$
$$= \$902.33$$
$$\boldsymbol{VAT\ 12\%} = \$108.27$$
$$\underline{\boldsymbol{TOTAL\ COST\ CNTRS} = \$1010.60}$$

The total cost in the management of Match Back 2 and second export case of a container arrived at the *Contecon* marine terminal, and stored in it for <u>20 days</u> (the *CGSA* offers a total of 5 free storage days for container exports) is $1056.41 (one thousand and fifty-six dollars with forty-one cents).

$$= \$204.04 + \$40.19 + \$10.90 + (\$3.41 \times 5d) + (\$4.09 \times 10d) + (\$34.07 \times 2t) + \$136.28 + \$148.21 + \$120.56 + \$156.96$$
$$= \$943.23$$
$$\boldsymbol{VAT\ 12\%} = \$113.18$$
$$\underline{\boldsymbol{TOTAL\ COST\ CNTRS} = \$1056.41}$$

The total cost in the management of Match Back 2 and second export case of a container arrived at the *Contecon* marine terminal, and stored in it for <u>30 days</u> (the *CGSA* offers a total of 5 free storage days for container exports) is $1117.45 (one thousand one hundred and seventeen dollars with forty-five cents).

$$= \$204.04 + \$40.19 + \$10.90 + (\$3.41 \times 5d) + (\$4.09 \times 10d) + (\$5.45 \times 10d) + (\$34.07 \times 2t) + \$136.28 + \$148.21 + \$120.56 + \$156.96$$
$$= \$997.73$$
$$\boldsymbol{VAT\ 12\%} = \$119.72$$
$$\underline{\boldsymbol{TOTAL\ COST\ CNTRS} = \$1117.45}$$

Empty Container Management #1

The total cost in Match Back 2 and first export case, of an empty container stored in the *Contecon* for 10 days (the *CGSA* offers a total of 5 free storage days for container exports) is $121.32 (one hundred and twenty-one dollars with thirty-two cents). This is the price paid for the empty container only; that is, the costs for entry, storage and exit of the empty container from the terminal before loading it with merchandise are considered. In addition, with the only placing of the security seal at the first container entry.

$$\boldsymbol{SUBTOTAL\ COST\ EMPTY\ CNTRS\ \#1} = CRD + SPP + ECS + CRD$$
$$= (\$40.19 \times 2t) + \$10.90 + (\$3.41 \times 5d)$$
$$= \$108.33$$
$$\boldsymbol{VAT\ 12\%} = \$12.99$$
$$\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS} = \$121.32$$

The total cost in Match Back 2 and first export case, of an empty container stored in the *Contecon* for 20 days (the *CGSA* offers a total of 5 free storage days for container exports) is $167.13 (one hundred and sixty-seven dollars with thirteen cents).

$$= (\$40.19 \times 2t) + \$10.90 + (\$3.41 \times 5d) + (\$4.09 \times 10d)$$
$$= \$149.23$$
$$\boldsymbol{VAT\ 12\%} = \$17.90$$
$$\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS} = \$167.13$$

The total cost in Match Back 2 and first export case, of an empty container stored in the *Contecon* for 30 days (the *CGSA* offers a total of 5 free storage days for container exports) is $228.17 (two hundred and twenty-eight dollars with seventeen cents).

$$= (\$40.19 \times 2t) + \$10.90 + (\$3.41 \times 5d) + (\$4.09 \times 10d) + (\$5.45 \times 10d)$$
$$= \$203.73$$
$$\boldsymbol{VAT\ 12\%} = \$24.44$$
$$\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS} = \$228.17$$

Empty Container Management #2

The total cost in Match Back 2 and second export case, of an empty container stored in the *Contecon* for 10 days (the *CGSA* offers a total of 5 free storage days for container exports) is $267.10 (two hundred and sixty-seven dollars with ten cents). This is the price that is paid for the empty container only; that is, the costs for entry of the empty container with the placing of the respective security seal is considered. Also, storage and the handling of it prior to the consolidation with merchandise.

$$\boldsymbol{SUBTOTAL\ COST\ EMPTY\ CNTRS\ \#2} = CRD + SPP + ECS + CHT + ECT$$
$$= \$40.19 + \$10.90 + (\$3.41 \times 5d) + \$34.07 + \$136.28$$
$$= \$238.49$$
$$\boldsymbol{VAT\ 12\%} = \$28.61$$
$$\underline{\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS} = \$267.10}$$

The total cost in Match Back 2 and second export case, of an empty container stored in the *Contecon* for 20 days (the *CGSA* offers a total of 5 free storage days for container exports) is $312.91 (three hundred and twelve dollars with ninety-one cents).

$$= \$40.19 + \$10.90 + (\$3.41 \times 5d) + (\$4.09 \times 10d) + \$34.07 + \$136.28$$
$$= \$279.39$$
$$\boldsymbol{VAT\ 12\%} = \$33.52$$
$$\underline{\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS} = \$312.91}$$

The total cost in Match Back 2 and second export case, of an empty container stored in the *Contecon* for 30 days (the *CGSA* offers a total of 5 free storage days for container exports) is $373.95 (three hundred and seventy-three dollars with ninety-five cents).

$$= \$40.19 + \$10.90 + (\$3.41 \times 5d) + (\$4.09 \times 10d) + (\$5.45 \times 10d) + \$34.07 + \$136.28$$
$$= \$333.89$$
$$\boldsymbol{VAT\ 12\%} = \$40.06$$
$$\underline{\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS} = \$373.95}$$

Observations

For a better understanding of the services used (2020), it can be observed that in the first export case of Match Back 1 and 2, the drayage service is used since it is a considerably long transfer for the full container until it reaches the operation for the validation and inspection of the container service. In addition, it is a full container, closed and ready for export. In the second export case, the drayage service could also be used for transporting the container instead of the empty container transfer service which in turn has a higher cost, but this second service offers a much better security to the container which is needed since it is completely empty inside and there may be bad intentions in loading illegal merchandise by any user in the terminal. This could be deduced by dint of an interview with high executives of the *Contecon Guayaquil S.A.*

3.4.5. Street Turn

Following the movement parameter of Empty Repositioning 1 until the full container exits the *CGSA* facilities, and in reference to the port services manual of the *Contecon* (2017). The process continues as follows.

Inside the premises of the importer the container is unloaded, and it is transferred to the exporter's premises in order to be loaded with merchandise. Later on, the container is transported to the *CGSA* facilities for its proper export. A synchronization is required between all parties to carry out this task without interruptions. At the access checkpoints of the terminal, the carrier presents the following documentation:

-AISV document

-Driver's license

-Customs document authorizing the entry of cargo

-In case of a refrigerated load, a temperature chart of the container must be disclosed in order to prevent any possible damage to the cargo

-In case of transporting dangerous cargo (IMO), all the information presented in the label must be complete. The customer or person in charge of the container will be solely responsible in case there were any accident or damage in the terminal, which occurred due to falsification or omission of relevant information of the IMO container

-VGM certificate

Once the inspection of the container is completed and the documents are verified, a security seal is placed on the container by measures of internal security regulations of the *CGSA*. For the shipment of the full container once it has been transported and placed alongside the ship, the Billing Department verifies electronically or physically the following information:

-Booking number or container to be shipped

-Payment made for the shipment of goods

-A copy of the document for the procedures with SENAE authorizations

(págs. 6-30)

All the merchandise must be duly authorized by *SENAE* and *PNA* for its shipment. The services rendered by the *Contecon* (2020), that will be used in the mathematical analysis are as follows:

1.-Full Container Transfer (Ship to Gate): $204.04 (Box)

2.-Container Reception/Dispatch (Services to Shipper): $40.19 (Box)

3.-VGM Certificate: $5.00 (Box)

4.-Seal Provision and Placing: $10.90 (Seal)

5.-Container Handling in Terminal: $34.07 (Box)

6.-Container Drayage: $46.88 (Box)

7.-Operation for Validation/Inspection of the Container (Services to Shipper): $120.56 (Box)

8.-Full Container Transfer (Ship to Yard/Yard to Ship): $156.96 (Box)

Description of each service rendered by the *Contecon*:

1.-The movement of the container begins with the full container transfer (Ship to Gate), this service comprises the set of all activities of loading/unloading, lashing/unlashing, embarking/disembarking, storage and drayage or internal transport in the *Contecon* marine terminal until the exit checkpoints of the port terminal. It also includes the issuance of all the respective documents for the dispatch of containers

2.-The container is unloaded at the premises of the importer and transferred to the exporter's premises, here the container is loaded with new merchandise and sent back to the marine terminal. The container reception service is based on the control of documents; all this in order to later be transferred to its place of storage or depot

3.-In addition, the VGM certificate is presented and it informs the gross weight of the container to be exported

4.-At the end of the inspection at the terminal access checkpoints, the seal provision and placing, as its name indicates, provisions the container with the security seal and places it on it

5.-The container handling service in the terminal is in charge of taking the cargo/container from its storage or depot (which is immediately without any setbacks) and placing it on a means of land transportation belonging to the *CGSA*

6.-The container drayage service is used, which includes any transfer or transport, stowage/removal, loading/unloading of general or containerized cargo that is completed inside

the marine terminal. Consequently, the container is transferred and placed alongside the ship to be embarked without interruption

7.-Prior to the container shipment, it must go through the operation for validation/inspection of the container service. This is s requirement requested by *SENAE* and *PNA*, and includes drayage services, in addition to loading/unloading and latching/unlatching (of the cargo accommodated inside the container), and the accounting in conjunction with the verification of the container. This operation is conducted in presence of the shipping agency's representative

8.-Finally, the full container transfer (Yard to Ship) comprises the activities of lashing/unlashing, loading/unloading, drayage and embarking/disembarking for the placement of the container on the ship once the inspection has been completed. Furthermore, this service includes all the respective documentation

3.4.5.1. Mathematical analysis

Service abbreviations:

Full Cntr Transfer -Ship to Gate- (*FCTSG*)

Cntr Reception/Dispatch (*CRD*)

VGM Certificate (*VGMC*)

Seal Provision and Placing (*SPP*)

Cntr Handling in Terminal (*CHT*)

Cntr Drayage (*CD*)

Validation/Inspection of the Cntr (*VIC*)

Full Cntr Transfer -Yard to Ship- (*FCTYS*)

Symbols and literals used in the formula:

Dollars ($)

Container Management

The total cost in the management of Street Turn, of a container arrived at the *Contecon* marine terminal is $692.83 (six hundred and ninety-two dollars with eighty-three cents). This is an import with an immediate export of merchandise and with a price that is quite reasonable; therefore, the best option to be considered.

$$\boldsymbol{SUBTOTAL\ COST\ CNTRS} = FCTSG + CRD + VGMC + SPP + CHT + CD + VIC + FCTYS$$
$$= \$204.04 + \$40.19 + \$5 + \$10.90 + \$34.07 + \$46.88 + \$120.56 + \$156.96$$
$$= \$618.60$$
$$\boldsymbol{VAT}\ \mathbf{12}\% = \$74.23$$
$$\underline{\boldsymbol{TOTAL\ COST\ CNTRS} = \$692.83}$$

Empty Container Management

There is no cost for transportation, storage or handling of an empty container in any moment inside the *Contecon* marine terminal with the Street-Turn model.

$$\underline{\boldsymbol{TOTAL\ COST\ EMPTY\ CNTRS} = \emptyset}$$

Observations

According to the interview had with Eng. Mario Cortes and Eng. Julio Vergara (2020), it was detailed that all the services used in the 5 movement patterns are the most recommended to employ. Street-Turn shows the greatest cost savings in the preparation for a full container export coming from the same imported container.

3.5. Index of the reverse logistics of empty maritime containers

Worldwide, the index of accumulation of empty containers in marine terminals is growing and, in turn, becoming a very complex problem to be solved by logistics operators. There is a

continuous search for new management models that allow the reduction of logistical costs, and with it the unnecessary accumulation of empty containers. It should be noted that, the urban traffic generated by an empty container in a port terminal (on top of it being a source of pollution to the environment) causes an imbalance in the containers movement, and consequently, a decline in competitiveness at the local level of the reverse logistics of empty maritime containers.

3.5.1. Indicator of unnecessary logistical costs based on the *Contecon*

For terminal operators, empty container traffic means less income because the handling fees of these are generally low. However, in the *Contecon* marine terminal, the cost of handling empty containers is higher than usually. This is due to the extra care that is takes; as an example, to prevent the possible loading of illicit merchandise. In turn, this generates a higher expense for the customer (exporter/importer or shipping manager/port agent). Similarly, in cases where there exists empty container storage to later be exported (full or empty), is an negative effect in general due to the difficulty of having to find an available space to temporarily store it in the terminal; something that due to the lack of an efficient management by the logistics operator causes delays in foreign trade processes.

Based on the analysis above, the Street-Turn management model is the most effective for international business operations. At a cost of only $692.83 (six hundred and ninety-two dollars with eighty-three cents), this is the cheapest container movement pattern for an export of merchandise from the *CGSA*. This is because it generates fewer movements and, in turn, no intermediate storage in needed. Also, there is no cost for an empty container inside the terminal. This service is only advisable if there is a previous study and the necessary resources to carry out the series of coincidences in the export and import operations; but since the container does not pass through a temporary storage/depot where the inspector/repairman works, there is a risk of

possible damage to the goods or rejection of the container in its pre-shipment in the event that it was a container in poor condition.

It can be deduced that the Match Back movement pattern is the most tentative one from the point of view of the shipping companies and, of course, the customers. This is because, in case that an immediate export does not occur, the container can remain in the storage/depot of the port terminal for more time. Within this, the repairman is in charge of restoring any possible deterioration of the container, in addition to the cleaning and disinfection of it if needed. The *CGSA* offers a maximum of 5 free storage days in its facilities for container exports, which is an excellent help to the exporter. In comparison to the first Match Back export case analyzed, the second case where there exists the consolidation of merchandise inside the terminal is more expensive, sometimes even exceeding one thousand US dollars when there is storage of the container.

Therefore, the first Match Back export case is the best option since it never exceeds the thousand dollars of expenses in the port terminal even with 30 days of storage. In addition, there is no unnecessary expense for the movement of an empty container inside the terminal. Even though the payment in the second export case is done between the shipping company and several exporter/importers, it ends up generating a setback in the movement of containers inside the terminal; which is something that the reverse logistics of empty maritime containers seek to avoid.

In foreign trade operations, Empty Repositioning is the last option to take into consideration because here are generated the highest costs for transport and storage of an empty container. Naturally, this occurs when there is an imbalance between exports and imports in the international level of the reverse logistics of empty maritime containers and the repositioning expenses are passed on to the respective shipping company since they can not charge a customer for the exportation or importation of an empty container (unless it is a container leased by the

customer). Ultimately, this causes congestion within the container movements inside the terminal, and with it an exaggerated use of the empty containers depot while it waits for an available space in a ship for its respective repositioning.

3.6 Comparative study between Valenciaport and *Contecon*

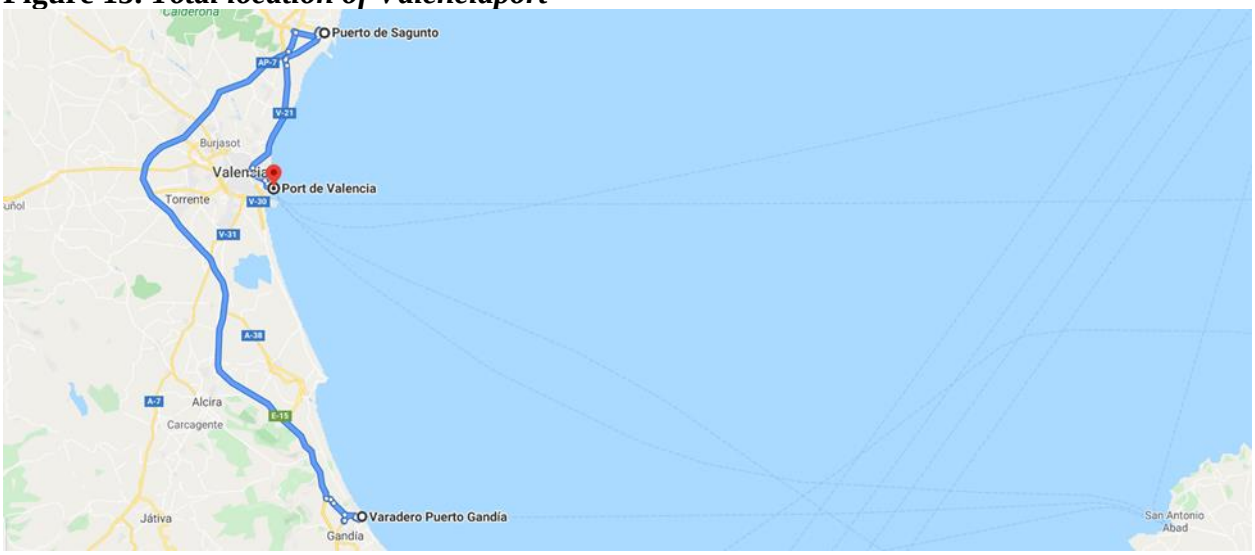
The *Autoridad Portuaria de Valencia* or also known worldwide as Valenciaport (2020), is a public body that manages the three state-owned ports in Spain; these are *Valencia*, *Sagunto* and *Gandía*, and are located along 80 kilometers of the eastern Spanish Mediterranean border. This seaport is considered to be the Mediterranean's leader in containerized commercial traffic; therefore, it has a largo dynamic area of influence in conjunction with a network of connections with all the main ports in the world.

Valenciaport presents a hinterland[24] that occupies 51% of the Spanish GDP[25] and where half of the Spanish working population resides, all within a radius of 350 kilometers; its geostrategic location is considered to be privileged since it is the closest port to the Suez-Gilbraltar axis, which is the route of the main interoceanic lines. Its merchandise is distributed in an efficient radius of 2.000 kilometers not only within Spain, but also with the other countries of the European Union and North Africa. It should be noted that this terminal of Spain has the best connections by road and rail to the center of the country, this analyzed worldwide. In figure N˚15 the total location of Valenciaport is illustrated and N˚16 details the port in the city of *Valencia* which is the main one.

[24] Zone of territorial influence.

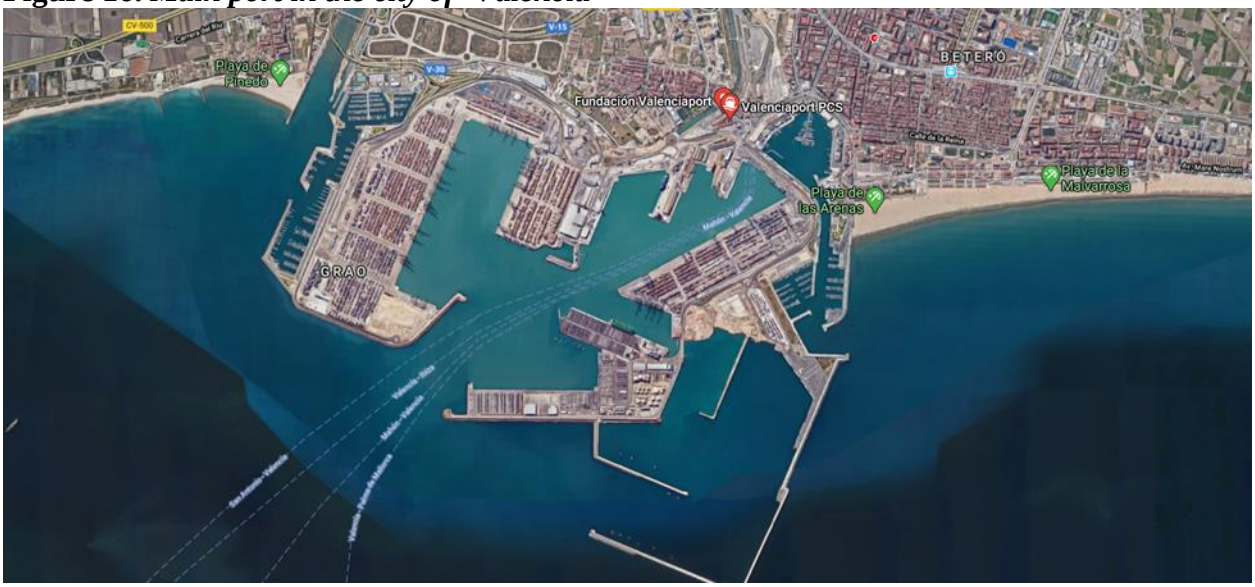
[25] Abbreviation for -Gross Domestic Product-.

Figure 15. ***Total location of Valenciaport***



Source: Google Maps , 2020

Figure 16. ***Main port in the city of -Valencia-***



Source: Google Maps , 2020

According to a report by the author Castro (2014), where an optimization model for movements of empty maritime containers applied to the port of *Valencia* was analyzed; the objectives were the same as those presented in the present thesis project in the *Contecon* marine

terminal. In like manner, the 5 movement patterns of the container were studied, reaching the following results.

At the *Valencia* terminal, the AMPL[26] resolution model was used for the variables, and with it the solver or also known as the CPLEX[27] decryptor was able to solve the problem in fractions of a second resulting as follows.

In Valenciaport it is recommended not to carry out any movements between terminals and exterior empty container depots, which is a logical point for any marine terminal because this minimizes costs. There should only be these movements in case the storage limits of the terminal or depots were exceeded. Another determining point analyzed is that the shipping manager or port agent must have a scheduled route between terminals for the container to be exported or imported, this prevents the possibility for the container to be entering and leaving the terminal, which in turn causes higher expenses even of documentation.

(págs. 51-61)

In analysis with the cross-border trade of Spain and Ecuador, the World Bank-Doing Business provides the following information.

Spain

The following table N˚8 indicates the estimated value calculated by the World Bank for a Spanish cross-border trade. As a whole, figure N˚17 illustrates its score at a worldwide level in 2020 currently.

[26] Program that expresses an algebraic modeling language for mathematical problems. It manifests in an algebraic notation the optimization problems.

[27] Program that decrypts and solves algebraic problems.

Table 8. ***Cross-border traffic in Spain***

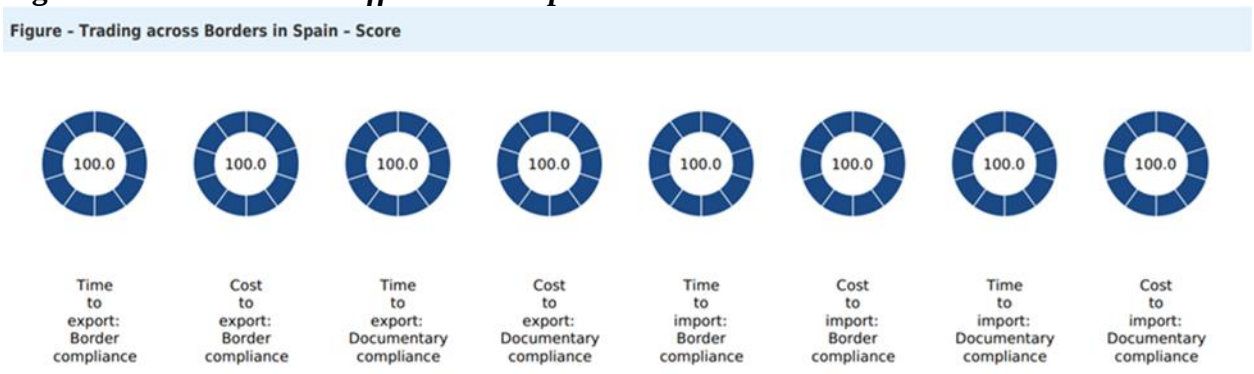
Doing Business 2020 | Spain

Trading across Borders - Spain

Indicator	Spain	OECD high income	Best Regulatory Performance
Time to export: Border compliance (hours)	0	12.7	1 (19 Economies)
Cost to export: Border compliance (USD)	0	136.8	0 (19 Economies)
Time to export: Documentary compliance (hours)	1	2.3	1 (26 Economies)
Cost to export: Documentary compliance (USD)	0	33.4	0 (20 Economies)
Time to import: Border compliance (hours)	0	8.5	1 (25 Economies)
Cost to import: Border compliance (USD)	0	98.1	0 (28 Economies)
Time to import: Documentary compliance (hours)	1	3.4	1 (30 Economies)
Cost to import: Documentary compliance (USD)	0	23.5	0 (30 Economies)

Source: World Bank Group, Doing Business 2020 - Economy Profile Spain , 2020
Author: World Bank Group

Figure 17. ***Cross-border traffic score in Spain***



Source: World Bank Group, Doing Business 2020 - Economy Profile Spain , 2020
Author: World Bank Group

The border compliance refers to an estimate calculated by the World Bank for the necessary time and cost needed to obtain, prepare and submit the respective documents during the management in ports and borders. In Spain there is a time and cost to export and import equal to 0, this in hours and money respectively; something considered relatively insignificant. In other words, practically no time is wasted in Spain for the reception/dispatch service in commercial ports and even in the corresponding customs.

The documentary compliance refers to the total work in preparing the set of necessary documents needed for the international trade operation of the respective product. In Spain there is an export and import time equal to 1 hour respectively in both cases. For Spanish business partners, negotiating internationally in conjunction with the modern technology of its ports, allows a fast presentation of documents generally without any unnecessary delays. Documentation cost is 0 or relatively insignificant, this is due to the fact that most of the time international trade is done between the members of the European Union.

Ecuador

The following table N˚9 indicates the estimated valued calculated by the World Bank for an Ecuadorian cross-border trade. As a whole, figure N˚18 illustrates its score at a worldwide level in 2020 currently.

Table 9. ***Cross-border traffic in Ecuador***

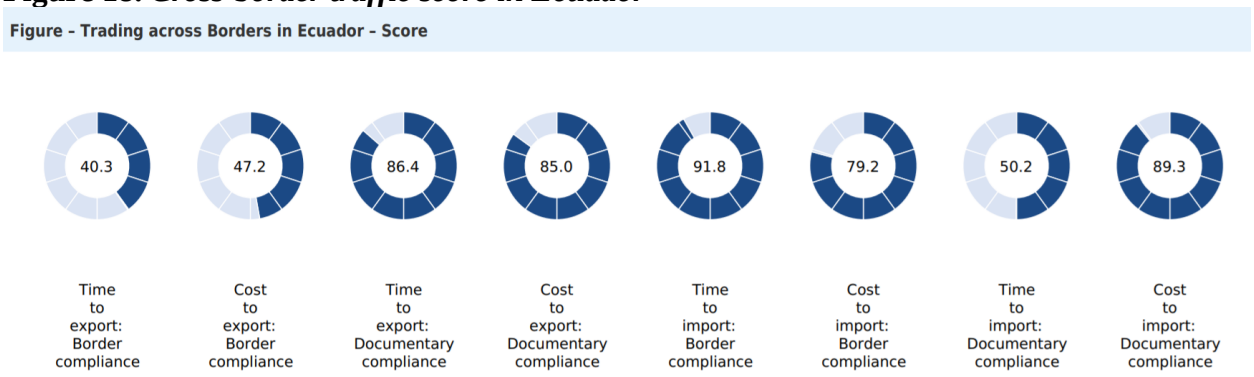
Doing Business 2020 | Ecuador

Trading across Borders - Ecuador

Indicator	Ecuador	Latin America & Caribbean	OECD high income	Best Regulatory Performance
Time to export: Border compliance (hours)	96	55.3	12.7	1 (19 Economies)
Cost to export: Border compliance (USD)	560	516.3	136.8	0 (19 Economies)
Time to export: Documentary compliance (hours)	24	35.7	2.3	1 (26 Economies)
Cost to export: Documentary compliance (USD)	60	100.3	33.4	0 (20 Economies)
Time to import: Border compliance (hours)	24	55.6	8.5	1 (25 Economies)
Cost to import: Border compliance (USD)	250	628.4	98.1	0 (28 Economies)
Time to import: Documentary compliance (hours)	120	43.2	3.4	1 (30 Economies)
Cost to import: Documentary compliance (USD)	75	107.3	23.5	0 (30 Economies)

Source: World Bank Group, Doing Business 2020 - Economy Profile Ecuador , 2020
Author: World Bank Group

Figure 18. ***Cross-border traffic score in Ecuador***



Source: World Bank Group, Doing Business 2020 - Economy Profile Ecuador , 2020
Author: World Bank Group

The border compliance refers to an estimate calculated by the World Bank for the necessary time and cost needed to obtain, prepare and submit the respective documents during the management in ports and borders. In Ecuador, a time of 96h (ninety-six hours) is indicated and a cost of $560 (five hundred and sixty dollars) for exportation. For importation, a time of 24h (twenty-four hours) is indicated and a cost of $250 (two hundred and fifty dollars). Ecuador has trade agreements with many countries around the world; however, due to failures in its border and customs logistics, there are substantial losses in time and formulation of many irrelevant documents.

The documentary compliance refers to the total work in preparing the set of necessary documents needed for the international trade operation of the respective product. In Ecuador there is indicated a time of 24h (twenty-four hours) and a cost of $60 (sixty dollars) for exportation. For importation, a time of 120h (one hundred and twenty hours) and a cost of $75 (seventy-five dollars) is indicated. In Ecuador, the virtual system “Ecuapass” offers the exporter the respective forms that, in turn, allows the shipper obtain the necessary documents for the departure of the products; this website presents failures on some occasions and therefore some delays in the established time when negotiating could occur.

Spain

For the analysis of an international negotiation in Spain, Doing Business offers the following example in table N˚10.

Table 10. ***Example cross-border trade in Spain***

Doing Business 2020 | Spain

Details - Trading across Borders in Spain

Characteristics	Export	Import
Product	HS 87 : Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	HS 8708: Parts and accessories of motor vehicles
Trade partner	France	France
Border	Spain- France border crossing	Spain- France border crossing
Distance (km)	474	474
Domestic transport time (hours)	8	8
Domestic transport cost (USD)	638	638

Source: World Bank Group, Doing Business 2020 - Economy Profile Spain , 2020
Author: World Bank Group

Taking as an approach the domestic transport used, it can be deduced that the cost of transportation to reach the border of the Spanish country with France is $638 (six hundred and thirty-eight dollars), and with a time of 8 hours approximately. The World Bank works with this mean data because the most frequent factories are located at a distance of 474 km (four hundred and seventy-four kilometers) from the French border; and in the same way, 497 km (four hundred and ninety-seven kilometers) from the *Valencia* marine terminal.

Ecuador

For the analysis of an international negotiation in Ecuador, Doing Business offers the following example in table N˚11.

Table 11. ***Example cross-border trade in Ecuador***

Doing Business 2020 | Ecuador

Details – Trading across Borders in Ecuador

Characteristics	Export	Import
Product	HS 08 : Edible fruit and nuts; peel of citrus fruit or melons	HS 8708: Parts and accessories of motor vehicles
Trade partner	United States	Colombia
Border	Guayaquil port	Tulcán border crossing
Distance (km)	413	238
Domestic transport time (hours)	10	8
Domestic transport cost (USD)	675	388

Source: World Bank Group, Doing Business 2020 - Economy Profile Ecuador , 2020
Author: World Bank Group

Taking as an approach the domestic transport used, it can be deduced that the cost of transportation to reach the marine terminal of *Guayaquil* is $675 (six hundred and seventy-five dollars), and with a time of 10 hours approximately. The World Bank works with this mean data because the most frequent factories are located at a distance of 413 kilometers from the marine terminal.

3.6.1. Study observations

In Spain, which main commercial port is Valenciaport, there is a perfect cross-border score in terms of time and cost to export and import. The paying amounts for border and documentary compliance are virtually nil. In comparison, Ecuador establishes high values to be payed, this being a Latin American country where the average population has a high-middle income; the contrast existing between these two countries can be evidenced, this has caused the score of the Ecuadorian country displayed by the World Bank. The existing time in the Ecuadorian borders for commercial management is where the greatest problem occurs, and therefore where there is the greatest time lost.

Domestic transport in Ecuador costs more than in Spain, this being a smaller country than the European one. The failures that exist in Ecuador are clearly seen.

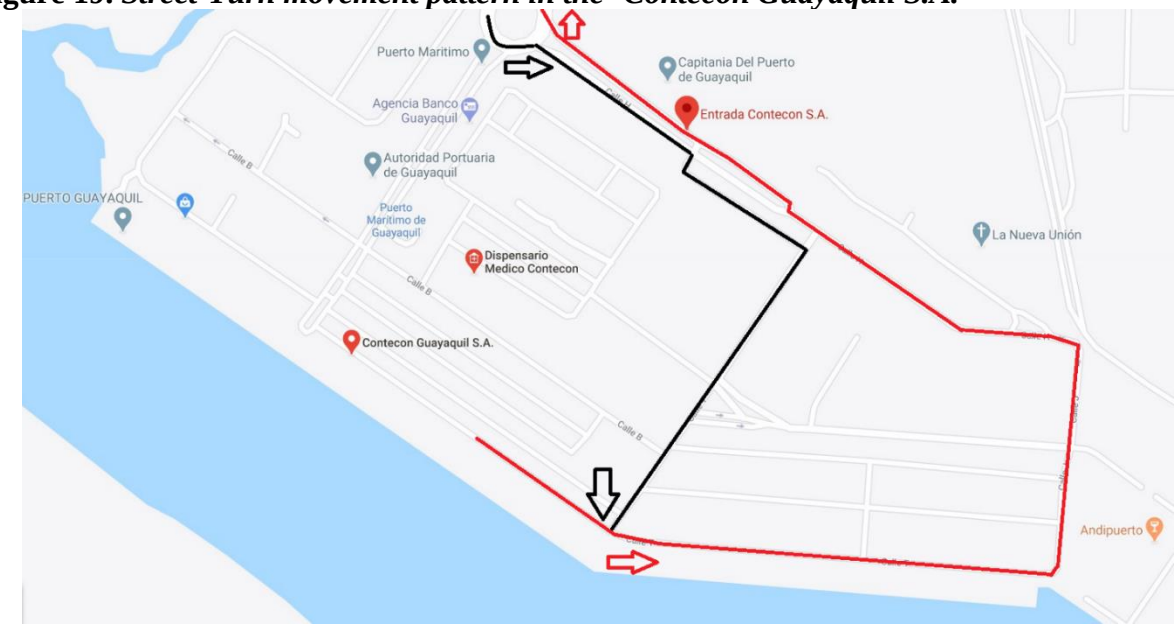
3.7. Final analysis of the results

In relation to the records displayed by the *Autoridad Portuaria de Guayaquil* (2019), regarding the index of exported and imported empty containers, and where the arriving terminal is the *Contecon*; in 2019 a total of 18.571 (eighteen thousand five hundred and seventy-one) empty TEU's containers were exported. In conjunction, a total of 9.645 (nine thousand six hundred and forty-five) full TEU's containers were exported during that same year. This data reveals the enormous number of Empty Repositioning cases that have existed in the *Contecon*.

With FEU's containers, the terminal reported different data with 145.368 (on hundred forty-five thousand three hundred and sixty-eight) of exported full containers and only 31.284 (thirty-one thousand two hundred and eighty-four) of empty containers also exported; including this information a total of 518 container ships were registered having arrived and shipped from the *CGSA*. This data for one year is relatively good due to the fact that more possible cases of Match Back or Street-Turn are revealed, which in turn, are the most recommended to be taken into account by logistics operators. In total it can be deduced that an average of 35 TEU's and 60 FEU's have been loaded empty per vessel throughout the year 2019.

As a result, a practice of the Street-Turn movement pattern is recommended in the *CGSA*; its model is shown in the following figure N˚19. Here, a usage of costs is represented to a minimum as well as the absence of a storage point. A coordination between all parties is necessary, and the results will be accurate. The figure shows the route of the container from the moment it lands on the dock where the red line begins until it returns to the terminal which is represented by the black line.

Figure 19. ***Street-Turn movement pattern in the -Contecon Guayaquil S.A.-***



Source: Google Maps , 2020
Made by: Freddy Guerrón

In addition, in foreign trade flows it is important to take into account this need for coincidence in export and import operations with the same type of container; in this case the Dry Van, which is the most commonly used. This is necessary for the existence of a complementary export to an import, and with it the inspection, cleaning or repair services can be carried out without causing delays in the supply chain management. The possibility of container exchange should also be considered between shipping companies, which would provide the exporting company with the indicated container (Reefer, One Top, Flat Rack, etc) and thus a wait for Empty Repositioning could be avoided. In the *Contecon*, the following shipping companies that most frequently arrive at the terminal and that work with container ships, therefore be able to work with each other are:

- Maersk
- Alioth
- Fouma
- MSC (Mediterranean Shipping Company)

- Acrux N

3.8 Conclusions

Chapter 3 demonstrates the possibility of being able to implement a correct reverse logistics of empty maritime containers by having all the necessary fundamentals for it. When implementing in the analysis the model of empty containers studied in Valenciaport, it can be appreciated how the AMPL language is used to obtain optimal and more specific results for a marine terminal; this is something that could be executed in the *Contecon*. In turn, this could be the ultimate tool for the operational decisions that the shipping/shipowner manager or port/shipping agent normally makes, or the hired logistics corridor.

In like manner, by virtue of the World Bank it was possible to obtain a small sample of the differences in the management of import and export processes between the two countries, Spain and Ecuador; which helped understand the complexity of the situation. However, even though in Spain the implementation of an optimal model of reverse logistics of empty maritime containers has a greater advance, it is important to point out that it does not yet have a definitive model in its studies. The end of a study will always bring future lines of research for the implementation of the corresponding improvements in the terminal.

General Conclusions

Logistics is a science that is constantly evolving, which aims to locate or position the final product in the hands of the client within the time and circumstances previously agreed. Logistics corridors/operators are in charge of this hard work, and with more reason they should be taken into account since there are different processes for each negotiation; in addition, there will continue to appear new and different kinds of processes as modernization keeps on advancing in commerce. Their knowledge must be in constant innovation and the coordination between all parties will be necessary for a proper operation of the entire area that comprises it.

The comparative analysis between the *Contecon* and Valenciaport, which are considered to be among the most important ones in the world, shows that Ecuador still has a long path ahead in order to improve its logistical profile in foreign trade. However, taking into account that logistics is in a constant evolution and continuous research that does not contain a definitive conclusion, there must be a participation from the public and private sector so that policies can be established for the benefit of both sectors and obviously being positive in the long-term.

The *Contecon* is a concessioned terminal by the *Autoridad Portuaria de Guayaquil*; and on account of this, the complete management by this private company has created good results, but there are some specific issues in which the state must intervene both inside and outside the terminal. Domestic transport used by the exporting merchants in *Guayas* as in the rest of Ecuador would be a good example. In spite of this, the research made to the *CGSA* has left good results and on the right path into being a powerful marine terminal.

Recommendations

Based on the analyses performed in Chapter III, it is recommended to develop the Street-Turn movement pattern in its entirety in the *Contecon*; in addition, an algorithm using not only the current data, but a minimum 10-year basis that will allow optimal results by having a larger and more precise range. All this to be able to execute the AMPL language in the *CGSA*, the same used in *Valencia*. Any issue of uncertainty within the model will be taken into account; that is, assumptions or risks that may occur in the management of a container, even the unthinkable will be included. These points will allow to expand the model and analyze the handling of containers inside the ships.

The extension of the *Contecon* marine terminal is another factor to consider due to the limited land capacity it has in comparison to other international commercial ports. Nevertheless, starting with the implementation of the correct movement pattern and the continuous analysis at the international level of the reverse logistics of empty maritime containers (due to world trade imbalances in terms of the container movements), it may be finally considered over the possibility of choosing the Empty Repositioning of the container option, which is also a worldwide logistical challenge.

Eventually, in the case of subsequent studies, an analysis from primary sources of the *Contecon* is recommended. All the essential information is included in this thesis project in conjunction with some solution proposals. The exact numbers needed for a solution will be possible with a fieldwork in the main container terminal of Ecuador.

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Annexes

Annex 1. *General Rates and Services of the -Contecon Guayaquil S.A.-*

GENERAL RATES 2020				
Code	**Basic Services**	**Unit**	**Rate**	**Detail**
TMN	Use of Dock by ship	$ (M/L/Hr)	1.36	
TTC	Transfer of Full, Containers	$ (Box)	204.04	
REE	Restow of Containers	$ (Box)	88.58	
CFS	Stuffing / Stripping (Containers)	$ (Teu)	136.28	
CFS	Stuffing Containers (Services to Exporter)	$ (Teu)	148.21	
TTG	Transfer of General Cargo (Ship to Gate) (4)	$ (Ton)	6.81	
TTB	Transfer of Banana Cargo (Gate to Ship)	$ (Ton)	7.41	
TTV	Transfer of Empty Containers	$ (Box)	136.28	
TPE	Weight of vehicles	$ (Veh)	13.63	
TAC	Storage rate of full containers (2)	$ (Teu/day)	3.41	Up to 10 days
TAC	Storage rate of full containers (2)	$ (Teu/day)	4.09	11 - 20 days
TAC	Storage rate of full containers (2)	$ (Teu/day)	5.45	More than 20 days
AG1	Storage rate of general Cargo in Yard (2)	$ (Ton/day)	0.27	Up to 10 days
AG1	Storage rate of general Cargo in Yard (2)	$ (Ton/day)	0.41	11 - 20 days
AG1	Storage rate of general Cargo in Yard (2)	$ (Ton/day)	0.55	More than 20 days
AG2	Storage rate for general cargo not containerized in warehouses (2)	$ (Ton/day)	0.41	Up to 10 days
AG2	Storage rate of general cargo not containerized in warehouses (2)	$ (Ton/day)	0.61	11 - 20 days
AG2	Storage rate of general cargo not containerized in warehouses (2)	$ (Ton/day)	0.82	More than 20 days
AG3	Storage rate of general cargo not containerized in special warehouses (2)	$ (Ton/day)	0.55	Up to 10 days
AG3	Storage rate of general cargo not containerized in special warehouses (2)	$ (Ton/day)	0.82	11 - 20 days
AG3	Storage rate of general cargo not containerized in special warehouses (2)	$ (Ton/day)	1.09	More than 20 days
TRF	Conection and Energy (Reefer Containers)	$ (Box/Hour)	4.34	
TRF	Conection and Energy (Reefer Containers) (Services to Shipper)	$ (Box/Hora)	3.85	
AFC	Operations of Validation/Inspection (Cntrs)	$ (Box)	117.73	
AFC	Operations of Validation/Inspection (Cntrs) (Services to Shipper)	$ (Box)	120.56	
AFG	Operations of Aforo/Inspection (Not containerized General Cargo)	$ (Ton)	1.64	
TPC	Drayage of Containers (3)	$ (Box)	54.94	
TPC	Drayage of Containers (3) (Services to Shipper)	$ (Box)	46.88	
TPG	Drayage of General Cargo (3) (4)	$ (Ton)	2.04	
RDC	Reception/Dispatch of Containers (*)	$ (Box)	47.09	
RDC	Reception/Dispatch of Containers (*) (Services to Shipper)	$ (Box)	40.19	
RDG	Reception/Dispatch of General Cargo (3)	$ (Ton)	2.04	
TMR	Use of facilities by tugs	$ (Operation)	68.14	berth/unberth

Source: Contecon Guayaquil

BASIC SERVICES	
TMN	RATE TO THE SHIPMENT FOR THE USE OF THE DOCK Will mean the unit price, expressed in US Dollars, by meter (or fraction) of total lenght and by each hour (or faction) of the Tme of Occupation of the shipment, that the concessionaire can collect from the shipments or its representatives fro the use of the facilities and accesories (docks, defenses, drag and maintenance of side dephts for the berth of ships or navy items) and for the activities of murrage and unmurrage.
TTC	TTC (RATE FOR THE TRANSFER OF FULL CONTAINERS): Will mean the unit price, expressed in US Dollars, by container, that the concessionaire can collect from the users for the tranfer of cargo mobilized in full containers. The transfer of containers includes the activities of fasten or unfasten; stevedoring or unstevedoring; shipping or unloading; drayage; loading or unloading; to terrestrial transportation, reception or dispatch; slash of cargo seal control and will include all the resources and activities necessary for the supply of the referred services.
TTG	RATE FOR THE TRANSFER OF GENERAL CARGO SHIP TO GATE: Will mean the unit price, expressed in US Dollars, by tone, that the concessionaire can collect from the users for the tranfer of cargo not mobilized in containers nor correpsonding to the cargo of exportation banana.
TTB	RATE FOR THE TRANSFER OF CARGO OF EXPORTATION BANANA: Will mean the unit price, expressed in US Dollars, by tone, that the concessionaire can collect from the users for the unloading of of terrestrial transportation, reception, preparation for the shipment, drayage, shipment, stevedoring and slashing of cargo belonging to the cargo of exporation banana not mobilized in containers that do not access to the Terminal in boxes, its stevedoring and transportation process is done by pallets from the warehouse to the ahip, this rate do not include the human work done for the palleting or the cost of the materials needed. In case of use of warehouse, this Transfer Rate do not include the Drayage of the cargo to this warehouse, nor the storage.
TAC	RATE FOR THE STORAGE OF CONTAINERS: Will mean the unit price, expressed in US Dollars, by TEU and by day (or fraction) that the concessionaire can collect from the users for the storage fo containers.
AG1	RATE FOR STORAGE OF GENERAL CARGO NOT CONTAINERIZED IN YARDS: Will mean the unit price, expressed in US Dollars, by tone and by day (or fraction) that the concessionaire can collect form the users for the storage of General Cargo Not Containerized in Yards.
AG2	RATE FOR GENERAL CARGO NOT CONTAINERIZED IN WAREHOUSES: Will mean the unit price, expressed in US Dollars by tone and by day (or fraction), that the concessionaire can collect from the users for the Storage of General Cargo Not Containerized in Warehouses.
AG3	RATE FOR THE STORAGE OF GENERAL CARGO NOT CONTAINERIZED IN SPECIAL WAREHOUSES: Will mean the unit price, expressed in US Dollars by tone and by day (or fraction), that the concessionaire can collect from the users for the Storage of General Cargo Not Containerized in Warehouses, including refrigerated cargo and dangerous merchandise.
TTV	RATE FOR THE TRANSFER OF EMPTY CONTAINERS: Will mean the unit price, expressed in US Dollars by container, that the concessionaire can collect from the users for the Transfer of Cargo corresponding to empty containers.

Source: Contecon Guayaquil

BASIC SERVICES	
REE	RATE FOR THE RE-STEVEDORING OF CONTAINERS: Will mean the unit price, expressed in US Dollars by container, that the concessionaire can collect from the users for the re-stevedoring of containers (in docks or in ships).
TPE	RATE FOR THE WEIGHT OF VEHICLES: Will mean the unit price, expressed in US Dollars by vehicle, that the concessionaire can collect from the users for the weight of vehicles.
CFS	RATE FOR CONSOLIDATION AND UNCONSOLIDATION OF CONTAINERS: Will mean the unit price, expressed in US Dollars by TEU, that the concessionaire can collect from the users for the Consolidation or Unconsolidation of Containers.
TRF	RATE FOR THE CONNECTION AND ENERGY TO REEFER CONTAINERS: Will mean the unit price, expressed in US Dollars by container and by hour of connection, that the concessionaire can collect from the users for the Connection and Energy to Reefer Containers.
AFC	RATE OF OPERATIONS FOR THE VALUATION OR INSPECTION OF A CONTAINER: Will mean the unit price, expressed in US Dollars by container, that the concessionaire can collect from the users for the Operations of Validation and Inspection of Containers.
AFG	RATE OF OPERATIONS FOR THE VALUATION OR INSPECTION OF FRACTIONED GENERAL CARGO: Will mean the unit price, expressed in US Dollars by TONE, that the concessionaire can collect from the users for the Operations of Validation and Inspection of Fractioned General Cargo.
TPC	RATE FOR THE DRAYAGE OF CONTAINERS: Will mean the unit price, expressed in US Dollars by container, that the concessionaire can collect from the users for the Drayage of Containers.
TPG	RATE FOR THE DRAYAGE OF GENERAL CARGO: Will mean the unit price, expressed in US Dollars by container, that the concessionaire can collect from the users for the Porteo and Reception or Dispatch of Containers.Significará el precio unitario, expresado en Dólares de los Estados Unidos de América por tonelada que el Concesionario puede cobrar a los Usuarios por el Porteo de Carga General.
RDC	RATE FOR THE RECEPTION OR DISPATCH OF CONTAINERS: Will mean the unit price, expressed in US Dollars by container, that the concessionaire can collect from the users for the Porteo and Reception or Dispatch of Containers.
RDG	RATE FOR THE RECEPTION OR DISPATCH OF GENERAL CARGO: Will mean the unit price, expressed in US Dollars, by tone, that the concessionaire can collect from the users for the Porteo and Reception or Dispatch of General Cargo.
TMR	RATE FOR THE USE OF FACILITIES BY TUG: Will mean the unit price, expressed in US Dollars, for the berth or unberth, that the concessionaire can collect from the operations of tugs, for the granting of installations and facilitites, for the supply of their services to the ships in the Terminal.

Source: Contecon Guayaquil

GENERAL DISPOSITIONS
(1) The cost do not include local tax (IVA). (2) Storage rates include: 5 free days for exports and 3 free days for imports. Storage rates in cooling warehouses do not include free days (3) Rates for Drayage and for Reception/Dispatch are applied in cases in which these activities are not the ones included in the Cargo Transfer (Ship to Gate) and become necessary for the supply of other services. (4) GENERAL CARGO: is the one presented in solid state and that can be handled by units, no matter if it is packed or unpacked, and its shape, dimension and weight allows to handle it as conventional cargo, which does not requires to be unitized or palleted to be operated with the equipment and the basic estructure of the port. (5) The weight or voulme unit will be the metric tonne or the cubic meter, non splitable according to the unit adopted. Break ups over this minimums will be rounded to the superior tonne for weight units and to the cubic meter for volume units. Metric ton will be applied if the volume weight of the cargo is not superior than its real weight. In this cases the values will be by cubic meter. (6) Banana Cargo: Its the one presented packed, coul be treat as a unit, wich shape, dimention and weight allows a treatment as a conventional cargo, wich not requires to be unitized or palleted to be operated with the equipment and the basic estructure of the port.

Source: Contecon Guayaquil

GENERAL RATES 2020

Code			Special Services	Unit	Actual Rate	Detail
Type		Subcode				
ST	C	0001-0	Transfer of Full Conatiners (Ship to Yard)	$ (Box)	156.96	
ST	C	0002-0	Transfer of Empty Containers (Ship to Yard)	$ (Box)	95.40	
ST	C	0003-0	Transfer of Transhipment Containers	$ (Box)	122.66	
ST	G	0001-0	Transfer of General Cargo (Ship to Yard)	$ (Ton)	4.77	
ST	G	0002-0	Transfer Of Transhipment General Cargo	$ (Ton)	6.81	
ST	N	0001-0	Transfer of Non Conventional General Cargo (Ship to Gate)	$ (Ton/M3)	10.22	
ST	N	0002-0	Transfer of Non Convencional General Cargo (Ship to Yard)	$ (Ton/M3)	6.13	
ST	N	0003-0	Transfer of Non Conventional Transhipment General Cargo	$ (Ton/M3)	9.54	
ST	P	0001-0	Loading, Unloading and Transit of Passengers	$ (Person)	27.26	
ST	V	0001-0	Transfer of Vehicles of car carriers ships (RO/RO)-Ship to Yard o Yard to Ship	$ (Veh)	27.26	(less than 2 Tons/unit)
ST	V	0001-1	Transfer of Vehicles of car carrier ships (RO/RO)-Ship to Yard o Yard to Ship	$ (Veh)	40.89	(more than 2 Tons/unit)
ST	V	0002-1	Restow of Vehicles of car carriers ships (RO/RO)	$ (Veh)	40.89	
ST	G	0003-0	Restow of Bulk Cargo in Warehouse	$ (Ton)	5.95	
ST	G	0004-0	Restow of Bulk Cargo in Dock	$ (Ton)	13.57	
SS	C	0001-0	Storage of Transhipment Containers	$ (Teu/day)	3.41	
SS	C	0001-0	Storage of Empty Containers	$ (Teu/day)	3.41	Up to 10 days
SS	C	0001-1	Storage of Empty Containers	$ (Teu/day)	4.09	11 - 20 days
SS	C	0001-2	Storage of Empty Containers	$ (Teu/day)	5.45	More than 20 days
SS	C	0002-0	Use of emergency flat-bottomed	$ (Day)	1,362.84	
SS	C	0002-1	Use of emergency flat-bottomed for IMO Cargo	$ (Day)	4,088.52	
SS	N	0001-0	Storage of Non Conventional General Cargo in yards (2)	$ (M3/day)	0.27	Up to 10 days
SS	N	0001-1	Storage of Non Conventional General Cargo in yards (2)	$ (M3/day)	0.41	11 - 20 days
SS	N	0001-2	Storage of Non Conventional General Cargo in yards (2)	$ (M3/day)	0.55	More than 20 days
SS	N	0002-0	Storage of Non Conventional General Cargo in Warehouses (2)	$ (M3/day)	0.41	Up to 10 days
SS	N	0002-1	Storage of Non Conventional General Cargo in Warehouses (2)	$ (M3/day)	0.61	11 - 20 days
SS	N	0002-3	Storage of Non Conventional General Cargo in Warehouses (2)	$ (M3/day)	0.82	More than 20 days
SS	N	0003-0	Storage of Non Conventional General Cargo in special Warehouses (2)	$ (M3/day)	0.55	Up to 10 days
SS	N	0003-1	Storage of Non Conventional General Cargo in special Warehouses (2)	$ (M3/day)	0.82	11 - 20 days
SS	N	0003-2	Storage of Non Conventional General Cargo in special Warehouses (2)	$ (M3/day)	1.09	More than 20 days
SS	V	0001-0	Storage of Vehcicles	$ (units/day)	4.77	(less than 2 Tons/unit)
SS	V	0002-0	Storage of Vehcicles	$ (units/day)	8.18	(more than 2 Tons/unit)
SR	O	0001-0	Various supplies services	$(Unit)	681.42	
SR	O	0002-0	Personnel supplying service	$ (Hour/Man)	13.63	

Source: Contecon Guayaquil

GENERAL RATES 2020

Code			Special Services	Unit	Actual Rate	Detail
Type		Subcode				
SR	O	0002-1	Personnel supplying service (Technicals)	$ (Hour/Man)	27.26	
SR	O	0003-0	Equipment supplying	$ (Hour)	953.99	MHC
SR	O	0003-1	Equipment supplying	$ (Hour)	115.84	(13 - 30 Tons)
SR	O	0003-2	Equipment supplying	$ (Hour)	25.42	(up to 3 Tons)
SR	O	0003-3	Equipment supplying	$ (Hour)	42.38	(6 Tons)
SR	O	0003-4	Equipment supplying	$ (Hour)	59.33	(10 - 12 Tons)
SR	O	0004-0	Connection to the water service net/chain	$ (Operation)	136.28	
SR	O	0004-1	Water supply	$ (Ton)	3.41	
SR	O	0008-0	Materials supplying	$(Unit)	681.42	
SP	O	0001-0	Use of insfrastructure for terrestrial vehicles of ship supply	$ (Vehicles)	27.26	
SO	C	0001-0	Conection/disconection of Reefer Containers on board	$ (Box)	6.81	
SO	C	0002-0	Pre-cooling (Reefer Containers)	$ (Box/Hour)	4.09	
SO	C	0003-0	Containers cleaning	$(Unit)	27.26	
SO	C	0004-0	Connection/unconnection of units to clip-on or genset	$(Unit)	20.44	
SO	C	0005-0	Desinfection of containers	$ (Box)	6.36	
SO	C	0006-0	Certification VGM	$ (Box)	5.00	
SO	O	0001-0	Planning for projects operations	$ (Project)	13,628.40	
SO	O	0002-0	Palleting service	$ (Pallet)	20.44	
SO	O	0003-0	Murrage and Unmurrage to terrestrial transportation	$(Unit)	20.44	
SO	O	0004-0	Granting of certificates and/or copies	$ (Document)	13.63	
SI	C	0001-0	Placing of seals	$ (Seal)	3.41	
SI	C	0002-0	Labelling/Unlabelling Containers/IMO Cargo (material not included)	$ (Operation)	13.63	
SI	C	0003-0	Provision and placing of seals	$ (Seal)	10.90	
SI	C	0004-0	PTI Inspection of Reefer Containers	$(Unit)	54.51	
SI	C	0005-0	Place/Unplace Electronical Seals	$ (Seal)	27.26	
SI	C	0006-0	Service of Testing for Vessel Gears	$ (Operation)	520.24	
SI	N	0001-0	Operations of Aforo/Inspection fon Non Conventional General Cargo	$ (Ton/M3)	1.64	
SI	O	0002-0	Bulk measuring	$(Unit)	6.81	
SI	O	0003-0	Classification	$ (unit/ton/m3)	2.73	
SI	V	0001-0	Operations of Aforo/Inspection for Vehicles	$(Unit)	2.73	
SI	V	0002-0	Vehicles inventory	$(Unit)	13.63	
SH	C	0001-0	Handling of containers in the Terminal	$ (Box)	34.07	
SH	N	0001-0	Reception/Dispatch of Non Conventional General Cargo	$ (Ton/M3)	4.09	

Source: Contecon Guayaquil

GENERAL RATES 2020

Code			Special Services	Unit	Actual Rate	Detail
Type		Subcode				
SH	O	0001-0	Hach covers	$(Unit)	136.28	
SO	O	0005-0	Transfer of units	$ (unit/ton/m3)	681.42	(less than 2 Tons/unit)
SH	V	0001-0	Reception/Dispatch of Vehicles arriving/departuring to Car Carrier Ships (RO/RO)	$ (Veh)	27.26	(more than 2 Tons/unit)
SH	V	0001-1	Reception/Dispatch of Vehicles arriving/departuring to Car Carrier Ships (RO/RO)	$ (Veh)	40.89	
SO	O	0006-0	Unpalleting service	$ (Pallet)	13.63	
SP	C	0006-0	Out of Norm		20%	
SO	C	0005-0	Weight of Containers	$ (Unit)	47.09	
SO	O	0007-0	Weight of General Cargo	$ (Ton)	6.13	
SO	B	0001-0	Operation for Banana Inspection	$ (Ton)	2.04	
SO	B	0002-0	Drayage for Banana Cargo	$ (Ton)	2.04	Up to 10 days
SS	C	0003-0	Storage of Containers in special yards	$ (Teu/day)	4.09	11 - 20 days
SS	C	0003-1	Storage of Containers in special yards	$ (Teu/day)	8.18	More than 20 days
SS	C	0003-2	Storage of Containers in special yards	$ (Teu/day)	10.90	
SO	B	0003-0	Drayage of Non Conventional General Cargo	$ (Ton/M3)	2.04	
SU	O	0001-0	Lashing of Non Conventional General Cargo	$ (point of lashing)	340.71	
ST	G	0001-1	Transfer of General Cargo (HOOK / HOOK)	$ (Ton)	2.73	
ST	G	0001-2	Transfer of Non Conventional General Cargo (HOOK / HOOK)	$ (Ton/M3)	4.09	
SW	O	0001-0	Stripping of cargo truck	$ (Unit)	231.68	DEMAG
SR	O	0003-5	Equipment supplying	$ (Hour)	408.85	
SS	C	0004-0	Rent of Containers	$ (Box/day)	54.51	

Source: Contecon Guayaquil

Code			Special Services
Type		Subcode	
ST	C	001-0	**Transfer of Full Containers Ship to Yard or Yard to Ship:** Will mean the unit price, expressed in US Dollars, per full containers or with remainings. that the concessionaire can collect from the users for the transfer of cargo mobilized in containers that includes the operation of fasten or unfasten; stevedoring or unstevedoring; shipping or unloading; drayage; loading or unloading; slash of cargo; seal control and will include all the resources and necessary activities for the supply of these services.
ST	C	002-0	**Transfer of Empty Comtainers Ship to Yard o Yard to Ship:** Will mean the unit price, expressed in US Dollars, per empty containers that the concessionaire can collect from the users for the transfer of cargo mobilized in containers that includes the operation of fasten or unfasten; stevedoring or unstevedoring; shipping or unloading; drayage; loading or unloading; slash of cargo; seal control and will include all the resources and necessary activities for the supply of these services.
ST	C	003-0	**Transfer of Containers of Transshipment:** Will mean the unit price, expressed in US Dollars, per full or empty containers that the concessionaire can collect from the users for the transfer of cargo mobilized in containers that includes the operation of fasten or unfasten; stevedoring or unstevedoring; shipping or unloading; drayage; loading or unloading; slash of cargo; seal control and will include all the resources and necessary activities for the supply of these services. The concessionairte must know the terms of transshipment of the unit before the unloading. The mentioned amount covers one of the two amounts that conform the cycle.
ST	G	001-0	**Transfer of General Cargo Ship to Yard o Yard to Ship:** Will mean the unit price, expressed in US Dollars, per tone, that the concessionaire can collect from the users for the transfer of cargo not mobilized in containers that includes the operation of fasten or unfasten; stevedoring or unstevedoring; shipping or unloading; drayage; loading or unloading; slash of cargo.
ST	G	002-0	**Transfer of Transhipment General Cargo:** Will mean the unit price, expressed in US Dollars, per tone. that the concessionaire can collect from the users for the transfer of cargo non mobilized in containers that includes the operation of fasten or unfasten; stevedoring or unstevedoring; shipping or unloading; drayage; loading or unloading; slash of cargo; seal control and will include all the resources and necessary activities for the supply of these services. The concessionaire must know the terms of transshipment of the unit before the unloading. The mentioned amount covers one of the two amounts that conform the cycle.
ST	N	001-0	**Transfer of Non Conventional General Cargo Ship to Gate o Gate to Ship:** Will mean the unit price, expressed in US Dollars, per tone or cubic meter that the concessionaire can collect from the users for the transfer of non conventional general cargo that includes the operation of fasten or unfasten; stevedoring or unstevedoring; shipping or unloading; drayage; loading or unloading; slash of cargo; reception and/or dispatch.
ST	N	002-0	**Transfer of Non Conventional General Cargo Ship to Yard o Yard to Ship:** Will mean the unit price, expressed in US Dollars, per tone or cubic meter, that the concessionaire can collect from the users for the transfer of non conventional general cargo that includes operations of fasten or unfasten; stevedoring or unstevedoring; shipping or unloading; drayage; loading or unloading; slash of cargo.
ST	N	003-0	**Transfer of Non Conventional General Cargo of Transhipment:** Will mean the unit price, expressed in US Dollars, per tone, that the concessionaire can collect from the users for the transfer of cargo non mobilized in containers, that includes operations of fasten or unfasten; stevedoring or unstevedoring; shipping or unloading;drayage; loading or unloading; slash of cargo. The concessionaire must know the conditions of transhipment previous to the unloading. The mentioned amount covers one of the two amounts that conform the cycle.
ST	P	001-0	**Barking, Unbarking and Transit of Passengers:** Will mean the unit price, expressed in US Dollars, per person, that the concessionaire can collect from the users for the transit, barking and unbarking of passengers from and to the shipment and also includes the transfer of passenger´s baggage and crew, security guards, for the operation area and space for buses at the shipment´s side. This service includes the personnel, area splitting equipment. This rate is applicable since the avalability of the facilities from the Technical Registry G5.

Source: Contecon Guayaquil

ST	V 001-0	**Transfer of Vehicles in Car Carriers Ships RO/RO:** Will mean the unit price, expressed in US Dollars, per vehicle, that the concessionaire can collect from the users for the transfer of vehicles that includes the operations of fasten or unfasten; stevedoring or unstevedoring; loading or unloading; drayage; slash of cargo.
SS	C 001-0	**Storage of Transhipment Containers:** Will mean the unit price, expressed in US Dollars, per TEU of container and per day or fraction, that the concessionaire can collect from the user for the storage of transhipment containers.
SS	C 001-0	**Storage of Empty Containers:** Will mean the unit price, expressed in US Dollars, per TEU of container and per day or fraction, that the concessionaire can collect from the user for the storage of Empty Containers.
SS	C 002-0	**Use of Emergency Flat-bottomed**: Will mean the unit price, exprssed in US Dollars, per day, that the concessionaire can collect to the users for the use of the emergency falt-bottomes to receive cargo remainings requested by the assembler, Shipping Agent, Customs Agent, loader or the consignee of the cargo. The service includes receiving the container with filtration, put this one over the flat-bottomed to restrain filtration, then discard it according to what is determined, and according to the environmental and security norms. .
SS	C 002-1	**Use of Emergency Flat-bottomed IMO Cargo**: Will mean the unit price, expressed in US Dollars, per day, that the concessionaire can collect from the users for the use of the emergency flat-bottomed to receive IMO cargo remainings requested by the assembler, Shipping Agent, Customs Agent, loader or the consignee of the cargo. The service includes receiving the container with filtration, put this one over the flat-bottomed to restrain filtration, then discard it according to what is determined, and according to the environmental and security norms.
SS	N 001-0	**Storage of Non Conventional General Cargo in Yards:** Will mean the unit price, expressed in US Dollars, per ton/cubic metre and per day or fraction, that the concessionaire can collect from the user for the storage of Non Conventional General Cargo in Yards. This rate will be pplied when cubic metres are higher than tons.
SS	N 002-0	**Storage of Non Conventional General Cargo in Warehouses:** Will mean the unit price, expressed in US Dollars, per cubic metre and per day or fraction, that the concessionaire can collect from the user for the storage of Non Conventional General Cargo in Warehouses. This rate will be applied when cubic metres are higher than tons.
SS	N 003-0	**Storage of Non Conventional General Cargo in Special Warehouses:** Will mean the unit price, expressed in US Dollars, per cubic metre and per day or fraction, that the concessionaire can collect from the user for the storage of Non Conventional General Cargo in Special Warehouses, including refrigerated cargo and dangerous merchandise. This rate will be applied when cubic metres are higher than tons.
SS	V 001-0	**Storage of Vehicles:** Will mean the unit price, expressed in US Dollars, per vehicle (light or heavy) that the concessionaire can collect from the users per unit/day for the corresponding storage of vehicles.
SR	O 001-0	**Various supply services:** Will mean the unit price, expressed in US Dollars, per unit, that the concessionaire can collect from the user for the rent of special materials or distinct from the ones used in the regular handling of ISO norm containers, and for overdimension cargo considered as of project, or bulks over 40 tons, requested.
SR	O 002-0	**Personnel Supply Service:** Will mean the unit price, expressed in US Dollars, per Hour/Men, that the concessionaire can collect for supplying personnel to develop a determined task whithin the Terminal, any reason.

Source: Contecon Guayaquil

SR	O 0002-1	**Personnel Supply Service (Technicals):** Will mean the unit price, expressed in US Dollars, per Hour/Men, that the concessionaire can collect for supplying personnel to develop a determined technical task whithin the Terminal, any reason.
SR	O 003-0	**Supply of Equipment:** Will mean the unit price, expressed in US Dollars, per Hour, that the concessionaire can collect for the rent of equipment according to the customer´s request. Includes equipment and specialized personnel for its handling. It will be billed according to the capacity of the requested equipment.
SR	O 004-0	**Connection to the water net:** Will mean the unit price, expressed in US Dollars, per operation, that the concessionaire can collect from the users for the connection to the net of fresh water.
SR	O 004-1	**Water Supply:** Will mean the unit price, expressed in US Dollars, per ton, that the concessionaire can collect from the users for the supply of fresh water.
SR	O 008-0	**Material Supply:** Will mean the maximum unit price, expressed in US Dollars, per unit, that the concessionaire can collect for the service of providing materials such as pallets, fetters, pulleys, sunchos, ropes, cables, air bags, etc, under request of the shipping command, for their representative agency or the shipper.
SP	O 001-0	**Use of facilities for terrestrial vehicles for supply to the shipments:** Will mean the unit price, expressed in US Dollars, per vehicle, that the concessionaire can collect from the users for the authorization of access to the Terminal Yard for vehicles and/or machinery not belonging to CGSA, which need to access and stay for supplying the shipments.
SO	C 001-0	**Connection/ Disconnection of Reefer Containers on Board:** Will mean the unit price, expressed in US Dollars, per container, that the concessionaire can colect from the users for the connection or disconnection of Reefer containers, which need energy supply on board, according to the instructions of the line. Includes the coordination of specialized personnel, own as sub-contractor for the connection or disconnection.
SO	C 002-0	**Pre-cooling (Reefer Containers):** Will mean the unit price, expressed in US Dollars, per container/hour, that the concessionaire can collect from the users for the reception, connection, pre-cooling and monitoring of reefer containers.
SO	C 003-0	**Cleaning of Containers:** Will mean the unit price, expressed in US Dollars, per unit, that the concessionaire can collect for providing personnel and materials for the vaccuming, cleaning and recopilation of trash from a containers.
SO	C 004-0	**Connection / Disconnection to a Clip On Unit or Gen Set Unit:** Will mean the unit price, expressed in US Dollars, per unit, that the concessionaire can collect for the service of disconnection or connection of units of provision of cold or energy to reefer containers. The service includes the use of a fork lift. In the case of connection, the unit must be at CGSA at the arrival of the container, and in case of disconnection the unit will be given to the owner who must pick it up from the terminal.

Source: Contecon Guayaquil

SO	C 005-0	**Desinfection of containers:** Will mean the unit price, expressed in US Dollars, per unit, that the concessionaire can collect for the fumigation of container with specialized equipment, trained technical personnel, materials, cleaning and treatment of chemical waste in the operation.
SO	C 005-0	**Desinfection of containers:** Will mean the unit price, expressed in US Dollars, per unit, that the concessionaire can collect for the fumigation of container with specialized equipment, trained technical personnel, materials, cleaning and treatment of chemical waste in the operation.
SO	C 006-0	**Certification VGM:** Will mean the unit price, expressed in US Dollars, per unit, that the concessionaire can collect for the service of certifaction VGM to containers of exportation.
SO	O 001-0	**Planning for projects operations**: Will mean the unit price, expressed in US Dollars, per project, that the concessionaires can collect from the users, and consists in defining, evaluate and plan the operation of special cargo of projects (bulks over 40 tons or overdimensioned), which requires highly specialized personnel, equipments of a high capacity of lifting, supplies specially designed for each operation, use of special methods of communication, analysis and hiring of additional insurance coverage, in order to cover this kind of risks case by case. The service will be provided with own security elements from the Terminal and specialized personnel. The use of cranes of high lifting capacity and especial handlings, are included.
SO	O 002-0	**Palleting Service:** Will mean the unit price, expressed in US Dollars, per pallet, that the concessionaire can collect for the service of arming (stevedoring)on pallets, units of cargo lower than this, slashing them (can be considered the allocation of corners, wraps, sunchos, staples, and any other element needed for the duly consistentcy of the pallet. Provision of materials is not included.
SO	O 003-0	**Murrage and Unmurrage to Terrestrial Transportation:** Will mean the unit price, expressed in US Dollars, per vehicle, that the concessionaire can collect for the supplying of personnel duly trainned with the required security elements, according to the CGSA security standards and light tools, to murrage, unmurrage, on carp and uncarp the cargo from its transportation, materials are not included.
SO	O 004-0	**Granting of Certificates and/or Copies:** Will mean the unit price, expressed in US Dollars, per document, that the concessionaire can collect from the users for documentation and consists in the establishing and supplying of additional documentation to the interested party. This includes legallized, original or simple copies.
SI	C 001-0	**Placing of Seals:** Will mean the unit price, expressed in US Dollars, that the concessionaire can collect for the allocation of labelsin containers.
SI	C 002-0	**Labeling/Unlabeling of Containers/IMO Cargo:** Will mean the unit price, expressed in US Dollars, per operation, that the concessionaire can collect for the allocation of the respective labels according to the IMO code, or for the removal of this labels, as corresponding. Provision of materials is not included.

Source: Contecon Guayaquil

SI	C 003-0	**Provision and Placing of Seals:** Will mean the unit price, expressed in US Dollars, per seal, that the concessionaire can collect for the provision and allocation of seals in containers.
SI	C 004-0	**PTI Inspection of Reefer Containers:** Will mean the unit price, expressed in US Dollars, per container, that the concessionaire can colect from the users for being inspectioned before consolidation and only if it is previously required by our technician and equipments, ensuring that the unit is in good conditions.
SI	N 001-0	**Operations for the Valuation or Inspection of Non Conventional Fractioned General Cargo:** Will mean the unit price, expressed in US Dollars, per ton/cubic metre, that the concessionaire can collect from the users for the the Valuation or Inspection of Non Conventional Fractioned General Cargo.
SI	O 002-0	**Measuring of Bulks**: Will mean the unit price, expressed in US Dollars, per container, that the concessionaire can collect from the users by ton or cubic metre, and this service consist in supplying personnel for taking measures to the packing of the cargo, issuing for that purpose a CGSA certificate where the measures will be certified. Cargo mobilizations are not included, if any.
SI	O 003-0	**Classification:** Will mean the unit price, expressed in US Dollars, per unit, ton or cubic metre, that the Concessionaire can collect for the segregation, classification and marking of bulks, according to the request of the customer at the moment of makin the unloading, loading or storage.
SI	V 001-0	**Operations for the Validation or Inspection of Vehicles**: Will mean the unit price, expressed in US Dollars, per unit, that the Concessionaire can collect from the users for the Operations of Validation or Inspection of Vehicles.
SI	V 002-0	**Inventory of Vehicles:** Will mean the unit price, expressed in US Dollars, per vehicle, that the Concessionaire can collect from the users for making a detailed and specific inventory of the physical conditions of the vehicle, specifically requested by the customer. For the supply of this service, the customer must requested the referred operation from 08:00 hrs. to 16:00 hrs. within working days. From this service, an official document will be issued, constituted into two copies. One copy for the interested party and another copy for the Concessionaire.
SH	C 001-0	**Handling of Containers in the Terminal:** Will mean the unit price, expressed in US Dollars, that the Concessionaire can collect from the Users for the transfer of units (drayage is not included) requested by the user.
SH	N 001-0	**Reception or Dispatch of Non Conventional General Cargo:** Will mean the unit price, expressed in US Dollars, per ton or cubic metre, that the Concessionaire can collect from the Users for the Drayage and Reception or Dispatch of Non Conventional General Cargo.

Source: Contecon Guayaquil

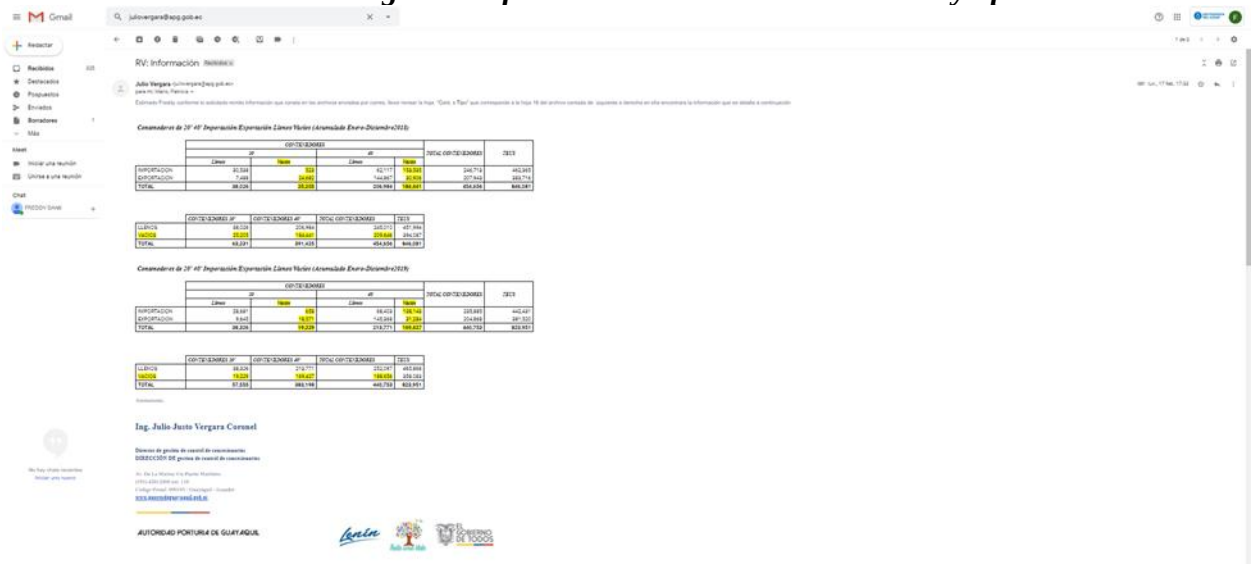
SH	O 001-0	**Pontoons Handling:** Will mean the unit price, expressed in US Dollars, per Pontones /Tapas of Warehouse, that the Concessionaire can collect from the Users for the transfer of pontoons required by the Assembler or Representative.
SH	V 001-0	**Reception or Dispatch of Vehicles (coming / Destinated to Car Carrier Ships RO-RO):** Will mean the unit price, expressed in US Dollars, per vehcicle, that the Concessionaire can collect from the Users for the reception or dispatch of vehicles.
SO	O 005-0	**Transfer of Units:** Will mean the unit price, expressed in US Dollars, per unit, tones, and-or cubic metre, that the Concessionaire can collect from the Users for the transfer of units, (full or empty) and - or cargo from the port to a determined facility or viceversa.
SO	O 006-0	**Unpalleting Service:** Will mean the unit price, expressed in US Dollars, per ton, that the Concessionaire can collect from the Users for the fractionning of pallets going from a higher unit cargo to a lower unit cargo.
SP	C 005-0	**Out of Norm:** Will mean the percentage to be added to the value of operation affected that the concessionaire can collect from the users for the non ISO containers and/or deformed, that can not be handled with conventional equipment and/or occupy a major volume from the nominal of the equipment.
SS	C 003-0	**Storage of containers in special yards:** Will mean the unit price, expressed in US Dollars, by TEU of containers and by day (or fraction) that the Conssecionaire can collect from the Users for the Storage of Containers in special yards (conditioned for dangerous cargo, protected against thermic actions, special custody)
SO	C 005-0	**Weight of Containers:** Will mean the unit price, expressed in US Dollars, per units, that the Concessionaire can collect from the Users for the weight or balance of containers.
SO	O 007-0	**Weight of General Cargo:** Will mean the unit price, expressed in US Dollars, per ton, that the Concessionaire can collect from the Users for the weight or balance of General Cargo.
ST	O 003-0	**Restow of Unattached Cargo in Warehouses:** Will mean the unit price, expressed in US Dollars, per ton, that the Concessionaire can collect from the Users for the Reload of Loose Cargo (within the same warehouse).
ST	O 004-0	**Restow of Unattached Cargo in Pier:** Will mean the unit price, expressed in US Dollars, per ton, that the Concessionaire can collect from the Users for the reload of Loose Cargo (in Pier).
ST	O 004-0	**Restow of Vehicles:** Will mean the unit price, expressed in US Dollars, per ton, that the Concessionaire can collect from the Users for the reload of vehicles (in pier or in ship)

Source: Contecon Guayaquil

SO	B 001-0	**Operations of Inspection (Banana):** Will mean the unit price, expressed in US Dollars, per ton, that the Concessionaire can collect from the Users for the Operations of Inspection of Banana Cargo.
SO	B 002-0	**Drayage of Cargo (Banana):** Will mean the unit price, expressed in US Dollars, per ton, that the Concessionaire can collect from the Users for the Porteo of Banana Cargo.

Source: Contecon Guayaquil

Annex 2. ***Screenshot of the e-mail response from Eng. Julio Vergara. Director of the concessionaire control management of the -Autoridad Portuaria de Guayaquil-.***



Annex 3. ***Screenshot of the e-mail response from Eng. Mario Cortes. Port operations analyst of the -Autoridad Portuaria de Guayaquil-.***