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Comparative Analysis of the Logistics Performance of Ecuador and the members of the Andean Community of Nations (ACN) based on the Logistics Performance Index

Graduate thesis prior to obtaining a
Bilingual Bachelor in International Studies minor in Foreign Trade

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Cuenca-Ecuador

2015

DEDICATION

This undergraduate thesis is dedicated to all of my family and friends who have given me unconditional support, especially to my brother, Josué, who is the one who encouraged me to complete this goal in my life.

ACKNOWLEDGEMENT

Foremost, I am grateful to God for his entire blessings and for putting in my life the people who have helped me overcome various obstacles to complete the goal that I set out to achieve. I want to thank with my mother and my younger brother for their constant support, my father for his words of encouragement, and my uncle, José, for his assistance. I cannot forget to mention my friends who despite of the distance, have continued supporting me to finish my academic research.

I would like to express deep appreciation for my thesis supervisor, Eng. Antonio Torres, who I consider my mentor. He has given me knowledge, time, patience and dedication to finish successfully this undergraduate thesis.

A special thanks to Justice Court of the Andean Community of Nations and the Economic Commercial Office of Peru's Embassy, both located in Quito, for supporting me in the development of this thesis.

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ABSTRACT

The current work will present a comparative analysis of the logistic performance of Ecuador and the other members of the Andean Community of Nations. In order to understand this topic it is necessary to know what is involved in the logistic topic. It will be necessary to tackle concepts, approaches, elements, supply chain, means and modes of transportation with the object of making it easier to clarify the logistics.

Having made the evaluation of content, it will proceed to determine the logistic profile of the members that form part of the Andean group with the objective of knowing what their structural elements are. This section evaluates the general profile, figure loading, port zone, airports, road systems, customs and internal distribution in each country that belongs to the Andean Community of Nations (ACN).

Finally, it will analyze the logistic performance amongst the Republic of Ecuador and ACN through indicators and data obtained from the Logistic Performance Index of The World Bank in order to determine the competitive ranking of each country. The analysis of competitive position is related to the use of tools that allow the comparison and measurement of the logistic performance. The research topic will be focused on the study of port infrastructure and customs efficiency.

COMPARATIVE ANALYSIS OF THE LOGISTICS PERFORMANCE OF ECUADOR AND THE MEMBERS OF THE ANDEAN COMMUNITY OF NATIONS (ACN) BASED ON THE LOGISTICS PERFORMANCE INDEX

INTRODUCTION

Logistics is a science that contributes to the development of the state's economy through the improvement of logistics infrastructure. Its goal is to reinforce a country's efficiency and competitive profile. On one hand, with a modern infrastructure countries can locate products with competitive prices in any market. On the other hand, any effort to improve the logistics platform through corporative strategies may be countered by deficiencies in ports, airports, roads, and customs. These issues impact the logistics performance because the final price of the product is too high and uncompetitive in foreign markets.

The members of the Andean Community of Nations share a similar reality but have little differences in the logistics field. These evidences are evident when one considers development of logistics and the commercial approach. This academic research focuses on analyzing the importance of the logistics processes in the operations of foreign trade and international negotiation through the administration of the logistics chain. It is necessary to be familiar with elements of the logistics profiles of Bolivia, Colombia, Ecuador and Peru. Finally, using existing information we analyze the logistics performance of the Andean Community of Nations based on the Logistics Performance Index by the World Bank. This academic research focuses specifically on maritime transportation as it dominates the commercial operations in the Andean bloc.

1. CHAPTER I: LOGISTICS OF INTERNACIONAL PHYSICAL DISTRIBUTION

1.1. Logistics of International Distribution

The present chapter is an introductory guide to understand what logistics topic involves: theories, approaches and components. Logistics of International Physical Distribution is an administrative science which has evolved with the pass of time until becoming an entrepreneurial approach that searches to generate profitability for the company. However, nowadays its study is not only focused on the private area, but on elements overpass the state sphere affording that a State can connect and relate to the world. The connectivity and commercial exchange with other countries depend on the level of efficiency and efficacy of the logistic infrastructure. Hence, logistics allow finding problems and suggesting possible solutions in order to stimulate positively the platform of the country with the objective of being competitive against other countries.

1.1.1. Concept of logistics

Logistics of international physical distribution is a fundamental base of human activities as commerce, and its contribution helps to reduce setbacks generated in the international traffic of goods. Based on the above considerations, Ronald Ballou (3) states that the logistics systems create advantages due to the production factors that ground and humans are not the same in all countries. In this context, it can express that logistics allows the efficient movement of the load; apart from it contributes to make necessary changes to the logistic platform to improve the competitiveness.

The transportation of merchandise from one place to another is important for both merchants and consumers of different nations. Throughout history, this science has three important landmarks: The Cross of the Holy Land (1095-1921), The Voyage of Marco Polo (1275-1292), and finally Silk Road (100-1300). These three periods have

contributed to improve the logistic approach related to reduction of distances, time and cost in the travels.

The concept of logistics varies depending on the branch applied. On the military field its function will be: ensuring, maintaining and transporting material, personnel and installations. (Ballou 4) Nevertheless, the military logistics are different from the business field, because it does not reflect a correct definition of it. Therefore, it is necessary to look for another source, which provides the next:

Logistics is part of the process of supply chain that plans, implements and controls the flow and storage effectively and efficiently from origin point to consumption point in order to satisfy the client's requirement. (Consejo de Dirección Logística en Ballou 4)

This definition describes logistics as the flow of products from its creation to its delivery to final consumer. It permits logistics operators to transport raw material, semi-finished products or finished products from an export country to a market of import country under the best conditions.

1.1.2. Fundamentals of logistics in business

Logistics is composed of two pillars that regulate its functioning. The first one evokes a combination of tools known as operations, and it is constituted by elements such as branding, labeling, packaging, use (containerization and palletizing), customs procedures, port operations, etc. Those elements together contribute to the process of international physical distribution. The second one is the marketing, but its development is parallel to the logistics field. Marketing incorporates logistics practices in its operations which contributes to better the merchandising process, helping to put products in the target market. In addition, it is not useful that a marketing manager plans an effective strategy in order to fulfill requirements of the clients without the necessary resources to place his product in the target market.

(Lledó 2015) The relation between these subjects depends on the level of correlation and synchronization for its functionality.

1.1.3. Approaches of the logistics

Logistic tends to change its form of operating according to new requirements of the clients. The guiding principles of this subject are materials management and distribution management. The first one, talks about the flow of raw materials, supply and components. The second one is related to inventory management, storage and transportation of products or services.

The constant evolution of the supply chain has contributed to the creation of other logistic approaches focused on the reduction of storage, coordination of materials flow, and nodes management. (Carrasco 22) These new waves are:

a) Trade-Off Management

It is based on the administration of situations that have opposite effects. For example, in a normal process of distribution, there are distribution warehouse and transport as long as they are of short distance (these processes might generate high or low cost for users). Nevertheless, according to Carrasco (22) this procedure ought to increase the numbers of warehouses in order to reduce costs with the object of avoiding the use of long - distance transport. But it would be expensive to use it; due to increasing number of warehouses, as a consequence it would raise warehousing cost. In summary, this method requires finding a balance point between the numbers of the warehouse and the transportation costs.

b) Order-Delivery Cycle

This cycle begins when a client orders a product and comes to its hands to be consumed. From the client's perspective, the time is important because the client is interested in the products' arrival and the shortest possible shipment time. In a traditional corporate the Order-Delivery Cycle is designated by people with little

coordination and without a complete vision of all the process. (Carrasco 22) For this reason, the organization must incorporate corporate objectives related to the Order-Delivery Cycle, and motivate its workers to become familiar with all the distribution process.

c) Logistics System

It is defined as a sum of activities based on the supply of raw materials and distribution of final products to clients. (Carrasco 23) However, its functionality is related to the data system that permits the collection of information whose aim is to generate information and make the decision-making process easier. The basis of the logistics system, according to Carrasco (24), is to seek for the best solutions of management and at the same time it seeks to evolve from a traditional approach to a broader approach that integrates new alternatives in the design of logistic system.

In the case of Amazon Spain, according to explicative video “Logistic of Amazon.es” by SabeloSpain, the logistics system begins when sellers send products to Amazon to be stored¹. When the merchandise gets in, this is catalogued and kept in one of logistics centers. These centers have systems of reception, preparation and automatic shipment that ensure security in the requirements of sellers. The main purpose of registering each item is to have the availability to send the product to the client since the first contact.

The clients can directly buy on Amazon or through other sales channels. Its logistics system registers the seller’s requests with the same system that Amazon uses with its orders. In this way when it receives requests of the seller from Amazon Portal these are transmitted to its logistics center for subsequent delivery, but if the order is made from the seller’s website, the seller must send a report through the seller central program so that Amazon takes a product from its storage and sends it to the client.

¹ The sellers have real access to its inventory through of “seller central” program by Amazon in order to realize controls and monitoring of packaging.

d) Logistics Total Approach

The business analysis is not only focused on company's external factors, but rather it must perform an internal exam in order to find the principal weakness and mistakes of the company. In this way, Carrasco (30) states it is important to consider the next aspects in this process:

- i. Policy of products.
- ii. Quality and Services.

Both aspects influence in the functioning of the Logistic Total Approach, but it must be coordinated with objectives, configuration, and performance of the company. In summary, a form of cooperation and communication between all involved actors in the commercial operation is necessary.

e) Integral Logistics Approach

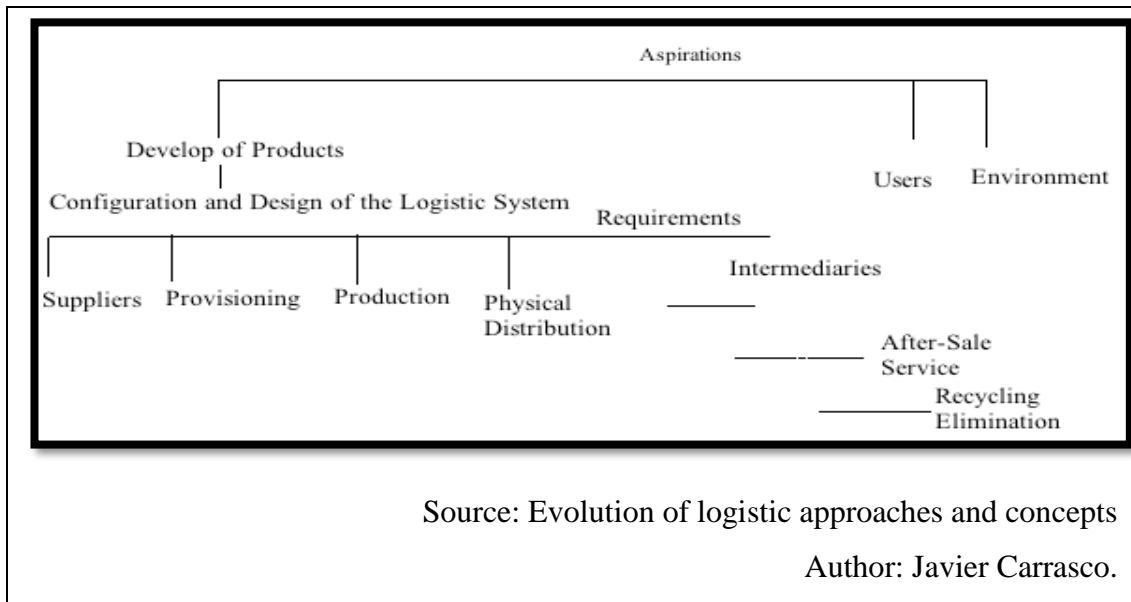
It incorporates concurrent engineering, this science is based on information management and decision making process. Concurrent engineering is important because it collects environmentalist methods related to reduction of materials use, recycling and valuation of materials. This process has support of reverse logistics theory, that is to say, from client to the supplier. (Carrasco 30)

In order to understand the functioning of total logistic approach, we base on the situation that the user has consumed or thrown out the product becoming the concern of the logistic system's operator. The diagram is resumed in three fundamental aspects:

- i. The process of reverse logistics.
- ii. Redesign of products with the objective to be friendlier with the environment.
- iii. Redesign the logistic system based on these new products.

Graph 1 below details the process of integrated logistics.

Graph 1 Integrated Logistics



1.1.4. Objectives of International Logistics

The objectives of logistics contribute to achieve the general objectives of the company. In other words, its use generates a major performance over investment and time. Ballou (27) states there are two dimensions this objective:

- a) The impact of design of the logistic in the contributions of incomes.
- b) The operation cost and requirements of capital to design it.

In this context, the objective of the logistic will be to reduce all costs related to the level of desired service for clients instead of increasing profits or the return on investment (ROI). However, professor Mora (11) expresses that the logistic objectives must be focused on three parameters:

- a) Ensuring the minor operative cost.
- b) Supplying adequate and appropriate products required by the final client.
- c) To convert the logistic in a competitive advantage in the face of rivals.

The logistics objectives can be quantified in the relation named Return on Logistic Asset or ROLA. Its formula of calculation is:

$$ROLA = \frac{\textit{Contribution to Income} - \textit{Costs of Logistics Operations}}{\textit{Logistic Assets}}$$

(Ballou 28)

The Contribution to the Income represents the sales resulting from the logistics system. The logistic costs refer to necessary expenses in order to supply the necessary level of logistics service to the client in order to generate sales. The logistics assets are the investment in the logistic system. In sum, the objective of this indicator is to get the biggest performance of the operations over investment.

1.2. International Physical Distribution

The International Physical Distribution or IPD is the sum of necessary operations in order to locate a product in the international market and carry out negotiating terms between buyer and seller.

1.2.1. Basic Guidelines of the International Physical Distribution

The basic guidelines of IDF are a sum of principles that must be followed by a logistics operator in order to ensure quality and conformity with the delivery of products. Hence, the operator is responsible for:

1. Identifying the type and nature of the load.
2. Recognizing the client's requirements and usual modality of load distribution.
3. Internationalizing the marketing terms of load.
4. Identifying the national and international legislation related to freight, insurance and payment method.
5. Recognizing the type of international freight.
6. Developing the logistics system based on the IDF.

7. Measure the IDF under two basic parameters: costs (direct and indirect) and quality of service.

(University of Azuay)

1.2.2. Actors in operations of Foreign Trade

The international commerce is based on the interchange of goods and services between actors from different countries. In theory this operation, can be of easy application, but in real life it requires the participation of several actors in order to make the commercial operations easier. In the international operations, according to Alvarado and Molina, there are actors such as:

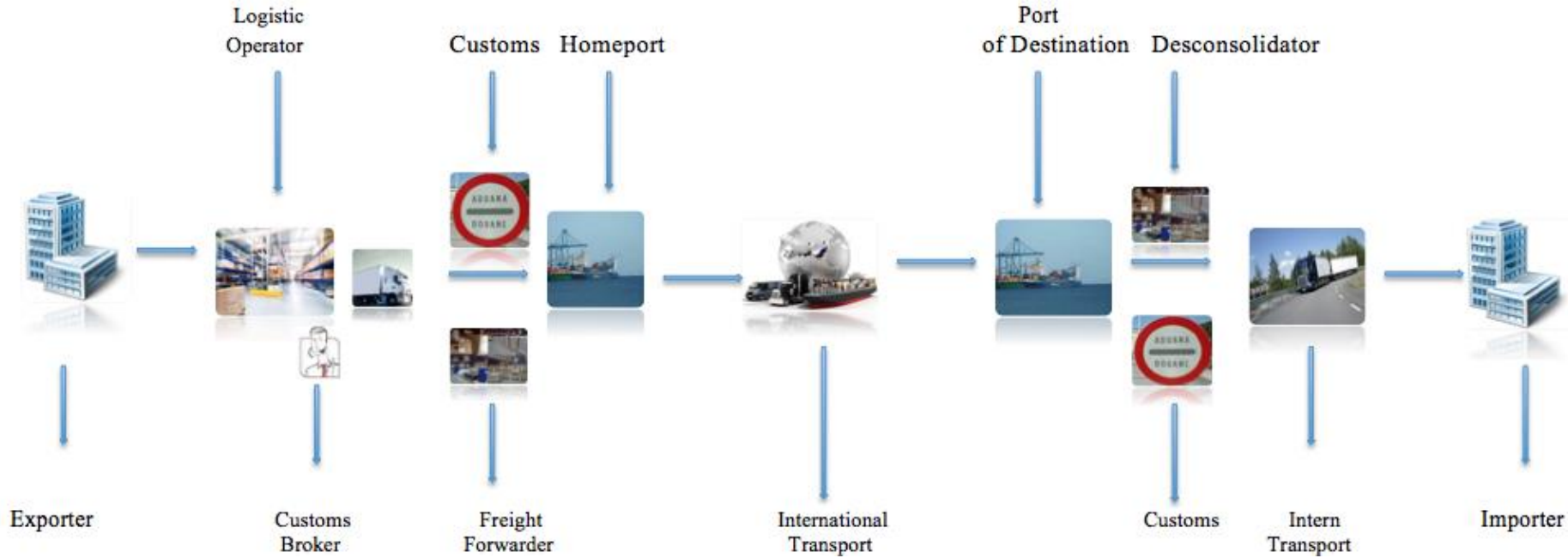
- a) **Exporter:** Is a natural or legal person that practices this activity in a professional way, that is to say, promotes the interchange of goods and services for consuming in foreign markets.
- b) **Broker:** Is person in charge of putting a seller and a buyer from different countries in contact in exchange for an economic value, but they do not have possession of the product.
- c) **Trader:** Is a professional involved in all activities of imports and exports. In contrast to the broker, the trader buys a product from a country and sells it in different countries with networks of distribution.
- d) **Logistic Operator:** Makes up the provision of specialized services to the supply chain such as warehousing, management, inventories and physical distribution with the objective of adapting to specific the needs of each client. (Mejía)
- e) **Freight Forwarder:** Known as shipper or freight forwarder that render his services to importers and exporters. The freight forwarder acts as intermediary in the commercialization of transport services, and organizes the cargo rendering specialized services. (ALOG Chile)
- f) **Consolidator:** He consolidates and puts different cargo of singular senders in the same container directed to many receivers, which is consigned to a desconsolidator in the destiny port. (Logisnet)
- g) **Customs:** It is the organism of public administration whose function is to make the operations of foreign trade easier. Its functions are: applying

customs legislation, and complementary and additional regulations, determining and collecting taxes to foreign trade. It has legal authority to solve customs affairs. (COPCI in SENAE, 2) This actor is important in the current investigation, because it is a competitive factor to comparative study.

- h) Customs Broker:** It is the natural or legal person whose license allows him to manage the dispatch of merchandises. The customs broker is a notary and assistant of the public administration; they are also subject to the control of Customs Authority. (COPCI in SENAE, 52-53)
- i) Carrier/Shipper:** They are registered and authorized companies to carry out intern transit of merchandise through borders under the denomination of international transportation.
- j) Importer:** It is the person who purchases goods or services with the object to resell them in his country or use them for final consume.

Graph n° 2 lists the principal actors in an operation of international business.

Graph 2 Main Actors in operations of Foreign Trade



Source: University of Azuay

Elaborated by: Author

1.3. Supply Chain

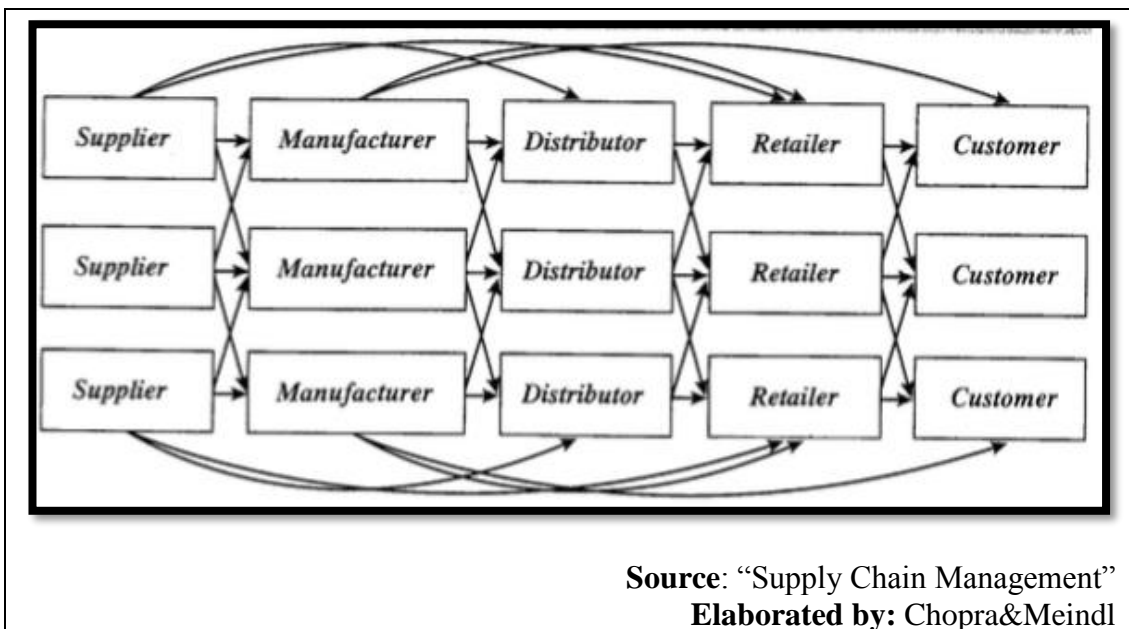
1.3.1. Concept

The Supply Chain is the result of creative materialization of the entrepreneur, because its development is related with the creation of a strategy according to the necessities of the client and the market. Its success depends on the level of relationship and support between internal and external factors of the company. As a consequence, its purpose is to generate profitability to the company.

The supply chain is defined as “a sum of useful activities (...), by which raw materials are transformed into final products and are added value for end consumers”. (Ballou 7)

The supply chain is illustrated in graph n° 3.

Graph 3 Model of Supply Chain



According to the reality and structure of the company, it starts with the supply management, transformation and product development, and distribution management and ends with the delivery to the client.

1.3.2. Transportation in a supply chain

Chopra and Meindl (385-386) express that transport in a supply chain is the movement of a product from one place to another place from the beginning of supply chain to the client, but its success will be linked to appropriate use of transport. In the same way the authors add that its operation requires the participation of four actors:

- Shipper: He takes the decision of investment.
- Transport Equipment: It is related with train engine, ship, vessel, truck and airplanes.
- Infrastructure: Road System, port and rails.
- Decision making of operation: The goal is to increase the performance. In other words, it refers to the logistic operators from the company.

1.3.3. Importance of logistic and supply chain

The importance of logistic and supply chain resides in the constant value generation for clients, suppliers, stakeholders, and it is also focused on time and place. (Ballou 13) This branch ensures that the load is delivered on time, with the client incurring minimum expenses with great benefits. However, the importance of logistics and supply chain does not only reside in the politic of cost as a factor of business competitiveness. The efficiency in the administration, according to Ronald Ballou (25-26), allows the company control and improves the process such as quality, production, design of the workstation, location strategies, purchases, costumer service, inter alia. The synergy of these elements creates a competitive and profitable model based on aggregate value for the corporation.

1.3.4. Coordination in supply chain

The business objective is translated in the desired success. This objective can be reached by the coordination of all actors related to the supply chain. In this way, *“the coordination requires that each stage inside the supply chain considers the impact that it produces in other phases.”* (Chopra & Meindl 497) The coordination allows

improving each stage of the supply chain with the objective of maximizing the total profits.

The coordination must be a synonymous of collaboration of all participants. Chopra and Meindl (506) state, it would create incentives with the goal of generating a positive leverage grade that allows reaching the company's global objective. Besides, the decisions should be based on profit-earning capacity instead of function of costs or profits of the supply chain. In sum, the coordination avoids the increase of cost, transport and replenishment times for the company.

1.4. Modes of International Transport

1.4.1. Basis of the operations and transport

Transport is a sum of necessary resources to carry a product from one place to another. It makes the commercial trade of goods amongst countries possible. If the transport system is poorly developed, its market amplitude is reduced to nearby areas from the production point.

The approach of operations and transport lies in the study of flow material and information, which begins from the supplier and finishes with the delivery to the client. (Universidad of Azuay) In other words, it is composed of three basic functions such as supply management, operational management and physical distribution management.

Planning permits reducing transportation cost as well as generating competition between companies. Ronald Ballou (165) states that a transport of low cost and high quality promotes the competence and allows products to be available in a market that normally could not solve the transportation costs.

1.4.2. Characteristic of International Transportation

The user has a broad range of transportation modes known as air, maritime and land. The use depends on the nature of the cargo and other factors such as price, transit

time, forfeiture and damage. In this way, international transport must offer to the users the following characteristics:

- **Uninterrupted:** Commercial Flow, high rotation and performance.
- **Fully Planned:** It must exist coherently along with the provisioning, production and physical distribution.
- **Effective:** It must have the capacity to reduce costs.

(University of Azuay)

1.4.3. Objective of Efficient Transport

The maritime conveyance rules the international transportation with 50% of the volume of interchange in dollars, consecutive with 21% of air transport and the difference corresponds to the different modes of transportation. (Ballou 180) Nevertheless, the domain of each one is affected by geography of each country and proximity of the commercial partners, even though its nearness allows them to establish combinations of conveyances. The main objective of international transport is moving safely large amounts while incurring minimum expenses. In addition, a suitable process must be chosen depending upon the characteristics of the cargo and the means of transport. (University of Azuay)

1.4.4. Modes of transport in international load

The means of transport allow for companies to establish its commercial advantage over other companies. For that reason the competitiveness of products is linked to the efficiency of the transport. However, for this study it is necessary to determine a difference between modes and means of transportation. The first one, according to Castellanos (64-67) is the combination of several networks, trucks and operations. Meanwhile the second expression is related with physical elements used to move the merchandise.

1.4.4.1. Maritime Transport

It is the most commonly used mode in the operations of international business, because it represents almost the total of international services of cargo movement. The maritime mode is characterized by having low tariffs in order to make large weights and volumes easier to transport. The document used in this type of transport is the *Bill of Lading*, which it is title of transferable value by endorsement to a third person based on the rules established in the Hague Convention in 1924.

By type of load, the maritime transport is divided into four categories:

- General Load
- General Load on Hold
- General Load on Surface
- Load in Containers
- Bulk Load

a) Ocean Freight

The ocean freight represents the compensation paid to the shipowners by the transport of goods from one port to another one. Its definition is contemplated in dollars (US\$) by each ton or cubic meter, according to the negotiated terms with the shipping company and the nature of the product. (Castellanos 76) In the regular services of line, according to logistics professorship of the University of Azuay, the tariff can be composed by three basic elements:

- Basic Tariff: It is established in moment of negotiation with the shipowner.
- Surcharges: It can be the following

Bunker Adjustment Factor (BAF)

Currency Adjustment Factor (CAF)

Out of Route (O/R)

Bill of Lading Emission (BL's)

Port Delay

Container redelivery charges

All in: All surcharges are included.

- Discount.

b) Advantages and Disadvantages

Among main advantages, according to Andrés Castellanos (83) are the following

- **Capacity:** It can support a maximum load of 560.000 metric tons.
- **Flexibility:** It has with a great variety of means of transport in order to facilitate, operate and mobilize the cargo.
- **Continuity in the process:** This mode of transport represents the lowest rate in relation to the development of the traffics and connections.

Although it has low cost and represents great support of the cargo, it has the following disadvantages:

- **Accessibility:** The maritime ports are located in distant parts, which difficult the mobilization of load.
- **Speed:** Most ships have reached 50 km.
- **Port Delay:** There are some countries in the world with inadequate structures. As a result, delay and congestion in costumer attention.

1.4.4.2. Air Transport

It is a dynamic activity that has allowed conquering markets with positive results in different nations. The attractiveness of air transportation is the speed from origin to destination through long distances. (Ballou 173) Though it looks almost perfect, it is susceptible to suffer external damages such as mechanical breakdown, weather conditions and traffic congestion.

Although air transport is fast in package deliveries, its use represents a high cost for users. The authors Chopra and Meindl (388) suggest that only articles of high value o emergency loading must travel through this means of transport.

The transported goods, according to logistics professor of the University of Azuay, are the following

- Urgent: In this category, there are items such as perishable products, flowers, legumes, articles of short life, dangerous articles, docs by courier, etc.
- High Value: Are considered items of high value as a precious metal, computer hardware and accessories, expensive parts, machinery and tools, work of art, material of fair, international missions, etc.
- Various Merchandise: Fragile articles, fabrics, helicopter, racing car, etc.
- Restricted products: Dangerous material, chemical products and radioactive elements.

a) Advantages and disadvantages

Castellanos (103) states the following advantages:

- Speed: It is irreplaceable for sending perishable products, medicine, parts and fashion items.
- Market Coverage: It has a particular characteristic to arrive in accessible places and landlocked countries over other means of transport.
- Client's Perspective: In relation to cost-time, unlimited destinies, speed, security, etc.

Nevertheless, air transportation has limitations to become a pioneer of international business. The disadvantages are:

- Capacity: By reasons as weight and volume not even the largest aircraft in the world has the capacity to compete with other means of transportation.
- Bulk Cargo: It cannot be used for transport of minerals, petroleum and by-products, cereals, chemicals and by-products.
- Dangerous Cargo: The international norms restrict the number of dangerous items that can be carried by air especially in combined services of cargo-passenger.

b) Cargo Handling

The document utilized in air transport is known as *Airway Bill*. This document represents the contract between the exporter and Airline Company. The Airway Bill is the receipt proof, because it is used as an instrument of accounting and customs control for the company.

The cargo handling is the most important step in air transport because the stowage in the hold of the aircraft requires precision, which is associated with planning. (University of Azuay) It is necessary to consider the following instructions:

- Space Reserve
- Checking of physical space and dimensions
- Nature of merchandise

The responsible persons in the physical distribution process of the aircraft's load are the Ramp Agents. Their labor is to coordinate all actions and information about flight, cargo, pallets, containers, passengers and luggage.

1.4.4.3. Land and Multimodal Transport

The land transport is perfect for "door to door" service and the tariffs are more economical than other means of transport. For companies it is a system necessary, because it is not limited to local level. Moreover, it is used in operations with bordering countries. (Castellanos 90)

1.4.4.3.1. Main means employed in land transport

a) Railway

It is a company of short distance and low speed whose purpose is to transport raw materials and finished products in little quantities that fit in a wagon. (Ballou 171) In

contrast, Chopra and Meindl (390) express that the use cost is related with distance traveled and performed time.

The advantages of this service, according to Castellanos (96), are the following:

- **Capacity:** By load volumes, it has advantages in its cargo capacity. For example, many trains have capacity and carry up to 12.000 MT.
- **Speed:** It is possible thanks to the new rails and new driving force.
- **Documentation:** It requires custom card and bill of lading.

In the same way, Castellanos (97) states the following disadvantages:

- **Little flexibility:** It has little flexibility due to the characteristics such as connections and width of the rails.
- **Transfers:** Depending on the production areas and railway station, it can be necessary before and after the shipment of goods. This operation implies greater handling of merchandise.
- **Sacking:** It is sensitive to theft due to the large numbers of stopover and storage stations between point of origin and destination.

b) Trucks

It is used to transport intermediate and finished products with a load length of 1,150 kilometers. (Ballou 172) The main objective, according to Chopra and Meindl (389), is to satisfy the needs of the client and reduce downtime that trucks are inactive and empty. The advantages and disadvantages, according to the book “Manual of Logistic Management and Merchandise Distribution (99)” are the following:

Advantages:

- **Versatility:** It allows arriving faster to the shipper’s installations and receiver than any other mode of transport.
- **Accessibility:** Agility in distribution and there is less manipulation in the merchandise.

- **Security:** The driver takes care of merchandise in order to reduce damage and thefts.

The disadvantages are the following:

- **Capacity:** It cannot compete with other modes of transportation, because it does not have enough capacity to carry great quantities of merchandise.
- **Distance:** It only can operate in certain limits. This system depends on other means of transport to carry merchandise to distant places.
- **Regulations:** It depends on the level of development in areas such as control, security, cargo capacity, etc.

1.4.4.3.2. Multimodal System

The multimodal system is a complex form of transport. This system is not considered as a means of transport, but rather a technique that combines the different means in order to get an efficient movement of load. (Castellanos 111) Its success is linked to coordination of all participant elements and not in the number of transports.

The combination of the means of transport depends on the logistic operator. The means of transport used in the multimodal system correspond to the mix of the three modes known as maritime, air and land. In spite of the traditional combination, Ronald Ballou (176) establishes ten possibilities of combination of multimodal services; however, in practices, two combinations are used: piggybag (railway-ship) and fishybag (truck-ship).

a) Benefits of the Intermodal and Multimodal System

Castellanos (112) establishes the following benefits:

- Decongestion at ports.
- Competitiveness of the products in the foreign markets.
- Sequence of the travel to final destiny.
- Adequate storage for load.
- Low cost of transport.

- Low time and risk for load.

1.5. Cost Component: For Country Export and Matrix of International Physical Distribution.

In the commercial area, the success or failure of an international negotiation depends on the sale price that the vendor or exporter offers in relation with his/her rivals. However, the successful negotiation is not only linked to the prices but rather to aspects such as administrative expenses, customs, logistics, production, etc. that promote international trading of goods and services. These elements are part of the competitive strategy whose finality is dealing with rivals. The costs represent the necessary disbursement that a company uses to manage and control the material and information flow associated with them. (Lobato and Villagr a 165) In the export process the costs are divided into two categories:

a) Variable Cost in Logistics

The indirect costs fluctuate proportionally to production volumes or sales, because they are constant by unit of production and vary in function of the quantity of elaborated piece. (Promexico) These costs have direct and indirect impact in the supply chain in all phases of the export process to the importing country. (Castellanos 159) The variable costs consider the next process:

- **Packing and Branding:** The cost of packaging varies according to the nature of the product, means of transport and target market. Nevertheless, it always will generate material and labor cost for the treatment of merchandise.
- **Documentation:** It is related to the necessary documentation for the export and import process. It is related to bills, bill of lading, licenses, phytosanitary certificate, etc.
- **Unitarization:** It is the cost for group pieces of the load in units of great volumes such as pallets or containers. In the case of pallets the cost corresponds to the materials utilized to cover the cargo and labor to carry out the task. In the case of containers, the cost is in function of the type of container, equipment, labor hand, etc.

- **Warehousing in origin and destination port:** In some cases, it is necessary for the merchandise to be stored because of external factors; for example ship delay, additional legal procedures, etc.
- **Transport:** In international transport the charter cost depends on the maritime or air transport.
- **Local Insurance of the Exporter to the Loading Port:** For the effects of calculation, it takes 1% of FOB value.
- **Customs and Bank Costs:** In the first case, it refers to the customs rights. The custom rights represent trade barriers applied to import products and in some cases are applied to the exports. In the case of bank services, the costs are honorariums, procedures and forms, but it is necessary to clarify that each bank has its own policies of encashment.
- **Agents:** According to its characteristics and activities the agents earn a secondment. The task carried out by agents of customs (freight, custom rights, etc.) will be accounted as cost of International Physical Distribution.

b) Fixed Costs in Logistic

The fixed costs are constant because they do not suffer modifications due to variation in production or sales. (Promexico) In other words, it is the payment that a company has to overcome regardless of the level of sales or production. Javier Castellanos (160-161) expresses the following fixed costs:

- **Administration:** It is related to the incurred time in management of export, departments and the necessary operations to collect data about the costs of physical distribution and the administration related to loading and delivery to the importer.
- **Capital:** It is the invested capital in the procedure of international physical distribution. The capital considers the value of the shipped goods and hired goods for shipment. No profit is seen during the transit time between importer and exporters locals. In general, the quicker the transit time, the lower the immobilized opportunity cost will be.

In summary, the penetration of a product in a foreign market depends on the level of competitiveness of prices and quality of products in relation to its competitors. The commercial strategy should be the result of an exhaustive analysis of the statistical information on imports, major trading partners and consumption trend of the target population. The objective is to establish a minimum margin of costs that the company should generate in order to elaborate a product.

1.5.1. Matrix of International Physical Distribution

The matrix reflects the study of the costs involve in the International Physical Distribution (IPD) for a specific loading to a specific market. (Castellanos 161) The matrix allows making notes of components related to product information, shipment, and other type of information related to the form of payment, use of INCOTERM and exchange rate executed in the negotiation.

The matrix shows guidelines to register the data of transport modes with cost components of the exportation cost (See Annex I). The exportation components, according to the matrix of IPD, are divided into three categories:

1. Costs for export country.
2. Costs of international transit.
3. Costs for importing country.

Castellanos (162) states that the matrix permits to identify the ideal transport mode for each geographic portion, because it follows a sequence of the activities with the respective cost and the duration in days.

CONCLUSION

The logistic of international distribution is a business branch that has not come to a halt, but it has evolved with time. At the beginning, this science was worried about the delivery of the product, but now it is focused on the merchandise being in the precise place, right time and when the client requires. The administration of supply chain seeks to provide the maximum customer experience, it also seeks to reduce the distribution costs and increases the benefits to the client and the company. As a branch that involves several actors, its uses allow to determine a break-even point in benefit of all actors and its study contributes to the development of the country as well. In the same way, it allows the companies to create a supply chain, according to its reality in order to increase the business performances and obtain high profit using minimum resources.

2. CHAPTER II: LOGISTIC FEATURE OF THE MEMBERS OF THE ANDEAN COMMUNITY OF NATIONS

The opening to commerce allows the merchandise exchange among nations regardless of its location. At a State level, the logistic infrastructure plays a fundamental role in the process of international physical distribution, given that it makes the commercial integration amongst countries possible. The current chapter gathers information from various sources with the aim of determining and knowing the logistic infrastructure from each of the members of the Andean Community of Nations. The logistical platform reflects a series of general data, territorial administration and politics from the country, conditions for load dispatch and access to international markets, among others. Thus, the logical structure in the Andean region has been formed based on a series of factors, both internal and external.

2.1. Logistics profile of Bolivia

2.1.1. General Overview

2.1.1.1. Geographic Location

Plurinational Republic of Bolivia is located in the central South America. It is located between the meridians 57°27' and 69°38' of western longitude, according to Greenwich Meridian, and the parallels 9°38' and 22°53'. (Procuador 1) Bolivia borders with the Federal Republic of Brazil, Argentina, Peru, Paraguay and the Republic of Chile. Graph N° 4 details its location and geographic borders.

Graph 4 Plurinational State of Bolivia



2.1.1.2. Area

Bolivia has a total territorial extension of 1.098.581 Km². Bolivia's territorial area is distributed as follows: 25% corresponds to the Altiplano zone and the Andes Mountains, 15% belongs to the inter-Andean valleys and 60% to flatlands. (Salamanca 7) Likewise to the Republic of Paraguay, Bolivia does not have access to the sea.

2.1.1.3. Population

In 2012, according to the statistical data from the National Institute of Statistics (5), Bolivia records an approximate population of 10.027.254 inhabitants. 71% of the total population is distributed into districts of La Paz, Cochapamba y Santa Cruz. (CEPAL 7) It is a multicultural country, according to Proecuador statistics (1), the ethnic Bolivian concentration reflects as follows: 62,6% are indigenous, 27,5% are mestizos and the rest are European creole.

2.1.1.4. Currency/Language

The official currency in Bolivia is the Bolivian peso (BOB) at market price of 6,84 BOB per American dollar, according to the Central Bank of Ecuador, June 2015. Regarding the language, Bolivia being a Plurinational state, has several languages from which Spanish is predominant, followed by Quechua, Aymara and foreign languages. (Proecuador 4).

2.1.2. Political and Territorial Administration of the State

The Plurinational Republic of Bolivia, whose constitutional capital is Sucre and administrative capital is La Paz, is divided into nine departments. Its political and territorial administration complies with the following statement:

“Bolivia is constituted as a Social Unitary State of Community Plurinational Law, free, independent, sovereign, democratic, intercultural, decentralized and autonomous; and it is founded in the plurality and political pluralism, economic, legal, cultural and linguistic, within the integrative process of the country”. (Prochile 1)

The organization and structure of the public power is reached through the Executive, Legislative, Electoral and Judicial branches. (Proecuador 4)

2.1.3. Conditions of access to the market destiny in terms of means of transportation.

2.1.3.1. Maritime route

In the Plurinational Republic of Bolivia, the logistic operations take place through maritime ports from other countries and its main fluvial navigation ports.

a) Maritime route

With the aim of improving the flow of merchandise, this nation has subscribed agreements to use the ports from neighbor countries. The United Nations Economic Commission for Latin America and the Caribbean (25) explains that Bolivia has special rights to use the ports of Peru and Chile in the Pacific; and in the Atlantic, it has an authorization to use the seaports of Argentina, Brazil, Paraguay and Uruguay (See Annexes 1 and 2). Due to these factors, the commercial success depends on the level of cooperation from neighbor countries. The Bolivian load is transported through Chilean and Peruvian harbors. Table n° 1 details the mobilization by tons from Bolivian cargo through these port terminals.

Table 1 Bolivian cargo mobilized through Chilean and Peruvian ports 2011-2015²

Exit Route	2011	2012	2013	2014	2015
	Measurement	Measurement	Measurement	Measurement	Measurement
	Gross Weight (Kg)	Gross Weight (Kg)	Gross Weight (Kg)	Gross Weight (Kg)	Gross Weight (Kg)
IQUIQUE - PISIGA - BELLA VISTA	18.900.804,96	48.932.526,29	87.460.155,41	75.754.048,52	26.930.656,54
CHARAÑA - ARICA	292.015.036,00	331.779.237,00	332.609.355,00	415.422.648,33	214.211.192,00
APACHETA - ANTOFAGASTA	16.661.492,73	15.291.745,79	15.716.930,78	16.452.722,80	7.346.210,20
ANTOFAGASTA - OLLAGUE - UYUNI	914.410.759,85	833.164.365,33	839.148.030,18	887.288.695,93	413.854.104,01
ARICA - CHARANA - TAMBO QUEMADO	915.609.746,10	934.134.738,97	1.216.402.981,32	1.063.992.304,25	422.203.846,31
DESAGUADERO	632.166.958,86	987.900.256,61	1.210.486.779,58	1.212.564.699,67	442.263.379,65
Total Kilograms	2.789.764.798,50	3.151.202.869,99	3.701.824.232,27	3.671.475.119,50	1.526.809.388,71
Total Tons	2.789.764,80	3.151.202,87	3.701.824,23	3.671.475,12	1.526.809,39

Source: Bolivian Institute of Foreign Trade
Elaborated by: Author

When occupying other countries' port facilities, it is essential to count with an organism that verifies the compliance of the operations. For this purpose, the Port Service Administration of Bolivia (ASP) was created. Its goal is to support the foreign trade operations in the authorized harbors for international transportation of merchandise from and to Bolivia. (Procuador 5)

² January to May

b) Fluvial Networks

This country counts with 14.000 kilometers of navigable rivers and its main fluvial ports are Central and Gravelal, located at Canal de Tamengo³. (CEPAL 23) The fluvial transportation, according to the Andean Development Corporation (27-27), is formed by three clearly defined systems:

- i. **The Northwest or Cuenca Amazónica Boliviana fluvial system:** It allows the connection of the community with the exterior. Its main ports are Virraoel, Trinidad and Guayamerín that record 100.000 tons of cargo per year.
- ii. **The South-East or Hidrovía Paraguay-Paraná fluvial system:** The waterway Paraguay-Paraná is shared by Argentina, Bolivia, Brazil, Paraguay and Uruguay. The private ports located in the Canal de Tamengo are Central de Aguirre and Gravelal which sovereignty is shared between Bolivia and Brazil. This Canal has 10,50 Km of length, allowing to connect to the River Paraguay and to transport 100.000 tons of cargo per year.
- iii. **Endorheic Basin or Lago Titicaca (Titicaca Lake):** It represents a connection to Peru. The volume of transported cargo that travels through Guaqui Port is significant in the bimodal system railroad-lake-railroad. Its functioning depends to a large extent on the oriental railway service.

The transported volumes through fluvial navigation are detailed in table n° 2.

³ Canal de Tamengo (natural-artificial) has approximately 11 kilometers long and connects with Puerto Suarez in Bolivia and with Río Paraguay in Brazil (See Annex 3).

Table 2 Mobilized Cargo volumes through Bolivian fluvial networks 2011-2015P⁴

Fluvial	Year				
	2011	2012	2013	2014	2015P
	Volume	Volume	Volume	Volume	Volume
Kilograms	524.958.88	793.340.285	955.547.77	876.841.60	436.006.17
Tons	524.959	793.340	955.548	876.842	436.006

Source: Bolivian Institute of Foreign Trade
Elaborated by: Author

2.1.3.2. Terrestrial routes

Merchandise transportation is done through the main roads of the Bolivian terrestrial system. From the road system, 55% of the roads are unpaved (Proecuador 6). Therefore, the costs for distribution are higher; they affect the cost of the products that use this kind of transportation. The composition of the national road system is detailed as follows in table n° 3.

Table 3 National Road System from Bolivia

Year	System	Length	Partial Length (KM)	
			Paved	Unpaved
2006	Fundamental National Network	15.847	4.332	11.515
2006	Departmental Network	20.048	207	19.841
2006	Municipal Network	37.066	61	37.005
Total		72.961	4.600	68.361

Source: Board of Directors of Iberia and Latin American Roads

⁴ January-May

The Bolivian road system is composed by transport corridors. The transport corridors connect the main nodes and create a network of transport stations for the exchange of international merchandise. (MinTransporte 129) The Bolivian terrestrial system has two elements: the road and railroad systems.

a) Road System

According to Proecuador (7), the road system has 80.887 kilometers from which are composed, according to CEPAL (17-18), by the following corridors:

- i. **East – West Corridor:** It has a length of 2.585 kilometers. It connects Arica and Iquique (Chile) ports in the Pacific Ocean. Moreover, it links Puerto Santos (Brazil) with the Atlantic Ocean. Furthermore, it is connected to a railroad system that allows access to Antofagasta Port in Chile and the Peruvian ports Ilo and Matarani.
- ii. **North Corridor:** It has a length of 2.962 kilometers. It connects the Rondonia state (Brazil) with the East-West Corridor through Bolivian departments Beni and La Paz, joining the Bolivian department Pando with Peru.
- iii. **South Corridor:** It has a length of 1.000 kilometers. It links Buenos Aires (Argentina) with Lima (Peru) and facilitates the access of Paraguay to the Pacific Ocean. (See Annex 4).

b) Railroad Network

According to Proecuador (7), the railroad system has a length of 3.697 kilometers and it is divided into two networks which are not linked between them. This system is divided into two networks:

- i. **Eastern Network:** Its extension is 1.244 kilometers. It is managed by the Ferrovial Oriental Sociedad Anónima (FCOSA). This network links the city of Santa Cruz with Argentina and Brazil.

- ii. **Andean Network:** It has an extension of 2.318 kilometers. The Andean Network is managed by Ferrovial Andina Sociedad Anónima. This railroad system links the city of La Paz with Argentina, Chile and Peru. (See Annex 5)

(CEPAL 20-21)

Cargo mobility by this mean is detailed as follows in table N° 4.

Table 4 Railroad Network: Cargo Volume (KG-TM) 2011-2015P⁵

Measurement	Year				
	2011	2012	2013	2014	2015
Kilograms	912.632.549,74	831.315.020,81	862.564.082,81	878.710.791,93	413.800.811,01
Tons	912632,55	831315,02	862564,08	878710,79	413800,81

Source: Bolivian Institute of Foreign Trade
Elaborated by: Author

2.1.3.3. Aerial routes

The aerial route is planned to mobilize passengers and short volume or high value load. According to the Andean Development Corporation (31), this country together with Ecuador records a low level air traffic, which has a direct effect in the costs at airports, fuel and fares. Currently, Bolivia has 13 airports; from which three are international stations (See Annex 7). According to CEPAL (26), those stations are:

- i. International Airport Viru Viru located in the city of Santa Cruz.
- ii. International Airport Jorge Wilstermann settled in the city of Cochapamba.
- iii. International Airport El Alto located in La Paz.

However, from the three already mentioned airports, only the Viru Viru station has a landing field of 3.500 meters long and 45 meters wide for any kind of aircraft landing. The load mobilized through airport system from Bolivia is detailed in table n° 5.

⁵ January to May

Table 5 Bolivian Cargo Volume (TM) mobilized through aerial routes 2011-2015P⁶

Aerial Infrastructure	2011	2012	2013	2014	2015P ⁶
Bolivia	Volume (Tons)				
Cochabamba/ Jorge Wilstermann	24	28	1	0	0
La Paz/ El Alto	619	648	747	1469	295
Santa Cruz/ Viru Viru	2036	945	907	933	241
Total	2679	1621	1655	2402	536

Source: Andean Community of Nations

Elaborated by: Author

2.1.4. Requested documents in Customs

The documentation that Bolivian Customs requires is applied to all cases in commercial shipment, sampling regime, documents for load importations and exportations. Regarding the most used negotiation terms (INCOTERMS 2010), in this country, for exports are Free on Board (FOB) and in case of imports, the used terms are Cost, Insurance and Freight (CIF). (Proecuador 10)

For import and export operations, according to the National Customs of Bolivia, it is necessary but not mandatory to count with the service of a customs dispatcher. The requested documents for merchandise imports and exports are illustrated in table n° 6:

Table 6 Requested documents for Bolivia National Customs

Exportation	Importation
Bill of Landing	Bill of Landing
Certificate of origin	Certificate of origin
Collection order	Commercial Invoice
Commercial Invoice	Customs Declaration of Importation
Customs Declaration of Exportation	Document for Customs Transit
Inspection Report (Fight against Trafficking Special Forces)	License for importation
Technical Standards, / Health Certificate	Packing List

Source: Doing Bussines

Elaborated by: Proecuador

⁶ January to May

2.1.5. Access Barriers

The access barriers refer to all the mechanisms that obstruct the free entrance of potential products for the industry. These barriers represent a fundamental aspect in determining the market structure, since they directly affect the number of enterprises, substitute products, new products and industry competence. Hence, Bolivia seeks to protect its market as much as its product consumers, so that they do not negatively affect the industry and consumer health. According to Proecuador (12), among the barriers for entrance into the Bolivian market, are:

- i. **Sanitary, phytosanitary regulations, institutions, time and requirements:** Since 2005, Bolivia applies the NIMF-15 norm. This norm seeks to reduce the insertion or spread of plagues related to packing wood used in conifer and no conifer wood, for international business development.
- ii. **Prohibited importation products:** Guns and ammunitions for civil usage, pharmaceutical products not approved by the Ministry of Health, products and beverages which are damaging for the consumer's health, fertile eggs or derivate poultry from Colombia, products or derivate of Brazilian ruminant and cattle. (Logistic Capacity Assessment)
- iii. **Transportation:** Although this country does not have access to the sea, its commercial operations are done through Chile or Peru harbors. In other words, it can be said that the level of difficulty for maritime operations causes to use the aerial transportation for heavy loads. The distribution process to Bolivia is made through trucks and the Eastern Railroad whose trains have a transportation capacity of 40 tons per carriage. (IBCE).
- iv. **Informal Economy:** Bolivian economy is composed by a informal business sector (street vendors, informal fairs and merchandise smuggling) that distort a healthy competition.
- v. **Distribution channels:** The access to the market of specialized products is made through direct contact and negotiation with the importer.
- vi. **Tariff Barriers:** The seven levels of duties are: 5%, 10%, 15%, 20%, 30%, 35%, and 40%. (Ministerio de Economía y Competitividad)
- vii. **Commercial Agreements:** According to the Bolivian Institute for Foreign Trade, this country has commercial agreements with México, Chile, Cuba,

Venezuela, Mercosur, CAN and preferential tariffs (SGP) with United States of America, European Union, Japan and Canada.

2.1.6. Internal Logistics and Distribution

The main destinations for Bolivian exportations are markets from United States, Europe and South America (Colombia, Venezuela y Peru). Among the products that Bolivia exports to the world, there are soya and its derivate, sugar, alcohol, beef, coffee, quinoa, wood and its derivate, textiles, jewelry and handicrafts, etc. Nevertheless, products transportation depends on the access road conditions to the harbors that this country utilizes to send merchandise abroad.

To carry out commercial operations, this country is supported by two routes that facilitate the transport of international merchandise. The first access route comprehends all kind of merchandise that is sent through the ports at the Pacific; the second one comprehends all the products that go through the internal navigable routes from Bolivia to the Atlantic Ocean. To carry out commercial operations in the Pacific coasts, Bolivia relies on Peruvian port Ilo and Matarani. However, the transported volume is relatively low due to the additional distance that exists with the Chilean ports, Arica and Iquique. On the other hand, to reach the ports at the Atlantic Ocean, this country uses the Paraguay/Paraná route, best known as Hidrovía and the route from Cuenca de la Plata harbor to reach the ports: Rosario in Argentina and Nueva Palmira in Uruguay. (Banco Mundial 107).

The logistic development of the Plurinational Republic of Bolivia dates back to the international agreements that it has done in order to obtain access to the sea. The publication of the World Bank (110) *“Strengthening Bolivian Competitiveness”* indicates that this country could improve its exporter condition as well as logistic, thanks to the Peace and Friendship Agreement signed in 1904 between Chile and Bolivia. This agreement, in the articles 6 and 7, points that Chile recognizes in perpetuity that Bolivia has the right to free merchandise transit through its territory without exceptions; as well as, both governments committed to keep customs agents and guarantee the mobilization and storage of merchandise in Chilean territory. However, Bolivia does not have maritime sovereignty but port authority in Arica and

Antofagasta seaports. This implies that Bolivia invests in customs authorities in those ports that will control, through the required documentation, merchandise dispatch as well as dictate its own custom duties and set importation rates. (Ministerio de Relaciones Exteriores 2)

To transport merchandise from and to Bolivia, they use containers and load in bulk. For the former, the use of containers has been raised since the highway to Arica was opened in 1990 and since the highways were paved, offering higher security for transporters. As a result, with highways in ideal conditions, the time for the trajectory was reduced from a week to three days. Load in bulk transportation is not expensive but it involves some limitations since the load volume through waterway are conditioned to the water depth (2.8-3 meters) are less favorable in some months of the year. (Banco Mundial 109)

Contrary to what has been expressed, Bolivia has difficulties to make logistic operations at the ports. The President of the National Chamber of Exporters from Bolivia, Guillermo Pou Mont, expresses that hundreds of trucks with national merchandise leave daily towards Chile seaports but, actually, they face a series of obstacles, that Chilean authorities set to the cargo and it cannot transit freely in the ports, in spite of the existence of current agreements. Additionally, it is added that the free transit to Chilean ports is not true because the trucks are subject to a series of controls and delays that are addressed for merchandise that enters having Chile as its final destination. (Telesur Tv)

2.2. Logistics profile of Colombia

2.2.1. General Overview

2.2.1.1. Geographic Location

The Republic of Colombia is located in the north part of South America. In the Caribbean Sea, this country borders with Panama and Venezuela, as well as, it shares border with Ecuador and Panama in the Pacific Ocean. According to the reports of the Comisión Económica para América Latina y el Caribe (Economic Commission

for Latin America and the Caribbean) (8), Colombia's geographic situation is better than the rest of the CAN members; by virtue of the fact that it is the only country in South America that possesses coasts in both the Pacific and the Caribbean. Its geographical coordinates are "(...) 4° North Latitude-72 West Longitude". (UNAD). Graph n° 5 details its location and geographic borders.

Graph 5 Republic of Colombia



2.2.1.2. Area

The Republic of Colombia has an area of 2.070.408 Km² from which 1.141.748 Km² corresponds to its continental territory and the difference -928.660 Km²- belongs to its maritime extension. (Proecuador A 1) Its geography is composed of three mountain chains⁷ that go through the country from north to south in its eastern half. (Proecuador B 1) Having direct access to both the Pacific Ocean and the Caribbean Sea in the Atlantic, the Republic of Colombia, is closer to the European markets and the Panama Canal. (Rosales 4)

⁷ The mountain chains are composed by coastal low grounds, central high lands, and eastern flatlands of low grounds.

2.2.1.2. Population

Colombia's total population in 2010 was 45.508.205 inhabitants. (DANE 1) According to population gathering and statistical data from DANE, the most representative departments for the Colombian government are Bogotá D.C. (16,35%), Antioquía (13,51%) and Valle del Cauca (9,77%). The majority of the population is gathered in the center (Andean region) and north (Caribbean region) of the country, while the east and south (flatlands and Amazon) are deserted zones. (Proecuador B 3)

2.2.1.3. Currency / Language

In Colombia, the official currency is the Colombian peso (COP). According to statistical data of Central Bank of Ecuador its price in relation to the US dollar is 2,254 COP per dollar. Its official language is Spanish. (Proecuador A 4)

2.2.2. Political and territorial administration of the State

The Republic of Colombia, whose capital is Bogota D.C., is divided into 32 appropriately organized departments. It is the only country in South America, according to the reports of CEPAL (8) that possesses islands (San Andres and Providencia) in the Caribbean Sea. Being a *“Social state based on the rule of law, [Colombia] is organized in shape of a Unitary Republic with politics centralization and administrative decentralization, where the public power is separated into three branches of government: legislative, executive and judicial.”* (Prochile 3)

2.2.3. Conditions of access to the market destiny in terms of means of transportation.

The previous governments firmly believed that to reach economic development, Colombia must center in improving its productive system and its state infrastructure. In 1990, Colombian ex-president, César Gaviria Trujillo, in a speech address to the nation, affirmed to reach internationalization of the Colombian economy, it was

necessary to stimulate private investment, to modify the Foreign Trade Institute in order to modernize both land transportation and ports, as well as improving aerial and maritime rates. (Universidad de los Andes 26-26). The emphasis that Colombia gives does not consist only on economic and commercial policies but also spins around the improvement of its logistic platform in order to become globally competitive. Its geography and relief in relation to the rest of the members of the CAN make it possible to place it as the best amongst all the members.

2.2.3.1. Maritime route

The activities for foreign trade in Colombia are developed in the maritime and fluvial ports of the country for cargo mobility from and to Colombia.

a) Port System

The majority of the commercial operations in Colombia are made through the maritime system. The seaport infrastructure is a motor that stimulates positively the economy of any state. With the aim of improving the logistical profile, according to CEPAL (21), through Law 001⁸, Colombia modified its port system, obtaining positive results. Currently, the port system contains 122 facilities, but from all of those, nine are specialized ports for specific activities (*see Annex 7*). (Proecuador B 3). Table n° 7 details the main ports of Colombia.

⁸ The goal of this law was to modernize the system, reduce rates and improve the port efficiency.

Table 7 Port System of Colombia: Load Volume (TM) 2012-2014

Seaport	Departments	Location	Type	Main Activity	2012	2013	2014
San Andrés	San Andrés	Atlantic	S/D	General Cargo and Passengers	131	100	141
Puerto Bolívar	La Guajira	Atlantic	Deepwater	Coal	0	33.500.000	0
Santa Marta	Magdalena	Atlantic	Low water	Hydrocarbon, Coal, General Cargo and Passengers.	6.610.538	4.944.348	3.596.209
Barranquilla	Atlántico	Atlantic	Low water	Hydrocarbon, Coal, General Cargo and Passengers.	4.611.909	4.051.816	4.390.559
Cartagena	Bolívar	Atlantic	Medium depth water	Hydrocarbon, Coal, General Cargo and Passengers.	3.005.692	2.701.173	14.502.669
Tolú	Sucre	Atlantic	S/D	Hydrocarbon and General Cargo.	261.169,94	0	0
Turbo	Antioquía	Atlantic	S/D	In development. Hydrocarbon, Fruits.	9.378,12	13.953,26	0
Buenaventura	Valle del Cauca	Pacific	Low water	Hydrocarbon, General Cargo and Fishing.	9.766.505	10.075.860	10.700.650
Tumaco	Nariño	Pacific	Low water	Hydrocarbon, General Cargo and Fishing.	2.862	8.834	8.700

Fuentes: CEPAL & Proexport Colombia & Ports and Transport Superintendence

Elaborated by: Author

In the previous table, there are seven ports that are settled in the area of the Atlantic and two that are located in the coasts of the Pacific. In Colombia, there are two important port societies: Cartagena y Buenaventura. The first is considered as a logistics center that joins the Caribbean with the world and it has interoceanic routes that cross the Panama Canal. The second is located at the southwest of Colombia, in the Pacific Ocean; it has a weekly frequency of exits and the time spent on the trajectory is three days. (Proecuador B 3-4)

b) Fluvial System

The country counts with rivers that reach approximately a navigable length of 18.225 Km, from which 6.500 Km are not used for navigation. (MinTransporte 37). In the digital publication Logistics Profile of Colombia, Professor Richard Fajardo (57) declares that Colombia's fluvial network revolves around two rivers: Magdalena and Meta, which represent the economic and regional axis that allows the integration of the isolated areas in the country through the mobilization of consumer goods (*see Annex 8*). The fluvial system of the Republic of Colombia is detailed in table N° 8.

Table 8 Republic of Colombia: Fluvial System

Main Rivers	Navigable Length (KM)			Total	No Navigable	Total
	Largest		Smallest			
	Permanent	Transitory	Permanent			
Cuenca del Magdalena	1.188	277	1.305	2.770	1.488	4.258
Cuenca del Atrato	1.075	242	1.760	3.077	1.358	4.435
Cuenca del Orinoco	2.555	1.560	2.621	6.736	2.161	8.897
Cuenca del Amazonas	2.245	2.131	1.266	5.642	1.493	7.135
Total National	7.063	4.210	6.952	18.225	6.500	24.725

Source: Ministry of Transportation

The mobilized load throughout the Colombian fluvial system records the following data in table N° 9.

Table 9 Fluvial System of Colombia: Cargo (TM)

Fluvial Transportation	Years				
	2011	2012	2013	2014	2015
Volume TM	2.304	468	867	786	4.425

Source: *DIAN & SIEX*
Elaborated by: *Author*

2.2.3.2. Road Routes

a) Road Routes

The Republic of Colombia, according to CEPAL statistics (16), possesses a road network of 165.000 Km. Its organization, construction, development and maintenance are under the supervision of the Ministry of Transportation of Colombia. The road network is distributed into three categories: primary roads, secondary or departmental roads, and tertiary or municipal roads (see Annex 9). In table N° 10, the road network distribution is explained.

Table 10 Transportation Infrastructures: Roads Mode (KM)

Year	Primary	Secondary	Tertiary	Total National Road Network
2013	17.037	44.399	141.955	203.932

Source: *Ministry of Transportation*
Elaborated by: *Author*

b) Road Corridors

The road corridors emerge from the necessity to fill up a specific route. (CEPAL 16) In the actual Colombia, the road corridors are directed to foreign trade and are located according to its functions:

- a) Production and consumer center inside the country.
- b) Harbor zones and terrestrial borders where the cargo is mobilized. (CEPAL 17)

The foreign trade operations are concentrated in cities like Bogota, Medellin, Barranquilla, Cali and Cartagena so that the corridors link those cities with transference nodes (maritime ports and airports). (See Annex 10)

c) Railroad Network

The Ministry of Transportation (29) states that the operating railroad network is constituted by 794 Km (see Annex 11). The products that are transported by this means are coal, steel, cement, coffee, cereal, paper and fertilizers. The railroad network in Colombia is made up by two systems that are detailed as follows:

- i. **Railway System of the Pacific:** it goes through the department of Valle del Cauca. The transported products are cereal, coffee, wood, etc.
- ii. **Railway System of the Atlantic:** It connects Bogota and Medellin with the coast of the Caribbean. The commercialized merchandise through this way are coffee, coal, steel, etc. (Procuador B 4-5)

Merchandise transportation is made through the following train engines: U10, U12, U18 and R22 with a unitary capacity of 40 tons for in bulk cargo and container cargo. (FDP) The railway system (Pacific and Atlantic) covers a route and a specific operation that is explained in table N° 11.

Table 11 Railway System of Colombia: Routes KM

Railroad Network	Railway segment	Km	State	Subtotal
from the Pacific	Buena Ventura - Cali	168,6	Commercial Operation	498
	Cali - Cartago	169	Rehabilitation	
	Cartago - La Felisa	118	Construction	
	Zarzal - Tebaida	42	Rehabilitation	
Railroad Network from the Atlantic	Chiriguana - La Loma - Ciénaga	210	Commercial Cargo Operation	245
	Ciénaga - Santa Marta	35	Logistic Operation of Trains	
			Total	743

Source: Ministry of Transportation

Regarding the cargo movement, the Colombian railway system, according to the Ministry of Transportation (39), records the following data:

- 2011: Register a cargo movement of 74.554 TM.
- 2012: The mobilized cargo was 76.800 TM.
- 2013: 76.781 TM Cargo was mobilized.

2.2.3.3. Aerial Routes

The airport system is considered as one of the best services that are offered through Latin America. To reach that prestige, one of the aspects that encouraged this service growth was the distance between its communities. (CEPAL 23). In this context, it can be said that the aerial transportation serves as a medium of integrations with the rest of the country.

According to Proecuador (B 5), Colombia counts with 73 airports from which 11 are international. These stations belong to the cities: Barranquilla, Cali, Cartagena, Medellin and Pereira (see Annex 12). The statistics for cargo in the main airports are explained below in table N° 12:

Table 12 Airport System of Colombia: International Cargo TM 2011-2015P⁹

Airport	2011	2012	2013	2014	2015P
Armenia/Quindio	0	0	0	12	0
Barranquilla/Ernesto Cortissoz	1.287	1.249	1.233	91	708
Bogotá/El Dorado	295.929	307.324	303.103	4.152	133.876
Bucaramanga/Santander	97	89	70	19	30
Cali/Alfonso Bonilla Aragón	3.519	2.505	2.490	318	1.034
Cartagena/Rafael Nuñez	96	87	221	165	19
Cúcuta/Camilo Daza	3	22	4	15	4
Leticia/General Alfredo Vásquez Cobo	0	0	1	0	0
Pereira/Matecañas	67	116	211	41	57
Rionegro/José María Córdova	62.192	64.674	65.743	529	29.987
San Andrés/Gustavo Rojas Pinilla	2	26	34	42	0
Total Tons	363.192	376.098	373.105	5.388	165.721

Source: Andean Community of Nations

In spite of the aerial service of Colombia being consolidated as the best of Latin America, its airport infrastructure has begun to stagnate. Although Bogotá, Cali, Barranquilla and Cartagena airports have the biggest number of cargo and passengers, these stations have landing track in bad conditions, platforms, stations and technical delays in some cases. (Pérez Pachón 15)

2.2.4. Requested documents in Customs

The documents that the Directorate of National Taxes and Customs of Colombia demand are applied for all operations of commercial delivery, sampling regimes for both process of importations and exportations. The negotiation terms or INCOTERMS 2010 of frequent use are Free on Board (FOB) and the term CIF or Cost, Insurance and Freight for commercial operations. The documents that DIAN requires are detailed in table n° 13:

⁹ January to May

Table 13 Demanding Documents in Customs of Colombia

Importation	Exportation
Record or License for importation	Bill of lading
Commercial Invoice	Commercial Invoice
Knowledge of shipping	Exportation Declaration
Certificate of origin and health	Inspection Report
List of packing	-
Country of Exportation Declaration	-
Source: <i>DIAN & Proecuador 2015.</i> Elaborated by: <i>Author</i>	

2.2.5. Access barriers

The use of protective mechanisms or access barriers to the market have the purpose of protecting internal industry of competitors that could destroy the national industry or in turn import products that are damaging for the consumers health. Among the access barriers to the Colombian markets are the following listed by Proecuador A (35-43):

- a) **Prohibited Importation Products:** In Colombia prohibited importation products are considered: chemical, biological, nuclear weapons and similar substances. In some cases, these products could only be imported by the national government through the military industry.
- b) **Sanitary and Phytosanitary Regulations:** Colombian state emits and regulates those certified as long as they have been approved by the Colombian Agriculture and Livestock Institute and the Agreement about Sanitary and Phytosanitary Applications of Colombia under the parameters of the World Trade Organization.
- c) **Technical Requirements:** Under approval of the Industry and Commerce Superintendence whose function is to guard and control the fulfillment of the technical requirements.
- d) **Requirements about packing, wrapping and labeling:** With the purpose of preventing national security, Colombia establishes strict barriers about pharmaceutical products and groceries for its entrance to the market.

- e) **Control of Chemical Substances Importation:** The aim of this regulation is to eradicate the production of narcotics and apply a higher control under the substances that can serve for its elaboration. The substances that need approval for their importation are propyl alcohol, 4-metilpetan-2-ona, propyl acetate; all of them are utilized in the elaboration of narcotics. (El Tiempo)
- f) **Tariff barriers:** with the aim of protecting the local industry, Colombia applies tariffs to agro-industry products, meat industry, automobiles and motorcycles.
- g) **Commercial Agreements:** the current agreements that Colombia holds are Free Trade Agreements (FTA) Colombia-Mexico, FTA: Republics of El Salvador, Guatemala and Honduras, CAN, CARICOM, MERCOSUR, TLC Chile, EFTA¹⁰, USA, Agreement of Partial Scope with Venezuela, Cuba, Nicaragua and the European Union. (MinComercio)

2.2.6. Internal Logistics and Distributions

In contrast with the rest of the members of CAN, Colombia possesses a big size market. Thus, the bigger the market is, the more time it will require for the distribution process. *“Traditionally, Colombia has had a minor market, as a result of a big part of the highly competitive geographic segmentation that is presented in the interior of the country.”* (Proecuador B 9). Nevertheless, the general structure of the commercial sector, according to author Andrés Arango (24-25) who indicates that Colombian logistic is divided into four chains that are as follows:

- a) **First Level Objective Chains:** they are the chains that recruit logistic of added value and have consolidated presence in Colombian exportations. For instance: flowers, coffee, pharmaceutical products, meat products and textiles.
- b) **Second Level Objective Chains:** they are chains of added value for traditional products of importation or national products with a high potential for exportation. For instance: tobacco, footwear and editorial industry.

¹⁰ Free Trade Agreements with Switzerland, Liechtenstein, Norway and Iceland.

- c) **Third Level Objective Chains:** They are chains with low potential for exportations and can be used to compensate the flow of transportation chains. Such as cereals, cattle and cement.
- d) **No Objective Chains:** Chains with dedicated logistic, it means, with no added value. For example: banana, precision instruments and oil.

In this context, it can be stated that the supplying chains in Colombia vary depending on the different zones of the country. Regarding its composition, the author James Hauk (16) explains that Colombian supplying chains have a strong structure and dwell in the main cities of the Republic of Colombia (Bogota, Medellin and Cali).

In Colombia each product to be exported has a specialized port to its shipment abroad. The specialization in the ports, according to Hauk (21), has as a purpose to reduce the prices of transportation and provide the opportunity for each product to be near the distribution point. The specialty of each port is detailed in the following table.

Table 14 IPD points in Colombia

Product	Port
Crude Oil	Coveñas-Mamonal
Banana	Santa Marta
Wood	Turbo
Coffee	Buenaventura
Cement	Barranquilla
All type of oil	Cartagena
Source: <i>Huak James.</i> Elaborated by: <i>Author</i>	

On an international level, the logistic management of the loads is delicate and includes a series of hard controls. Since Colombia takes into consideration these strong requirements, it works together with the organization “Enterprise Alliance for a Safe commerce, in Spanish BASC” with the purpose to ensure the success of every operation and avoid any irregularities during the business. This organization judges and guarantees that the loads are free of any type of criminal phenomenon.

2.3. Logistics Profile in Ecuador

2.3.1. General Overview

2.3.1.1. Geographical Location

The Republic of Ecuador is situated in the north-occidental region in South America. Among its territorial limits, it shares borders with Colombia and Peru. (Proecuador A 1) In the earth globe, this country is located between the parallels 01°30' N y 03°23.5' S and the meridians 75°12' W y 81°00' W. The equatorial line goes through this country at 22nd kilometer from the city of Quito. (INOCAR 1) In the following graph n° 6, its location and borders are illustrated.

Graph 6 Republic of Ecuador



Source: Google Maps

2.3.1.2. Area

The territorial extension of this country is of 256.370 Km² and 283.560 Km² including the Insular region or Galapagos. (Instituto Geográfico del Ecuador) Ecuador is made up of four natural regions –the highlands, the coast, the Amazonas and the Insular or Galapagos region- and it is known worldwide for the richness of natural resources.

2.3.1.3. Population

According to statistical data from the National Institute of Statistics and census (INEC) in 2010, the total population of the Republic of Ecuador is 14.483.499 millions of inhabitants. The most important cities by order of inhabitants' concentration are Guayaquil, Quito and Cuenca. (CEPAL 5) According to Prochile (1), from the total amount of the Ecuadorian population, 49,24% of the inhabitants are concentrated in the Coast Region, 44,95% in the highlands while the remaining part of the population is concentrated in both the Insular and the Amazon region.

2.3.1.4. Currency/Language

Since 2000, the official currency used in Ecuador is the dollar of United States of America which replaced the original currency, Sucre. Similarly to the other members of CAN, the official language of the Republic of Ecuador is Spanish; however, there are other ancestral languages such as shuar, quichwua, tsáfiqui among others which are official languages used by indigenous towns. (Prochile 2)

2.3.2. Political and Territorial Administration of the State

The territorial administration of the Republic of Ecuador, whose capital is the Metropolitan District of Quito, is formed by 24 provinces (CEPAL 5). Ecuador is organized in the form of Republic and it has a decentralized government. Its powers are divided among the following functions: Executive, Legislative, Judicial, Transparency and Social Control and Elective function. (SENAGUA)

2.3.3. Access conditions to the market destiny in terms of means of transportation

2.3.3.1. Maritime route

a) Port system

In the Republic of Ecuador, the harbor system is formed by maritime harbors, petroleum and private terminals. These maritime harbors are located in the coastal part of the Pacific Ocean and the fluvial ports are located in the Amazon zone of the country on the shores of the main rivers (see Annex 13). (CEPAL 17) In the following table 15 its maritime, oil and fluvial loads movements are explained in detail.

Table 15 Maritime ports, Oil Terminals and Fluvial ports in Ecuador load movement (TM)

Volume (TM)					
Maritime Seaports	2014	Oil Terminals	2014	Fluvial Port	2014
Bolívar Port	1.827.394,00	Balao Port	24.499.324,00	El Carmen de Putumayo Port	S/D
Maritime Port of Guayaquil or Puerto Libertador Bolívar	20.705.636,79	Libertad Port	3.821.413,00	Francisco de Orellana Port	S/D
Port of Esmeraldas	984.810,00	El Salitral Port	1.020.631,08	Nuevo Rocafuerte	S/D
Port of Manta	815.678,00	-	-	Misahuallí Port	S/D
Ayora (Galápagos) Port	S/D	-	-	Colón y La Punta Port	S/D
-	-	-	-	Morona Port	S/D

Source: CEPAL&INEC
Elaborated by: Author

Citing the previous classification, it can be seen that from all the group of terminal ports mentioned, the one that has more participation to Ecuador is the port of Guayaquil. The Andean Corporation Of Development in its publication “*Ecuador: Analysis of the Transportation sector (21)*” states that this terminal manages 62% and the participation of other maritime harbors in commercial operations are the following ones.

- a) 18% by the Bolivar Port
- b) 15% in charge of Esmeraldas Port
- c) 5% Port of Manta

91% of the operations related to oil and refined products belong to the oil port terminals of Balao, 4% to the Libertad Port and 5% to Salitral with the purpose of making oil refined products operations.

a) Fluvial Networks

In spite of having sailing hydro-routes, the development of the fluvial level of transportation in the Republic of Ecuador has been gradual. At the beginning, the Guayas river¹¹ was counted as an available way, but nowadays this route has been affected by problems (sedimentation, growing of the Palmar islet, among other problems) that affect its navigation capability. (CAMA E)

The CEPAL (45) in its digital article “*Toward a sustainable development and integrated in the Amazon region*” states that Ecuador has a fluvial system based on a corridor that goes along the Napo river between Coca (Francisco de Orellana) and Nuevo Rocafuerte until Cabo Pantoja in the Peruvian side and continues until the union with the Amazon river (See Annex 14). The transported load in Napo is categorized in the following manner: load for the regional use (nourishing and consumption products), other products loads for the regional market and loads for the industry (cement, steel, stone, etc). Regarding the province of Esmeraldas, the fluvial way is the only transportation for people and loads. (CAF 22)

¹¹ The Guayas River emerges from the union of Daule and Babahoyo rivers.

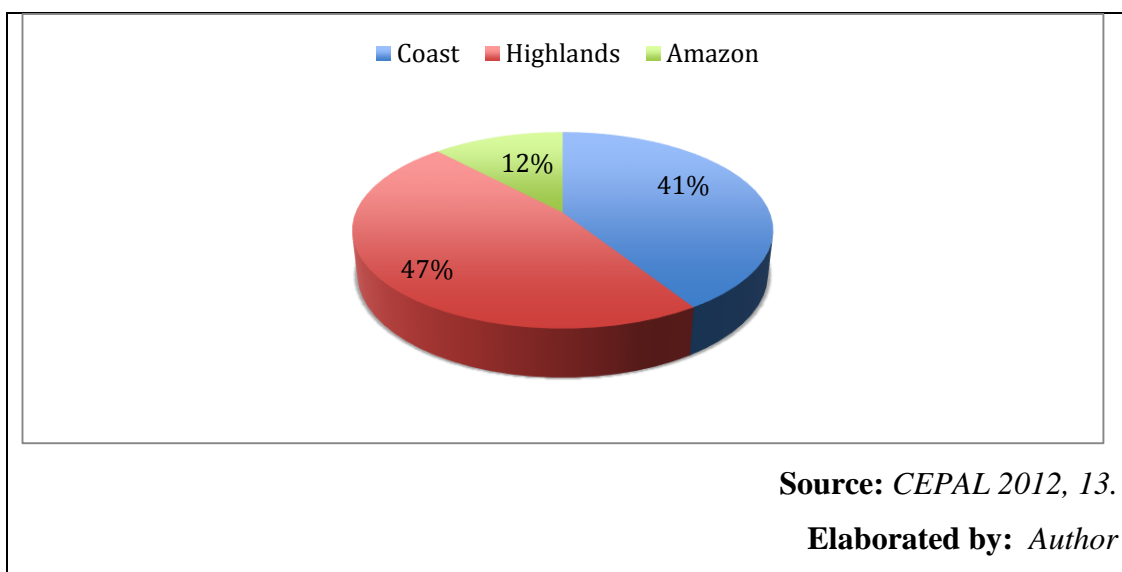
Nevertheless, it is important to mention that the official number of load movements is not registered because there is no evidence of registers of loads by official sources (primary and secondary) in any database of the Republic of Ecuador.

2.3.3.2. Terrestrial routes

a) Terrestrial highway

The Ministry of Transportation and Public Operations defines the network routes with a longitude of 43.670 Km which are distributed as the following: state route network with 8.654 Km. 12.477 km to the province route network and 22.540 km to the canton route network (CEPAL 13). The Economic directive for Latin America indicates that from the whole amount state network, only 8.158 are paved and the remaining part of 35.512 is not paved.

Graph 7 Republic of Ecuador: Public Road Network



As it can be observed in the previous graphic, that the majority of via network is situated in the coastal zone of Ecuador, it is followed by the highlands and finally we have the Amazon region. It might be possible that the percentages of this distribution are associated to geographical and environmental factors.

The Ecuadorian's road network is composed by corridors that influence the development and transportation of both loads and people (see Annex 15). The most important vial corridors are:

- i. Coastal corridor:** It is developed in the coastal plain of the Pacific joining the main harbors of Ecuador. This corridor connects Huaquillas (Peruvian border) with Mataje (Colombian border).
- ii. Highlands corridor:** It passes through the country from north to south and joins the main provinces to Quito. It ties Macará (Peruvian border) with Tulcán (Colombia border).
- iii. Amazon Corridor:** It begins at the south point of Zamora and spreads until the north. It covers the whole Ecuadorian Amazon region until El Conejo location, Colombian border. (CEPAL 13)

b) Railroad network

The Ecuadorian railroad system is made up 965 Km. Most of the 75% of the mileage railroad network is located in the Ecuadorian highlands. The run has narrow paths (1.067 m), using wooden beams and low expenses rails which limit the capability of load and speed. (CEPAL 17) The railroad network is distributed into three parts.

- I. Southern Division:** It joins the provinces of Guayas, Cañar, Chimborazo, Tungurahua, Cotopaxi and Pichincha.
- II. Northern Division:** It goes among the provinces of Pichincha, Imbabura, Carchi and Esmeraldas.
- III. South Sub-division:** It connects the provinces Chimborazo, Cañar y Azuay. However, this road has only part of its infrastructure due to external factors and damages in the riels. **(See Annex 16)**

Even though at the beginning a considerable distance was covered by the railroad, currently, a great part of the railroad network has been lost due to either authorities' carelessness or different situations not related to their administration. According to the ex-president Eloy Alfaro, the initial purpose of the Ecuadorian railroad was a

railroad focused on light merchandise loads and people's transportation, but nowadays this system is limited to tourism activities. (El Telégrafo)

c) Multi modal Transportation

The connection of several means of transportation makes it possible to deliver products to places of difficult access for other vehicles. However, Ecuador is a country where multiple-modalities of transportation have not yet been developed because of the lack of participation of the railroad and the absence of transferring stations.

2.3.3. Aerial Routes

Ecuador owns an aero infrastructure composed by 32 airports situated along its territory and the Amazon region. Because of its characteristics, it has 249 landing fields (see Annex 17). (El Telégrafo) (PROEXPORT Colombia 6) According to CEPAL (19), among the most representative loading airports for Ecuador we have the following ones:

- I.** Quito International Airport: moves 66,17% of the total load
- II.** International airport Jose Joaquin de Olmedo or Guayaquil: transports 30,18% of the total load
- III.** International airport Cotopaxi or Latacunga and Eloy Alfaro or Manta airport mobilize 3,65% of the remaining amount of load, but it is shared between these two airport terminals.

The mobilization of merchandise through the Ecuadorian airports is described in table No 16

Table 16 Ecuadorian Airport System: International Cargo (TM)

Airports	Arrivals	Departures	Total
Quito	30296	132614	162910
Guayaquil	15287	22839	38126
Latacunga	785	24932	25717
Esmeraldas	0	1	1
Manta	0	139	139
Total	45582	180525	226893

Source: INEC Annual Statistics

2.3.4. Requested Documents in Customhouse

The most used negotiation terms about commercial activities in the Republic of Ecuador are Free on Board (FOB), Cost, Insurance and Freight (CFI), Cost and Freight (CFR) and in some cases other terms are used such as Ex works. The organism in charge of supervising the legibility of commercial acts is the National Customs Service of Ecuador (SENAE). The Ecuadorian customs establishes a series of requirements for the arrival and departure of merchandise to the Ecuadorian territory. The documents required by the Ecuadorian customhouse are detailed in Table No 17.

Table 17 Requested documents by SENAE

Importation	Exportation
Declaration of Customhouse Exportation (DAE) in ECUAPASS	Declaration Customhouse Importation (DAI) in ECUAPASS
Commercial invoice	Supporting documents
Previous Authorizations (if necessary)	Commercial invoice
Certification of electronic origin (if it is necessary)	Certification of origin (when it is required)
-	SENAE Documentation considered as necessary

Source: SENAE, 2015.

Elaboration: Author

According to Proexport Colombia (10), in the case of sending commercial samples, five commercial bills for under \$200.00 are required.

2.3.5. Access Barriers

Since 2012, the Ecuadorian government along with the change of the productive matrix proposes a series of protective regulations that encourages the sustained growth of the local industry. These barriers are not only centered on the development of the national industry, but also based on these regulations; it is pursued to correct negative values of the non-petroleum commercial balance of the country. In order to reach this objective several restrictions have been established with the objective of encouraging specific products that are made in the Ecuadorian market. The final goal is to protect the local industry to preserve the customers' life. According the digital publication of Proecuador (22-37), the Republic of Ecuador establishes the following barriers in the market:

- a) **Prohibited Importation Products:** They are the ones disposed by the Foreign Commercial Committee (COMEX) in resolution 450¹² (See Annex 23).
- b) **Safe-conduct of payments:** They are extra-charges Ad-valorem; they are special extra-charges for custom duties (additional to the actual duty) and quantitative value restriction capacity. For these regulations 5%, 15%, 25% and 45% rates were applied to 2.800 tariffed items (El Comercio 20015)
- c) **Sanitary Department requisites:** The import process for agriculture products and of animal origin (except the industrialized ones) only can arrive to authorized seaports and airports of AGROCALIDAD. On the other hand, the organism that authorizes products of industrialized origin is the National Hygiene Institute Leopoldo Izquieta Pérez. It is in charge of admitting the sanitary register of human consumer products.
- d) **Technical standards and regulations:** The Ecuadorian Institute of Regularization (INEN) is a State official organism in charge of the ethical standards and to ensure agreement with the support of the Ecuadorian Institute of Accreditation (OAE). In this context, it can be stated that these organisms seek to ensure the quality of the products through these inspections.

¹² The list of products prohibited for importation can be seen in the following link:
<http://www.produccion.gob.ec/wp-content/uploads/downloads/2013/06/resolucion450.pdf>

- e) **Packing and tagging requisites:** Regarding the packing and bottling or wrapping of a product, it is searched that all the technical requisites are filled. Concerning the tagging, INEN establishes several requisites about the tagging of the product. ¹³.
- f) **Commercial Barriers:** outflow tax fee (Ministry of Economy and Competitiveness)

2.3.6. Logistic and internal distribution

The trade and different ways to make business in the Republic of Ecuador is based on a traditional market. Previously, the traditional trade samples which are mostly predominant in the country are the stores in neighborhoods and the large malls. The processes of distribution and logistics in the country have a high average rotation of merchandise. Thus the wholesale distributors design routes with the purpose to supply its customers. (Proecuador B 50)

The great distributors control the trade based on marketing strategies. In order to have advantage over the competition, one of the trade strategies applied in malls is the exclusivity of imported merchandise. Similarly, Proecuador (51) in “*Trade guidebook 2013*” states that the Ecuadorian trade is characterized by being a competitive market. Additionally, the distributors of consume products have developed their logistics structure very well in the highland as well as in the Ecuadorians coast.

There are different types of supplying networks in the country and its creation is due to the type of entrepreneurial constitution. According to Professor Johan Dreher (2-4), among the most important business chains of the country the following examples are highlighted.

- a) **Detailed Manufacturer or Direct Distribution:** It is used by the enterprises with high demanding and perishable products. This type of chain is skipping the distributor link or distribution center. The model is

¹³The tagging requisites can be found in the following link: <http://normaspdf.inen.gob.ec/pdf/nte/1875-3R.pdf>

applied by companies such as Coca-Cola, Mr.Pollo , Pingüino and Bimbo in Ecuador.

- b) **Wholesale-Manufacturer-Distributors or Centralized Distribution:** It let the creation of economy by scales and it is used by high consume enterprises all over the state. This model allows to incorporate its products to traditional canals. In Ecuador, the centralized model of distribution is used by the commercial brands de La Favorita y TIA S.A.
- c) **Planning-Supplying-Transformation-Distribution- Refunding of the product:** This model is applied by enterprises that come from the industrial sector such as NOVOPAN S.A. (Casares&Ubidia 42-44)
- d) **Traditional canal:** This model is used by small business such as neighborhood stores, bakeries, grocery stores, candy stores, etc.

In this new context it can be seen that models and concepts in Ecuador have evolved according to the new requirements of the market, competitiveness and new international practices. The chain success is explained by the rentable, efficient and sustainable strategy through time, and the use of minimal efforts in order to obtain significant benefits.

2.4. Logistics Profile of Peru

2.4.1. General Outlook

2.4.1.1. Geographical Location

The Republic of Peru is situated in the south-occidental part of South America. Among its geographical limits, this country shares borders with Colombia and Ecuador at the North, Chile at the South, Brazil at the East and Bolivia at the south-eastern side. (Proecuador A 1). According to the source *The Cía Factbook* , the geographical coordinates of the Republic of Peru are 10 00 S y 76 00 W. Peru has one of the greatest diversity around the world as well as it is highlighted by the diversity of landscapes such as valleys, high plateaus, mountain ranges, etc. Graph n° 8 details the geographical limits of Peru.

Graph 8 Republic of Peru



Source: Google Maps

2.4.1.2. Area

It is the third country with the largest territorial magnitude in South America after Argentina and Brazil. The Peruvian total area is 1.285.215 Km² and 57,5% is composed by jungle, 31,8% highlands and 10,7% coastal areas. (Prochile 1). In this way, Proecuador (A2) states that the Peruvian territory is made up of a coastal plains, the high Andes, the highlands and the Amazon jungle.

2.4.1.3. Population

According the last census of population and dwelling from the National Institute of Statistics and Computer Science, the total population of Peru is 27.412.157 millions of inhabitants. Considering the previous information, the most important departments according to the concentration of population are Lima, Piura, Cajamarca, Libertad and Puno. (CEPAL 8)

2.4.1.4. Currency /Language

The official circulation currency in the Republic of Peru is the Nuevo Sol (PEN). Regarding its relation with the American Dollar, its value is 3.17 per each dollar, according to the National Central Bank. Because of the Spanish inheritance, Peru similarly to other members of the CAN uses Spanish as the official language. It is spoken by 70% of the population, followed by quechua and aymara. (Proecuador A 3)

2.4.2. Political and Territorial Administration of the State

The territorial administration of the Republic of Peru with Lima as capital. It is divided into 25 provinces or regions. Based on the previous considerations, and being a constitutional Republic, Peruvian constitutional powers are distributed into three organisms: Executive, Legislative and Judicial. (Prochile)

2.4.3. Access conditions to the market destiny in terms of means of transportation

2.4.3.1. Maritime route

The maritime infrastructure of the Republic of Peru to transport merchandise from and to foreign countries is composed by the harbor and fluvial network system. In other words, international trade activities in the Peruvian State are made by maritime and fluvial ways

a) Port system

Nowadays, The Republic of Peru has a harbor infrastructure formed by 11 ports located in the Pacific Ocean. (Proecuador B 4) Regarding their location, CEPAL (23) expresses that maritime ports are located in the Pacific coast (see Annex 18). Table n° 18 the most important maritime harbors and its load numbers are detailed:

Table 18 Port System of Peru: Cargo TM 2012-2015P¹⁴

Ports	District	Type of Load	Province/Region	2012	2013	2014	2015
Salaverry Port Terminal	Salaverry	Solid Granel	La Libertad, Trujillo	0	2.092.547	2.658.400	623.484
Chicama Port Terminal	Razuri	Fraccionated Load	Ascope, Libertad	0	0	0	0
Chimbote Port Terminal	Chimbote	Fraccionated Load	Santa, Región Ancash	0	50.773	0	0
Supe Port Terminal	Supe	General	Barranca, Lima	0	6.173	3.786	1.130
Huacho Port Terminal	Huacho	Fraccionated Load	Huaura, Lima	0	7.255	7.290	2.746
Callao TNM APMT Port Terminal	Central Coast	General, Containers, Granel, Solids, Rolling, Fractionated and other	Callao, Callao	14.712.945	15.286.348	0	0
Callao Zona Sur - DP World Port Terminal	Central Coast	General, Containers, Granel, Solids, Rolling, Fractionated and other	Callao, Callao	14.953.692	13.917.884	0	0
General San Martín Port	Paracas	General and Solid	Pisco, Región Ica	0	1.275.762	1.165.858	0
Ilo Terminal Port	Ilo	Containers	Ilo, Moquegua	0	415.897	435.795	117.504
Paita Terminal Port	Paita	Containers	Paita, Piura	39.032.420	38.809.406	0	0
Matarani Terminal Port	Islay	Granel y Containers	Islay, Arequipa				

Source: National Authority of Seaports & ENAPU
Elaborated by: Author

¹⁴ January to May

It can be highlighted that among the previous observations that the most representative harbor in Peru is El Callao Port. From all existing seaport in this country, “ this port terminal moves 71% of the total maritime load”. (CEPAL 23)

b) Fluvial Network

In Peru, the fluvial transportation of merchandise is transported by Iquitos, Yurimagua and Maldonado Harbors (see Annex 19). The fluvial operations can be done through the following hydro-ways.

- I. **Amazon River:** It goes from the Brazilian border to Iquitos.
- II. **Marañon River:** It is the way that goes through Iquitos to Samiriza.
- III. **Huallaga River:** The union from Marañon river to Yurimaguas river.
- IV. **Ucayali River:** The way that goes from the Pacullpa to the Marañon river intersection.

(CEPAL, 23)

The merchandise transportation of fluvial networks is detailed in the following table n° 19

Table 19 Peruvian Fluvial System: International Load TM 2012-2015¹⁵

Fluvial	2012	2013	2014	2015P	Total
	Volume				
Iquitos Terminal	414.240	413.321	425.874	134.054	1.387.489
Yurimaguas Terminal	100.647	89.348	76.933	46.414	313.342
Maldonado Harbor	1.019	3.049	1.104	219	5.391
	Total				1.706.222

Source: Authority of National Seaports
Elaborated by: Author

2.4.3.2. Terrestrial highways

The logistics operation regarding terrestrial infrastructure in the Republic of Peru is developed in a terrestrial transportation framework. Highways and the railroad network are used for the transportation of merchandise and other services from and toward foreign countries.

¹⁵ Enero a Mayo

a) Terrestrial highway

According to data provided by the Ministry of Transportation and Communication (40), the Peruvian highway network has 130.648,33 Km of longitude (see Annex 20). Its distribution is made around three main axes.

- **National Network:** It has a longitude of 24.092,28 km but 14.122,78 km are paved while 9.969,50 are not paved.
- **Departmental Network:** It has a longitude of 25.171,04 km. 2.127.85 are paved and 23.043,19 are not paved.
- **Neighbored Network:** It has a longitude of 81.385,01. Only 1.509,09 are paved while 79.875,92 are not paved.

As it can be observed, this country owns a wide vial network that can connect different places in the interior as well as abroad the country. When having a wide highway network, the Peruvian state has four vial axes that connect neighbor countries to make trade operations according to CEPAL (17-18). Its main highways are the following ones:

- I. Longitudinal or Panamerican Highway from the Coast (Route 001):** It has a longitude of 2.470 Km. This route links the Ecuadorian and Chilean borders.
- II. Longitudinal Highway from the highlands or Incan ways (Route 003):** It has a longitude of 3580 Km. This route connects the Ecuadorian and Bolivian borders.
- III. Longitudinal Highway (Route 005):** It has around 2.520 km of longitude. This highway connects the Canchis River to the Ecuadorian borders and to the Pardo port / Heath River with Bolivia.
- IV. Transversal Corridors:** It connects with diverse cities of the country.

b) Railroad Network

In Peru, the railroad system has a longitude of 3.462 Km, and it is managed by two granted companies (see Annex 21). On one side, there is the Trans-Andean Railroad Company that operates in the South and South-oriental part of the country. It offers transportation services of loads and people. On the other hand, the company called Central Andean Railroads works in the center of the country. It offers services such as transportation of load at great scales and transportation of mineral products. (Proecuador B 6). The transportation of railroad loads are detailed in table n° 20

Table 20 Railroad System of Peru: Load TM 2010-2013

Volume	2010	2011	2012	2013
Loads (Miles Tones)	8.14	7.91	7.62	7.67
Tone – Kilometer	1.110.50	1.037.61	1.045.24	1.043.82

Source: ENEI

2.4.3.3. Aerial Routes

The Peruvian State has 58 airports with paved landing fields. From the total of airports, the most important is Jorge Chavez Airport, which is located in Callao, Lima (see Annex 22). The reports made by Proecuador B (7) show that the quality of this airport is reflected through the following characteristics.

- a) Facilitates for aerial and maritime loading
- b) It is considered as the main gateway of the country and it is situated between Lima and Callao near the Callao Harbor.
- c) It has connection with other airports of the country.

The load is moved through the airports mentioned in the following table:

Table 21 Airport system of Peru: Load TM 2011-2015P¹⁶

PERU	2011	2012	2013	2014	2015P
	Volume				
Cusco/Velazco Astete	0	0	0	12	1
Iquitos/Coronel Fap Francisco Secada Vignetta		3	3	7	56.995
Lima-Callao/Jorge Chávez	177.783	187.157	196.245	3.827	0
Pucallpa/Capitán Fap David Abensur Rengifo	1	1	0	0	0
TOTAL	177.785	187.161	196.250	3.846	56.996

Source: Community of Andean Countries

2.4.4. Requested Documents in Customs

In trading activities, the most used negotiation terms or INCOTERMS 2010 to establish risk regulations and prices of the customer as well as the seller are Free on Board (FBO) and Cost, Insurance and Freight (CIF) according to the article “Logistic Profile of the Republic of Peru. The institution in charge of watching over the fulfillment of the legal processes in international trade operations in Peru is the National Superintendency of Tax Administration of Peru (SUNAT). The SUNAT establishes a series of requisites for both arrivals and departure of merchandise. The required documents by the Peruvian customhouse are detailed in the following table.

¹⁶ January to May

Table 22 Requested documents by SUNAT

Imports	Exports
Bill of lading	Bill of lading
Order of Freed Load	Origin certification
Origin Certification	Commercial Invoice
Commercial Invoice	Customhouse Declaration of Exportation
Customhouse Declaration of Importation	Packing list
Packing List	Payment Bills in the terminal
Reception of Payment Bills in the terminal	-
Source: Doing Bussines & Proecuador 2015. Elaborated by: Author.	

In case of the products without commercial value, in other words, the products that cannot be destined to be sold in the country, it is necessary to present documents such as “(...) the customhouse declaration, original commercial bill and copy and the informing of shipping”. (Proecuador B 13)

2.4.5. Access Barriers

With the purpose of protecting the National Industry and preserve the customers’ life in the National market, Peru establishes the following access barriers to its market.

- a) **Sanitary Regulations:** The service of Agricultural Sanitary (SENASA) has established a standardized framework that regulates the arrival of any merchandise or animal/vegetable product. The aim is to avoid the spread of plagues that could be harmful for the national production. (Proecuador B 11)

- b) **Packing and tagging requisites:** The products should have the following requisites established by the Peruvian authorities. According to Proecuador B (10) the requisites are the following: the products have to maintain their original tags, names and number of identification of the contributor/importer in the packing cover, sanitary register (in case of medicine) and the container should have the ingredients or composition of the product, origin and additional information of the product.

- c) **Commercial Barriers:** With the aim of protecting the Peruvian National Industry, tariffs measures are applied to the following products: Hackers and Software, automobiles, agro-industrial products, etc. (Ministry of Economy and Competitiveness)

- d) **Tributes and taxes:** Ad Valorem (0, 4, 6, 11%), General tax for selling (IGV 16% based on CIF customhouse), Tax Municipal Promotion (2% based on IGV), Selective Tax to the consume, Specific rights (System of prices), Provisional Corrective Rights Ad Valorem (It can be applied to members of CAN) and Rights Anti-dumping y Compensatory. (Ibid.)

- e) **Subscribed trading agreements:** Global Trading Organization (OMC), Member of the Asia-Pacific Economic Cooperation Forum (APEC), Andean Community, Latin-American Association (ALADI) and bi-lateral agreements with several countries. (Prochile 2)

2.4.6. Internal Logistic and Distribution

The logistic infrastructure of the Republic of Peru shows itself as a solid model in its construction and composition. For this reason, the platform makes the transportation of merchandise through the different modes and means of transportation possible. Thus in 2013, the participation of the transportation sector experimented a real growing rate of 5.8%, becoming in a positive result to all its means of transportation. (Ministry of Transportation 2013 in Marchena, 12). In this context, it can be said that great part of the growing in the transportation zone is due to an efficient administration in the public sector. For all the reasons stated, it is important to highlight that the infrastructure of the country is in excellent condition to receive or send merchandise without any problem and with competitive prices.

The components of the supplying chains of the Peruvian state are formed as explained in the following paragraph according to the development Intern-American Bank- BID (9)

- a) **Traditional chains:** They are composed by the manufacturer, distributor, wholesale and the traditional minor sellers
- b) **Modern Chains:** It is composed by the manufacturers, distributors, modern retailers, and traditional minor sellers.

Similarly, the BID adds that modern chains represent a more attractive option for the buyers, citing Mega Market Northern Olives as an example of an organization which follows the modern format of the supply chains. Proecuador (11) states that there is another chain of less size (minors Chanel) inside the Peruvian market and that is composed by small warehouses such as stores and affirms that internal distribution of the products in the Peruvian market is dynamic and predicts that it will maintain its status for a couple of periods.

CONCLUSIONS

Once the profiles of Bolivia, Colombia, Ecuador and Peru have been analyzed, it can be said that each of them have built a logistic platform in relation to their geographical reality. One of the visible examples is the case of Bolivia because in spite of being catalogued as a state without a coastal part, its international trading development has not been stemmed regarding the maritime part. However, great part of the measured development of the Bolivian economy is due to the lack of action and development of the harbor logistic system and other countries. As a result of that, a raise of prices was obtained from the process of physical distribution internal as well as external.

The Republic of Colombia shows a prodigious potential of growing due to this country having specialized harbors with departures to the coast of the Pacific Ocean and Caribbean Sea. However, Colombia shows drawbacks or lack of action in its logistic infrastructure, especially in the aerial part, which has been disregarded. Its

characteristics allow to say that this nation can stand out as an innate icon not only in the CAN, but as a reference to South America. Nevertheless, it needs to reformulate its politics about competitiveness and modernize the areas of potential growing.

The resources of the Republic of Ecuador permit to develop and evolve a traditional approach to a global logistic system. In this context, it must not only seek to breakdown links related to improve the harbor part efficiently, but also it must have the purpose to encourage the aerial, terrestrial and fluvial transportation.

Finally, the Peruvian infrastructure shows a clear solidity in its development, especially the harbor part. The elements that make part of the logistic profile of the Peruvian State are developed in a proportional way where the maritime way has main representation in load movements.

3. CHAPTER III: COMPARATIVE ANALYSIS OF THE LOGISTIC PERFORMANCE OF ECUADOR AND THE MEMBERS OF THE ANDEAN COMMUNITY OF NATIONS

Both the increase of the commercial flow and the reduction of the trade barriers have promoted policies that encourage States to sell products in foreign markets at competitive prices. Nowadays, competitiveness plays a fundamental part in the elaboration of local policies in order to improve the efficiency and efficacy of operational processes. For this reason, States must consider that a developed infrastructure allows locating a product in a foreign market without setbacks in the process. The present chapter is focused on understanding what encompasses the Logistic Performance Index (LPI) developed by The World Bank. Next, the analysis proceeds to evaluate the logistics infrastructure based on two of six elements of the LPI (Infrastructure and Efficiency of Customs) in order to determine the logistics performance of each member of the Andean Community of Nations. This investigation will be focused on the study of the maritime platform, because it transports larger volumes of cargo than other means of transports. As a consequence, the analysis of air transport and land transport will be excluded

3.1. Logistics Performance Index

3.1.1. Concept

In 2007, the World Bank developed the Logistics Performance Index (LPI) and it is upgraded every two years. The LPI measures the efficiency and the logistics performance of 160 countries. Its application reveals which are the main deficiencies, trade barriers and connectivity issues.

The World Bank (3) states that LPI is strongly associated with the reliability of the supply chain and the reliability of the delivery services. This indicator is a very useful resource to States and private actors, because it allows the discovery of problems and their possible solutions. The goal is to improve the competitiveness of the country's logistics platform.

3.1.1.2. Application

The application of the LPI is based on two areas. The first, according to the World Bank (7), is the international area and it examines six components:

- i. The efficiency of customs and border clearance (“Customs”).
- ii. The quality of trade and transport infrastructure (“Infrastructure”).
- iii. The ease of arranging competitively priced shipments.
- iv. The competence and quality of logistics - services trucking, forwarding, and customs brokerage.
- v. The ability to track and trace consignments (“Tracking and tracing”).
- vi. The frequency with which shipments reach consignees within scheduled or expected delivery times (“Timeliness”).

The second is the domestic area, which is related to information measuring cost, time and operational activities of loading and unloading. (The World Bank 5)

3.2. Components of the international performance index

The comparative study will be focused on analyzing two of six elements of the LPI. These elements are the efficiency of customs, and quality of commerce and transport infrastructure. The previous elements have a greater incidence in the efficiency and efficacy of the management of the supply chain.

3.2.1. Infrastructure Component

The infrastructure component is considered a fundamental factor that makes the commercial interchange from interior to exterior of the country easier. The infrastructure component boosts the economic development of a country, and it is composed of state resources such as seaports, airports and roads. The sum of these state elements allows placement of a national product or service in foreign markets at competitive prices. (Consejo Nacional de Competitividad 2014)

3.2.2. Service Component

The service component is related to the quality and competitiveness of the logistics services. (The World Bank 20) For example, the LPI (20) qualifies and locates the best freight forwarders in this category, and it makes recommendations in order to improve a specific area of the country's logistics platform possible.

3.2.3. Border Procedures and Cost (Efficiency of Customs)

According to The World Bank (20-25), there are the following variables:

- i. Import and export time: In imports, a control measure of logistics performance is the time used to complete commercial transactions. However, it is not only focused on the time indicator as a competitiveness factor, but also in measuring the efficiency in border procedures. For that reason, the World Bank (21) states that the relationship between distance and time of delivery are important because it determines the capacity of connection between countries. In the case of exports, the procedure is faster because the export periods are shorter. In contrast to the developed countries, the export procedures are less competitive and hard to commercialize in less developed countries.
- ii. Documentation: Developed countries use two documents for operations of foreign trade. In contrast, a less developed country needs up to four documents. As a consequence, the number of requirements is a type of trade barrier that hampers the free flow of merchandise.

3.2.4. Components of Delay, Reliability, and Service Delivery

These elements have an influence on supply chain performance. On the one hand, there are internal factors such as infrastructure, services, and border clearance that can be improved through a decision-making process. On the other, there are external factors that affect the performance of a company. The World Bank (25-26) details a possible list of delays such as informal payments (corruption), compulsory warehousing, theft, preshipment inspection and maritime transshipment.

3.3. Comparative analysis of logistics performance between Ecuador and Andean Community of Nations (ACN)

The last chapter analyzed the components of the logistics profile of each member of the ACN. For academic reasons, it has taken as a references point the main figures - number of load, km, number of documents, etc. - of ports, airports, roads and customs. The sum of these elements allows making a comparative analysis of the logistics platform of each member of the Andean bloc. However, the academic research will be focused on examining the port infrastructure due to the following information:

- i. Although Bolivia does not have access to the sea, Bolivia makes commercial operations through Chilean ports. In Bolivia, the maritime operations represent 25,25% and by-land transport represents 56,52% of participation. (Instituto Nacional de Estadística)
- ii. In the Colombian State, commercial operations are made through maritime zones with a participation of 82,30%.
- iii. In the Republic of Ecuador, maritime transport dominates over other means of transport with 99,56%.
- iv. In Peru, maritime transport represents 75% of international movement of cargo.

Based on the above considerations, this study will be focused on the analysis of maritime infrastructure. The maritime infrastructure represents 70% of the average movement of cargo in the different ports that belong to the Andean Community of Nations. Bolivia is the exception due to it being a landlocked country, but it has a maritime movement of cargo through to Chilean ports.

3.3.1. Logistics Infrastructure of members of the Andean Community of Nations

The analysis of the World Bank about Logistics Performance Index places the countries of the Andean Block in an intermediate position in relation to 160 participant countries. In this context, the competitive position of each country

member is the result of applying local policies in order to improve the competitiveness profile and global connection of the State. Table n° 23 shows the real position of the countries of CAN with regard to logistics performance.

Table 23 Andean Community of Nations: Logistics Performance Index 2014

Position	Country	LPI	Result	Logistics Performance
1	Peru	78	2,84	59,00%
2	Ecuador	86	2,71	54,80%
3	Colombia	97	2,64	52,50%
4	Bolivia	121	2,48	47,40%

Source: The World Bank
Elaborated by: Author

Table n° 23 describes the following considerations:

- Peru is located in the first place with a qualification of 2,84 out of 5 points. The score is related to the real situation of the logistics infrastructure, services and inter alia. Peru has a great logistics performance in its operational processes in relation to the rest of the country members of ACN.
- According to the result of The World Bank, Ecuador is located in the second position in the Andean Block. The success of Ecuador resides in the state policies established by politicians with the objective of improving its infrastructure. However, the position of the Colombian State is near that of Ecuador.
- Though Colombia has both resources and infrastructure to become an innate leader of the block, Colombia is located in the third position.
- Although Bolivia is a landlocked country, its development is representative. For that reason, Bolivia has sought alternative plans of development, economic growth and global connectivity. At the global level, Bolivia is situated above countries from Asia and Africa.

The qualification of the Logistics Performance Index (2014) is general and establishes a rank amongst countries of the Andean Community. Hence, it is necessary to make a depth analysis based on elements that allows checking the data

published by The World Bank. The analyzed components are port infrastructure and efficiency of customs.

a) Port Infrastructure

Ports are the link between an origin market and a destiny market. According to its level of development, its contribution could be positive or negative for the state economy. On the one hand, in positive terms, its contribution would generate a successful inclusion of the country in international markets, and it would stimulate the national economy, promoting a sustainable economy. On the other, it can be useless if it has a maritime infrastructure that operates at half capacity. The consequences would be disastrous for the nation due to the multilateral relationships that would be limited or null. Instead of representing income for the country, the structure would generate expenses in order to preserve an unprofitable logistics platform. Table n° 24 shows information about elements of the Andean Community's ports based on official sources.

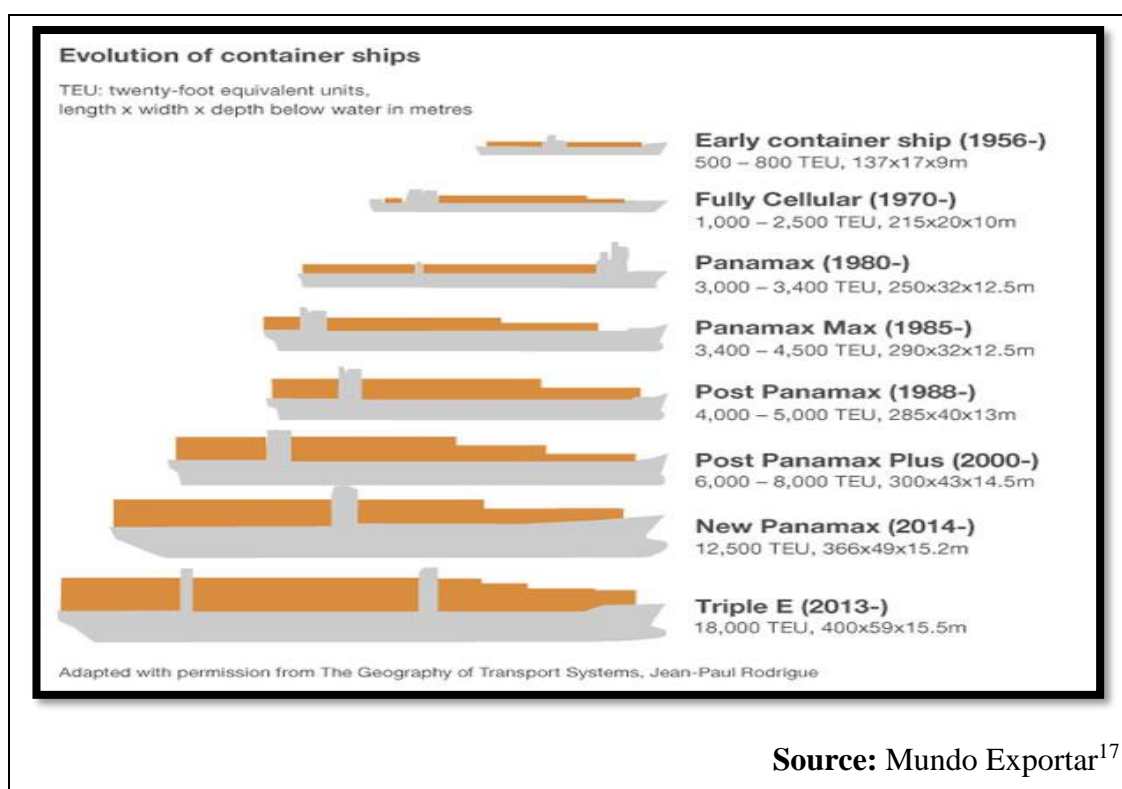
Table 24 Andean Community of Nations: Port Infraestructure

Characteristics	Bolivia				Colombia						Ecuador						Peru						
	Arica		Antofagasta		Buenaventura		Cartagena		Barranquilla		Puerto Guayaquil		Puerto Bolívar		Puerto Manta		Puerto Paita		Puerto Callao		Puerto Salaverry		
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Draft (m)	8,20	12,50	7,90	12,00	7,62	9,45	5,79	13,10	9,75		9,75		12,50		6,50	11,50	13		10	12,5	10		
Future projection of enlargement draft (m)	No Registra		16,00		15,00		No registra		No registra		16,00						No registra		16		12		
Berth or Pier (u)	5,00		7,00		4,00		7,00		6,00		9,00		4,00		3,00		4		18		4		
General Load	-	-	-	-	-	-	-	-	-	-	5,00	-	2,00	-	2,00	-	-	-	-	-	-	-	
Pier to grain and multipurpose ships	-	-	-	-	-	-	-	-	-	-	1,00	-	2,00	-	-	-	-	-	-	-	-	-	
Pier to container ships	-	-	-	-	-	-	-	-	-	-	3,00	-	-	-	-	-	-	-	-	-	-	-	
Pier of Breakwater	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pier of Cabotage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pier of Services	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,00	-	-	-	-	-	-	-	
Length of the Pier (m)	-	-	180,00	210,00	101,00	1.254,00	130,00	270,00	357,00	701,00	-	-	-	-	-	-	-	-	-	-	-	-	
Cranes (u)	2,00		3,00		23,00		6,00		3,00		31,00		N/D	N/D	1,00		2		10		24		1
Yard Granty Crane	-	-	-	-	4,00	-	-	-	1,00	-	-	-	N/D	N/D	-	-	-	-	6	14	1	-	
Land Crane	-	-	-	-	3,00	-	-	-	2,00	-	-	-	-	-	-	-	-	-	-	-	-	-	
Superpost-Panamax Twin 20' Crane	-	-	-	-	-	-	2	-	-	-	23,00	-	N/D	N/D	-	-	-	-	4	4	-	-	
Post Panamax Crane	-	-	-	-	-	-	2	-	-	-	5,00	-	N/D	N/D	-	-	-	-	-	4	-	-	
Panamax Crane	-	-	-	-	-	-	-	-	-	-	3,00	-	N/D	N/D	-	-	-	-	-	-	2	-	
Mobile Crane	-	-	-	-	-	-	2	-	-	-	-	-	N/D	N/D	-	-	-	-	-	-	-	-	
RTG Crane	-	-	-	-	16,00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Cranes with capacity of 100 Tons	-	-	-	-	-	-	-	2	-	-	-	-	N/D	N/D	-	-	-	-	-	-	-	-	
Cranes with capacity of 124 Tons	-	-	-	-	-	-	-	2	-	-	-	-	N/D	N/D	-	-	-	-	-	-	-	-	
Áreas de Respaldo																							
Storage Area of Cargo (m2)	170.000,00		59.600,00		68432		30765		27900		145.348,00		163.554,00		110.000,00		25000		264.743		40320		
Certifications	ISO 14001		ISO 14001		Certification BASC		Certification BASC		N/D		ISO 9001		ISO 9001		BASC		BASC		BASC		ISPS		
	Monitoring of the air quality		-		Certification PBIP		Certification ISPS		N/D		ISO 14.001		ISO 14.001		ISPS		ISO 14.001		ISO 14.001		-		
	Quality of the Sea Water and Sediments		-		-		ISO 9001		N/D		ISO 18.001		ISO 18.001		-		ISO 9.001		ISO 9.001		-		
	-		-		-		ISO 14001		N/D		ISO 28.000		ISO 28.000		-		OHSAS 18.000		OHSAS 18.000		-		
	-		-		-		OHSAS 18000		N/D		ISPS		-		-		-		-		-		
	-		-		-		-		-		BASC		-		-		-		-		-		
-		-		-		-		-		-		Ecuadorian Certificate Punto Verde		-		-		-		-			

Elaborated by: Author

At global level, different economies compete to offer port services of the best quality and they seek to appear more efficient than other States. The main factors that have contributed to port development are the increase of commercial flow through globalization, constant evolution of container ships, continuous improvement of port operations, and the wish to obtain high results of competitiveness in relation to other ports. The load movement is possible thanks to the constant evolution of container ships due to the load volumes. Graph n° 9 details the evolution of freighters up to 2013.

Graph 9 Evolution of container ships



In this context, graphic n°9 and table n°24 allow one to conclude that the port system development of the Andean block is gradual in comparison with developed countries. However, the Andean Community of Nations does not have an appropriate structure to receive in its installations port vessels such as Post Panamax, New Panamax and Triple E. The ports of the Andean block have limitations of capacity, particularly in the deep draft (13 meters) and the width of the Panama Canal. The abbreviation TEU means Twenty-foot Equivalent Unit.

¹⁷ <http://mundoexportar.com/transporte-maritimo/>

The state policies about development must be centered on the continuous improvement of the whole instead of a specific area. Economic prosperity entails a sum of various elements, the most important being the logistics platform. The logistics performance of a modern platform will be completely superior to others. For example, with renewed maritime zones, the ports will have the capacity to receive big vessels in their installations. As a result, the cost of distribution will be minor due to the use of scale economics.

The capacity to receive container ships depends on conditions of installations and the structure of each country member of Andean block. To illustrate the preceding information, take as references the transportation of a container from Livorno Port, Italy to the ports of the ACN and vice versa. The information is detailed in table n° 25 and the terms used are the following:

- a) BL or Bill of Lading.
- b) THC or Terminal Handling Charge.
- c) BRS or Bunker Recovery Surcharge.

Table 25 International Freight: Cost USD

Italia/Livorno			
To Pacific Ports of the Andean Community of Nations			
Cargo with Shipload			
Container		20'	40' & 40'HC
Basic Tariff		1.500	1.600
<u>Surcharges</u>		320,58	400,58
BL	30		30
THC	210,58		210,58
BRS	80		160
Total (USD)		1820,58	2000,58

Source: PROCOLOMBIA, 2015
Elaborated by: Author

Based on the above considerations, it can be said that the price of transporting a container of 20' is \$1.280, 58 and a container of 40' (HC) is \$2.000,58. According to table n° 24, the port installations of Bolivia (Chilean Ports), Colombia, Ecuador and

Peru are capable of receiving container ships such as Panamax. Therefore, the transportation cost - assuming that the ships are at maximum capacity - according to table n° 26 will be:

Table 26 Total Cost: Containers Movement TEU-USD

Container Ships	TEU	
	Quantity of containers	USD
Early Container Ship	800,00	1.456.464,00
Cellular	2.500,00	4.551.450,00
Panamax	3.400,00	6.189.972,00

Elaborated by: Author

In the above table, the total transportation cost is 1,456.464 and 6,189.972 depending on the type of vessel. Nonetheless, the above result applies to vessels with shipload and a limiting factor that impedes the arrival of big ships to the ACN is the depth of the draft.

The fixed costs have direct repercussions when a ship arrives with half of its load capacity. The fixed costs do not decrease, but rather the costs are divided by the total number of containers transported on the ship. The result of this operation is negative due to the fixed costs affecting the final price of the transported goods, and the products are uncompetitive in the destination market. To evidence the effects of the fixed costs, we compare them in the following table:

Table 27 International Freight: Container Cost USD

International Freight		
TEU	Cellular	Panamax
	USD	USD
CAPACITY 100%	4.551.450,00	6.189.972,00
CAPACITY 29 AND 40% (1000)	1.820.580,00	1.820.580,00
DIFFERENCE USD	2.730.870,00	4.369.392,00
ADJUSTMENT TO THE CONTAINER WHEN THE SHIP IS LESS THAN 100%	2.730,87	4.369,39
VALOR DEL CONTENEDOR	1820,58	2.000,58
ADJUSTMENT+CONTAINER	4.551,45	6.189,97
TOTAL	2.730.870,00	4.369.390,00

Elaborated by: Author

The previous table demonstrates that the cost of transporting a container rises considerably. Transporting a container of 20 feet that cost \$1,820.58 now costs \$4,551.45 and a container of 40 High Cube cost \$2,000.58 now costs \$6,819.97. Definitely, this increment will affect the price of the product in the target market of any country member of the Andean Community of Nations. Thus, it is necessary to analyze and evaluate the current situation of the ports with logistics elements.

3.3.1.1. Analysis Indicators for Port Platforms of the ACN

The port installations of ACN have different capacities. The chosen indicators to compare the maritime ports are based on similar elements. According to the digital paper of the CEPAL about “Productivity Indicators for the Port Industry. Implementation in Latin-American and the Caribbean”, there are the following indicators:

- i. Draft: It allows analyzing the relation between the distribution costs and the capacity of cargo of the vessel. The container ships have technical regulations as maximum depth of the draft and the referential draft in the ports of the ACN is 12,50 meters. Panamax vessels can arrive at Andean ports, but with

limited capacity. The fixed costs are distributed to the total number of containers.

- ii. Berth or Piers: They facilitate the loading and unloading of merchandise. The efficiency of the pier depends on the equipment (cranes) and port installations (storage area of cargo). The pier productivity is measured by dividing the total tonnage by the total number of piers.
- iii. Equipment: The equipment is focused on loading and unloading of merchandise, as well as making the container traffic easier in order to improve the transit of vessels. The number of containers is used as a measure to calculate the crane's productivity (22 movements), in other words, it is the quantity of transferred load in a time unit (hour).
- iv. Storage Area of Cargo: The storage area of cargo makes temporary storage of merchandise easier in case of reshipment or final dispatch. The measure used in this indicator is TEU, because it makes it possible to group them per hectare. Nonetheless, the storage areas of the ACN are built in m^2 instead of m^3 , which makes it difficult to determine the maximum capacity of storage of each one.
- v. Certifications: The certifications guarantee the performance of certain international requirements in the operations of the port. The port certifications are focused on the following areas: Environmental Management System, International Ship and Port Facility Security Code (ISPS), Quality Management System, Business Alliance for Security Commerce Certification (BASC) and inter alia. This indicator evaluates the number of obtained certificates by the port installations.

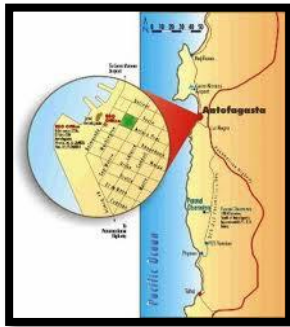
Now that the pattern is defined, we proceed to make the quantitative analysis to determine the performance of each variable in the port infrastructure. With the result of the indicators, we proceed to make an average calculation of the sum of all indicators in order to establish an infrastructure ranking in the Andean Community of Nations. Table n° 28 expresses the performance of each indicator in percentage terms, containers (TEUS), time (hour), area (m^2), etc.

Table 28 Andean Community of Nations: Comparative Analysis in Port Infrastructure

Country	Draft (m)			Berth and Pier (TEU)						Equipment: # Cranes (Hours)						Storage Areas m2	Certifications (u)	
	13	12	10	4	5	6	7	9	18	1	2	3	6	23	31			34
Bolivia	65,38%			328,57						36,11						76533,33	42,86	
Port of Arica (Chile)		100%			500,00						56,82						170.000,00	3
Port of Antofagasta (Chile)	96,15%		0%				485,71					51,52					59.600,00	
Colombia	82,56%			509,13						22,86						42365,67	71,43	
Port of Buenaventura			72,69%	625,00										4,94			68.432,00	5
Port of Cartagena	100%						485,71						25,76				30.765,00	
Port of Barranquilla			75,00%			416,67						37,88					27.900,00	
Ecuador	86,54%			514,81						90,62						139664	100	
Puert of Libertador Bolívar (GYE)			75,00%					277,78							3,67		145.438,00	7
Bolívar Port	96,15%			850,00						154,55							163.554,00	
Manta Port		88,46%				416,67				113,64							110.000,00	
Perú	98,72%			624,07						65,15						110021	57,14	
Port of Paita	100%			850,00							77,27						25.000,00	4
Port of El Callao		96,15%						188,89							4,55		264.743,00	
Port of Salaverry			100%	833,33						113,64							40.320,00	

Elaborated by: Author

The analysis of table n° 28 allows diagnosing the ports with growth potential in each country of the Andean region. The ports are the following:



Port of Antofagasta (Chile): Since the treaty of “Peace and Friendship” signed in 1904, Bolivia can use Chilean ports to carry out commercial operations. The strength of this port is the reception capacity of fully cellular vessels, and it has an increase average of container unloads.

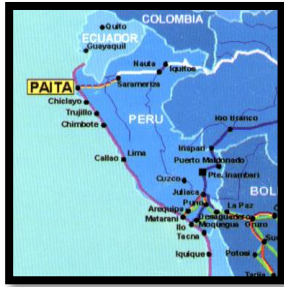


Port of Cartagena: It is located in the Caribbean Sea. The Colombian port can receive Panamax ships. The strength of this port is in various elements such as draft, equipment, berth zones and storage zones. It has international certification with the object to guarantee the performance of the maritime operations.



Puerto Bolívar: It is located in the southern zone of the country, and it is one of the three principal ports in the Republic of Ecuador. However, logistics operators do not use Puerto Bolívar for international distribution process. Its draft allows receiving Panamax ships in its port installation, which would reduce the operating costs in the logistics process. Most of the international load is mobilized through the Port of Guayaquil whose platform has structural limitations (shallow draft). As a consequence of this, the merchandise is more expensive in the target market. The Puerto of Guayaquil will be inoperable at any moment due to the constant evolution of container ships. Based on the above considerations, the idea of constructing a deep-water port in the city of Posorja, Guayaquil arises. The new port would have the capacity to receive Plus Post Panamax ships, because this infrastructure would have a draft of 16 meters. Moreover, it would allow development of the intermodalism with plans such as

construction of a highway corridor and an intercontinental airport on Daular. (Fun-sang 2011)



Puerto Paita: Is located on the north coast of the Republic of Peru, and it has a deep draft that makes it possible to receive Panamax ships. Though it has a powerful infrastructure, all resources and equipment are concentrated in the port of El Callao. This maritime port is considered a national emblem.

The trade liberalization and potential markets stimulate the process of international trading contracts amongst different countries. For that reason, each State seeks to optimize its operational process with the objective of becoming competitive with others. The variables were analyzed in table n° 28, and these variables are the base used to elaborate a qualifying criterion amongst the port platforms of the ACN. The valuation method is a simple mathematic calculation based on a proportional relationship in order to get a qualification of five points. For example, to obtain the score of the draft we must round up the obtained results in table n° 28.

$$\left(\frac{100 * 5}{100} \right)$$

In the case of piers, the loading and unloading of 625 containers are used as a reference for the referential calculation. In the case of the equipment (cranes per hour), the process is a little longer because to measure the efficiency we divide the number of base hours by the worked hours and the percentage result. Both for storage area to the certification, the qualification will be the superiors immediate as referential figure. Table n° 29 expresses the final result of the competitive position of each member of the Andean Community of Nations.

Table 29 ACN: Ranking based on the proportional relationship of the qualification of port infrastructure

Country	Qualification					Total
	Draft	Pier	Equipment	Storage Areas	Certifications	
Peru	4,94	4,80	1,81	3,93	2,81	4,57
Ecuador	4,33	3,96	1,26	4,99	3,56	4,53
Colombia	4,13	3,92	5,00	1,51	1,08	3,91
Bolivia	3,27	2,53	3,18	2,73	1,95	3,42

Elaborated by: Author

Based on the above considerations, the competitive position of port infrastructure of ACN is the following:

1. The Republic of Peru is the natural leader of the Andean block. It has a solid and modern infrastructure which is evidenced in the score of its indicators. Peru has invested in the development of its port and it has a complete incorporation in the logistics area. In the interview made in Quito to Victor Salazar, in charge of diplomatic business of Peru embassy, expresses that logistics deficiencies have reduced gradually. For example, The Port El Callao had a series of deficiencies that were solved by ProInversión - a Peruvian entity that analyzes potential areas to invest - through foreign concessions in order to improve the port development. The goal reflects a reduction of costs, time, automation of processes as well as modernization of other maritime ports. Another plan is identifying a secondary port related to El Callao to encourage an equitable development in the ports of Peru.
2. The policies related to the modernization of Ecuador's infrastructure are outstanding. As a result, the Republic of Ecuador ranked second in the Andean block. Ecuador has the same capacities to receive Panamax ships as Peru, but the logistics performances in its operations are slightly inferior to the group leader. The Republic of Ecuador has the largest numbers of piers, equipment and wide storage areas of load. The policies applied in the production model are positive, as evidenced in the results published by the World Bank, due to improvement in the country's infrastructure.

3. While the infrastructure and logistics performance are very similar to Ecuador, the Republic of Colombia is a few positions below the Ecuadorian state. This State has the same capacity as its fellow members of the Andean block to receive Panamax ships. Its installations such as piers, storage areas of load, and certifications are slightly lower than Ecuador and Peru; however, this does not mean that they are inefficient in their port operations. In recent years, Colombia has started to work on port zones in Santa Marta, Cartagena and Barranquilla (Caribbean and Atlantic Sea) in order to receive large vessels once the extension of the Panama Canal is finished. (El Tiempo)
4. The Chilean installations have supported the port operations of Bolivia. Nonetheless, the improvement of Chilean ports depends on Chile, and the Bolivian state has no power. In an interview made to Dr. Gustavo García, General Secretary of the Tribunal of ACN, he expresses that limited development of the logistics in Bolivia is related to being landlocked and when a country does not have that possibility, it cannot build its own maritime infrastructure. The repercussions are negative in export products because if a country does not have an easy and sovereign access to the maritime transportation, as a result, it will generate high costs of dealing and elevate time without the possibility of improving. Although Bolivia uses foreign maritime installations, its use is limited, and it does not have the possibility to invest in it. The Bolivian state does not want to invest because the treaty of occupation of the maritime installations can be terminated at any moment, and it is possible that it would lose its investment. A positive point of using foreign structures is related to Know-How, that is to say, the process of learning that Bolivia obtains regarding port administration.

d) Efficiency of Customs

The mobilization and competitiveness of goods and services depend on the level of efficiency in each customs organization in the Andean Community of Nations. It is useless for the merchandise to arrive on time, if the merchandise is slow coming out of the customs area. This lapse (transit time) represents costs to users. The customs organizations of the Andean block area are:

- i. National Customs of Bolivia.
- ii. Directorate of National Taxes and Customs of Colombia (DIAN).
- iii. National Customs Services of Ecuador (SENAE).
- iv. National Superintendency of Tax Administration of Peru (DIAN).

The customs organizations ensure compliance with certain requirements for import and export processes. These requirements are the result of an effort to verify the legality of the import and export process. Chapter II “Logistics Profiles of Andean Community of Nations” provides information about the number of legal requirements to import or export goods. Furthermore, it takes as reference information from the Doing Business indicator “Trading Across Borders” by The World Bank. Table n° 30 shows the following information about customs of ACN:

Table 30 Efficiency in Customs

Exports				
Country	Documents	Cost (USD)	Time (Hours)	Days
Bolivia	7	25,00	192	8
Colombia	4	90,00	60	2,5
Ecuador	5	140,00	96	4
Peru	6	80,00	72	3

Imports				
Country	Documents	Cost (USD)	Time (Hours)	Days
Bolivia	7	30,00	96	4
Colombia	6	50,00	64	2,67
Ecuador	4	75,00	120	5
Peru	7	80,00	72	3

Source: Doing Business

Elaborated by: Author

To analyze the time variable, the same method as equipment area is used - it divides the number of base hours by total hours of all document processes - in order to obtain a percentage result. Finally, the percentage result is calculated at five points. In the same way, the documental process - whose referential value is \$25.00 - uses the same method as time variable. Finally, the two results are averaged to get the final qualification. Table n° 31 expresses the final result of each custom of ACN.

Table 31 ACN: Ranking of efficiency in Customs

Country	Qualification	Qualification	Total
	Time	Cost (USD)	
Colombia	5,00	5,00	5,00
Peru	4,33	2,12	3,22
Ecuador	2,89	1,67	2,28
Bolivia	2,17	1,25	1,71

Elaborated by: Author

Based on the above considerations, the ranking of efficiency in customs is the following:

- i. DIAN: The customs of Colombia completes the export process in 2.50 days and imports in 2.67 days, which demonstrates speed in its customs operations. The DIAN manages average costs in the processes, and it has a great score compared other members of the ACN.
- ii. SUNAT: The SUNAT carries out documental operations in three days, both import and export, and it has the same customs cost. The final result places it in the second position.
- iii. SENA: The customs of Ecuador completes operational processes between three and four days. Furthermore, it has the highest costs of customs operations of Andean bloc. The final result placed Ecuador in the third place.
- iv. NATIONAL CUSTOMS OF BOLIVIA: This organism takes eight days to export and four days to import. It reflects a clear deficiency in the customs administration.

e) Comparison with Logistics Performance Index 2014

The previous analysis about infrastructure and efficiency in customs are the basis used to compare and contrast the data published by The World Bank through the Logistic Performance Index. Table n° 32 expresses the comparative data between LPI and the information analyzed by the author.

Table 32 LPI: Infrastructure and efficiency of Customs

Country	Infrastructure		Country	Customs		
	LPI The World Bank	Author		LPI The World Bank	Author	
Peru	2,72	4,57	Colombia	2,59	Colombia	5,00
Ecuador	2,5	4,53	Ecuador	2,49	Perú	3,22
Colombia	2,44	3,91	Perú	2,47	Ecuador	2,28
Bolivia	2,17	3,42	Bolivia	2,40	Bolivia	1,71

Elaborated by: Author

On the one hand, table n° 32 demonstrates that the author's analysis is similar to the data of The World Bank. That is to say, the categorization of the Andean infrastructures coincides with calculations of the author. Although the calculations of the author are proportionally higher, the logistics performance index reflects the same positions of state members of the Andean Community of Nations. On the other, there are little differences in customs efficiency, particularly between Ecuador and Peru, which could conform to current situations. For example, Ecuador demonstrates efficiency in electronic processes through the ECUAPASS system with the objective to speed up the customs operations; in contrast, Peru has a solid system. Peru has merged organizations (Customs and Taxation System) in order to reduce setbacks. In summary, it can be emphasized that there are slight differences, but these make big differences in the customs process.

3.3.2. Strengths and Weakness of the Infrastructure of Ecuador

The strengths and weakness of logistics platform of Ecuador, according to collected information in previous chapters, can be defined in graphic n° 10.

Graphic 10 Republic of Ecuador: Strengths and Weakness

Strengths	Weakness
<ul style="list-style-type: none">•Certification in process of port operations.•Modern equipment and cranes in ports.•Modernization in international airport of Ecuador.•Road Infrastructure: construction and maintenance of roads.•Automation in customs processes.	<ul style="list-style-type: none">•The railway infrastructure is used for tourism.•Underutilization of ports.•It has not developed multimodal transport in Ecuador

Elaborated by: Author

CONCLUSION

Chapter III shows the direct relationship between logistics infrastructure and country competitiveness. On the one hand, if a logistics platform is inadequate to handle big shipments, the costs will be too high for final products in any foreign market. On the other, the development of logistics platforms in the Andean Community of Nations has been gradual. This development belongs to the reality of the member countries, and the current situation is impossible to improve. In the case of the Bolivian state, its development depends on third-party countries in order to project into the future.

A great weakness of the infrastructures of the Andean bloc is focusing all resources on a geographic point. In the beginning, it could be very useful because it improves the efficiency of a port, but only at the local level. As a result, the infrastructure becomes stronger and more efficient. Although it boosts the efficiency of the port, the concentration of resources in a single port has negative effects, such as underutilization of other seaports.

The efficiency in customs shows a similar reality according to the analyzed data together with the information of the World Bank. The different authorities of the

Andean block show a clear effort to improve customs administration. The logistics platform requires the support of a solid and efficient organism that guarantees fulfillment of international operations. In other words, the logistics competitiveness is not only focused on a single axis, but rather it must strive for an equal development of all its elements.

GENERAL CONCLUSION

Logistics is a science which is in constant evolution and its priority is to locate a product at the moment, place and time agreed. It is an area that requires the participation of both private and public actors in order to establish policies that benefit them. The supply chain management allows the logistics operators to identify who the principal actors are in a process of physical distribution and the level of development of the country's infrastructure. The objective of the logistics is to create strategies to place national products in international markets at competitive prices.

The administration of logistics allows the users to know which are the strength and weakness of a country's infrastructure. Besides, it allows boosting continuous improvement plans for each area of the logistics platform. The Andean Community of Nations has similar logistics platforms but with little difference in the process. Each member of the Andean block has given priority to improve a particular area of its structure. For example, Peru has prioritized improving its seaports instead of airport platforms. Furthermore, it is necessary to find a breakeven point in the country's economy in order to distribute the resources equally to all areas besides creating a solid structure that can compete with other seaports.

The comparative analysis shows structural differences amongst the members of Andean bloc. In some cases the progress of the logistics profile is undeniable, but in other cases the decision-making depends on third countries. In the case of Bolivia, the port regulations regarding infrastructure depend on Peru and Chile.

The evolution of trade and container ships have influenced in the development of the logistics profile of a country. If the previous elements are not taken into account, the results may be negative for the nation. The Republic of Ecuador executes more than

80% of its operation of foreign trade through Port Libertador Bolívar of Guayaquil. On the one hand, the characteristic of this seaport makes the port operations are expensive and limit the entry of large ships. On the other hand, Maricruz Fung-sang (6) in her thesis “Feasibility and Pressing Necessity of a Deepwater Port to Guayaquil” states that the Port of Guayaquil will be inoperable in the next 20 years due to the tendency to build large vessels with drafts superior to ten meters. In this context, the port stagnation entails negative consequences to the nation and the urgency to construct a Deepwater Port in the city of Posorja.

The comparative analysis between the author and the data of Logistics Performances Index reflects the same competitive reality amongst these countries. However, the bibliographical and field research shows that the Andean block concentrates all growth potential in a specific area. For example, Ecuador and Peru centralize all efforts in the port installations of Guayaquil and El Callao. The result to invest in these two installations has counteracting effects. Though the port is a synonym of efficiency, other infrastructures are neglected. As a consequence, it generates the underutilization of port terminals, and it diminishes the logistics performance.

RECOMMENDATIONS

Based on the previous analysis in Chapter III, it recommends the country members of the Andean Community of Nations to evaluate according to the current situations: vessels, aircrafts and inter alia, and to the logistics platform in order to establish improvement plans based on the new tendencies.

The centralization of the seaport operations is another important factor due to the limited the competitive capacity of the State. It is recommended to evaluate the situation of each port in order to boost and compensate its disuse. In the case of Ecuador, if the Posorja project is not carried out, it is necessary to start to use the rest of port infrastructures with the object of speeding up the transit time. Moreover, it is necessary to encourage the uses of other platforms through marketing campaigns that show the benefits of using Port Bolivar and Port of Manta. The efficiency of ports affects the import costs from fixed costs and as a consequence the development of the country.

Finally, in the case of subsequent studies it is necessary that the institutions that manage the information related to the research topic are of free access. For example, in Ecuador the information is confidential and inaccessible. In the same way, it is recommended for the Andean Community of Nations to create its own indicator of evaluation and related to international level with constant monitoring and evolution through time.

ANNEXES

Annex 1

Chilean and Peruvian ports used by Bolivia



Fuente: Gestión¹⁸

Annex 2

Atlantic ports used by Bolivia



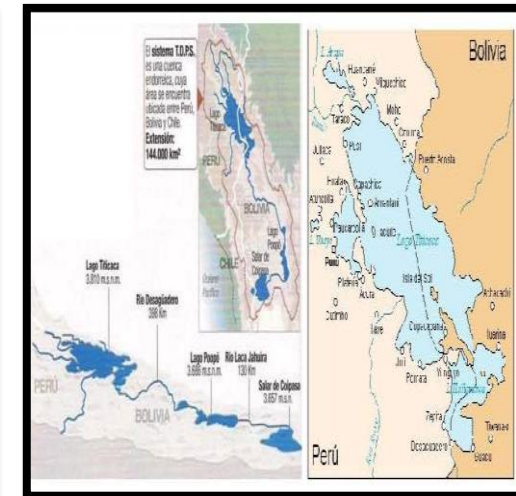
Source: Sociedad¹⁹

¹⁸ <http://gestion.pe/politica/bolivia-busca-exportar-asia-puertos-ilo-y-matarani-2059115>

¹⁹ http://www.eldiario.net/noticias/2015/2015_04/nt150419/sociedad.php?n=56&-hidrovia-una-alternativa-de-salida-al-atlantico

Anexo 3

Plurinational State of Bolivia: Fluvial Network



Fuente: *Varios Autores*²⁰

²⁰ http://www.herencia.org.bo/index.php?q=amazonia_boliviana/criterios; <http://coalicionalregional.net/funcionario-brasileno-pide-retomar-el-acuerdo-de-la-hidrovia-paraguay-parana/>; <http://granadablogs.com/gr-arquitectos/2010/05/06/lago-titicaca-un-lugar-magico-i/>.

Annex 4

Road System of Bolivia



Fuente: *Vías Bolivia*²¹

Anexo 5

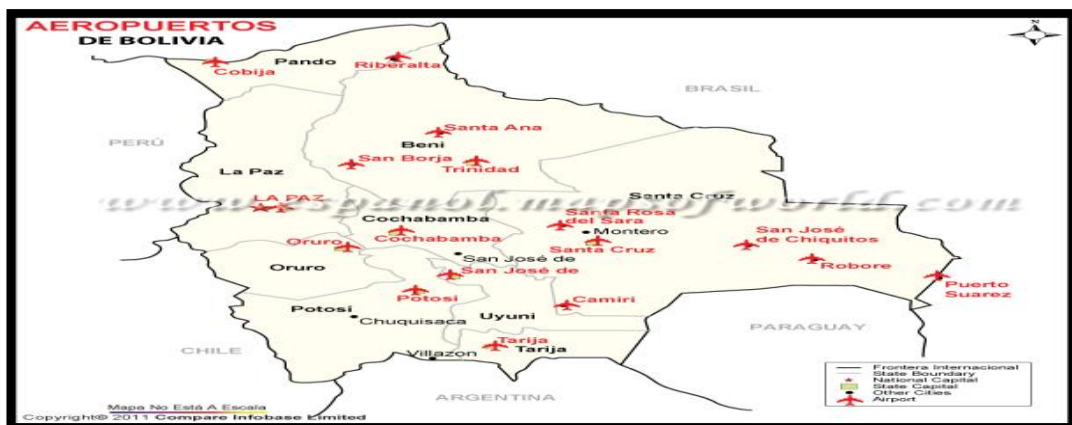
Plurinational State of Bolivia



Source: CEPAL²²

Anexo 6

International Airports of Bolivia



Source: Mapas del Mundo²³

²¹ <http://www.viasbolivia.gob.bo/viasbolivia/images/Mapas/maparetenesw.jpg>

²² http://www.cepal.org/perfil/noticias/noticias/7/29957/Caso_Bolivia.pdf

²³ <http://espanol.mapsofworld.com/continents/sur-america/bolivia/aeropuertos-de-bolivia.html>

Annex 7

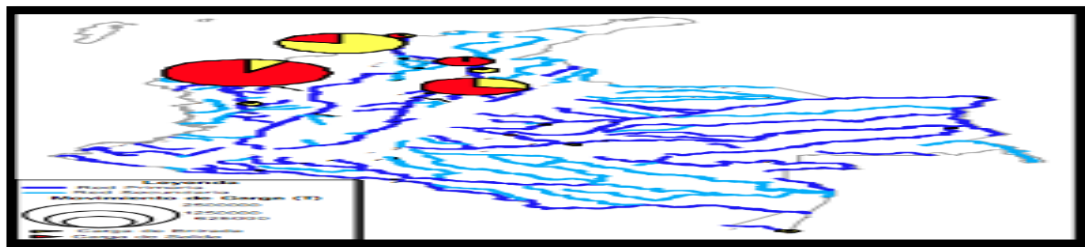
Colombia: Main Ports



Source: *Legiscomex*²⁴

Annex 8

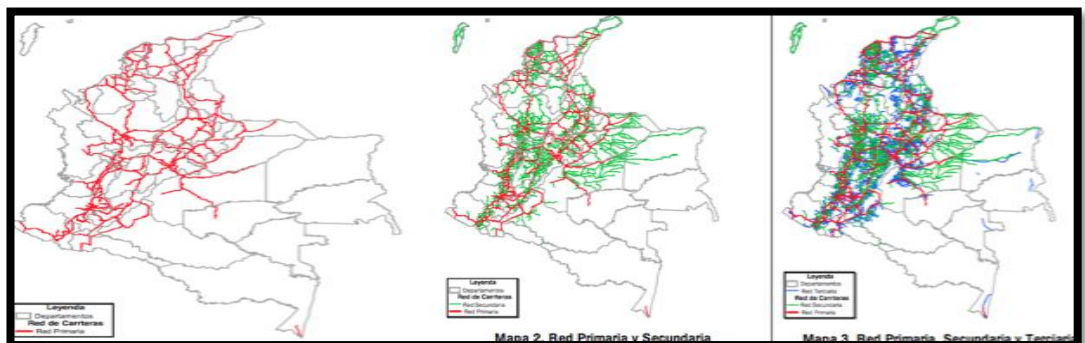
Republic de Colombia: Fluvial Network



Source: *Banco Mundial*²⁵

Annex 9

Road System of Colombia



Source: *Banco Mundial*²⁶

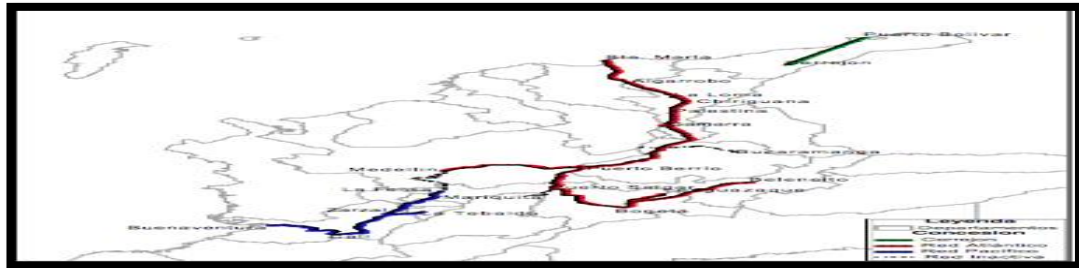
²⁴ <http://www.legiscomex.com/BancoMedios/Documentos%20PDF/perfil-logistico-colombia-2014-completo.pdf>

²⁵ <http://www.worldbank.org/transport/transportresults/regions/lac/lac-colombia-corregido.pdf>

²⁶ <http://www.worldbank.org/transport/transportresults/regions/lac/lac-colombia-corregido.pdf>

Annex 10

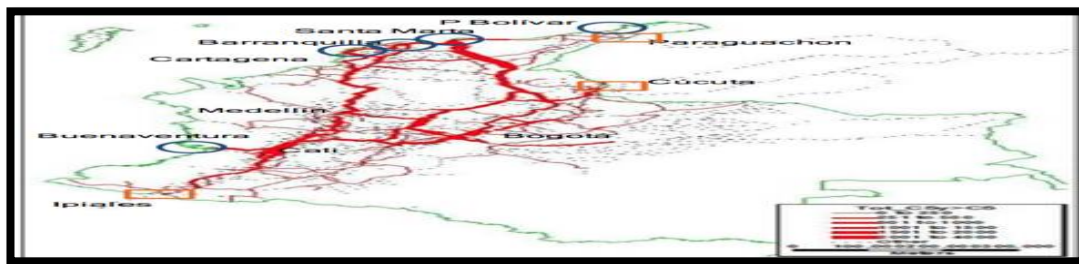
Republic of Colombia: Railway System



Source: Banco Mundial²⁷

Annex 11

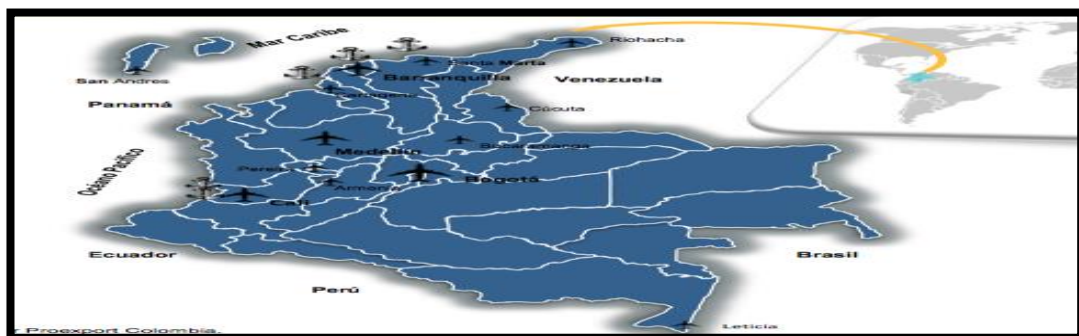
Republic of Colombia: Road Corridors



Source: CEPAL²⁸

Annex 12

Airport Infrastructure of Colombia



Source: Proexport Colombia²⁹

²⁷ <http://www.worldbank.org/transport/transportresults/regions/lac/lac-colombia-corregido.pdf>

²⁸ http://www.cepal.org/perfil/noticias/noticias/7/29957/Caso_Ecuador.pdf

Annex 13

Location of main seaport of Ecuador



Source: Marmedsa 2015³⁰

²⁹<http://colombiatrade.com.co/sites/default/files/Perfil%20Colombia%20para%20portal%20Colombiatrade.pdf>

³⁰ <http://www.marmedsa.com/es/herramientas-paises-y-puertos-marmedsa.php>

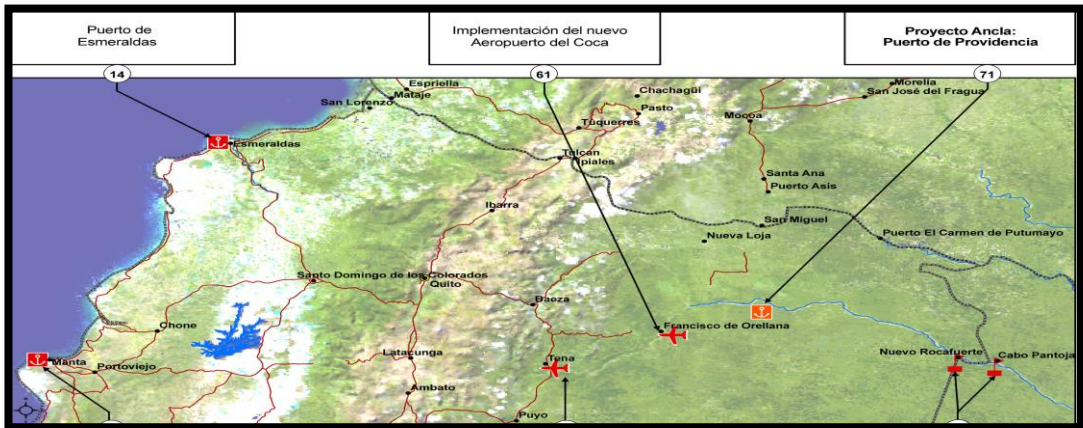
Annex 14

Main Fluvial Port of Ecuador

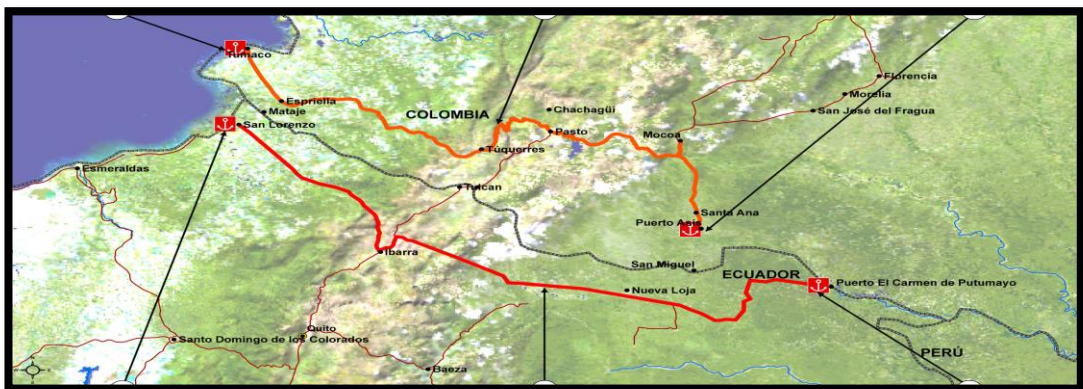
a) Puerto Morona



b) Puerto de Providencia



c) Puerto Carmen de Putumayo

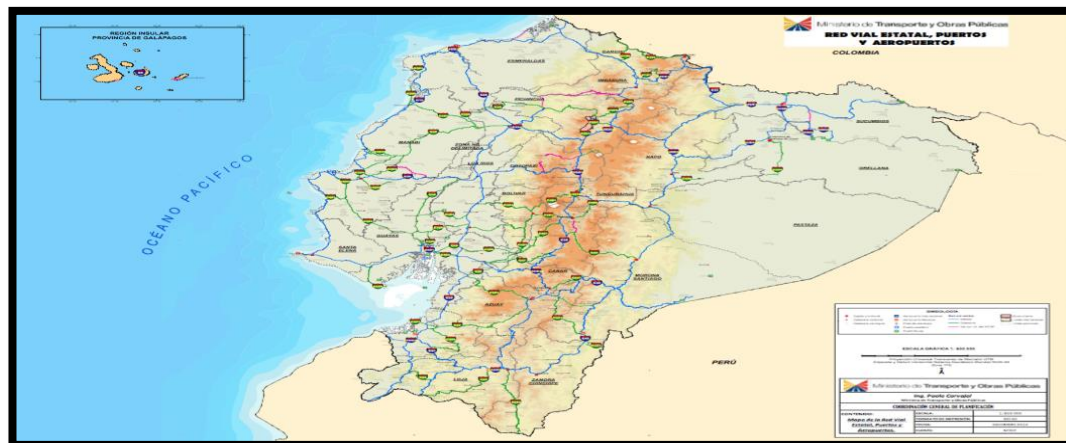


Fuente: IRSSA³¹

³¹ <http://www.iirsa.org/Projects/GruposEje?eje=3&>

Annex 15

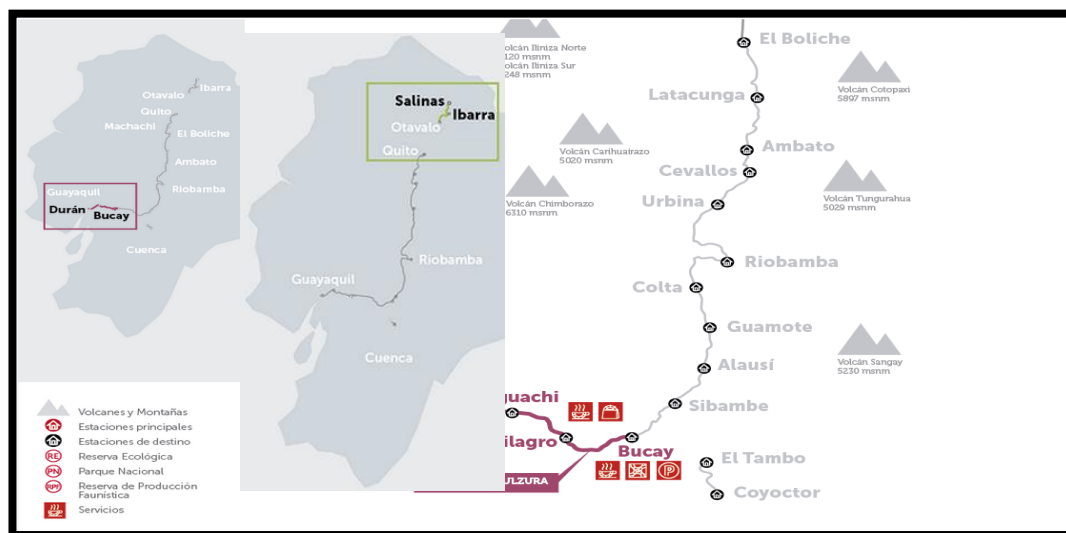
Ecuador: Road System



Source: Ministerio de Obras Públicas³²

Anexo 16

Railway Network of Ecuador



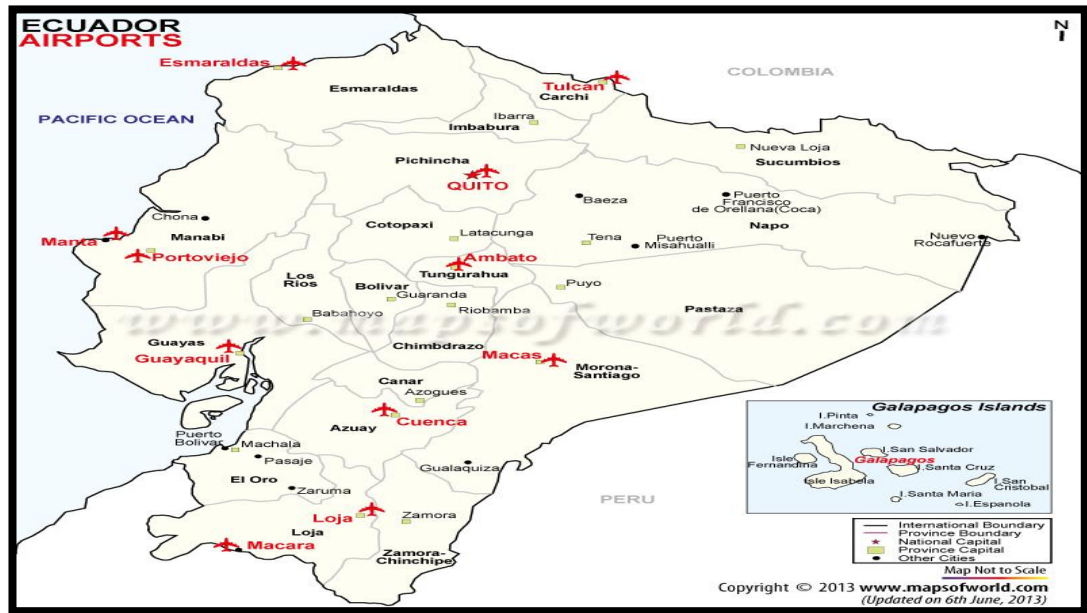
Source: TrenEcuador³³

³² http://www.obraspublicas.gob.ec/wp-content/uploads/downloads/2014/12/18-12-2014_MRV_Mapa_Red_Vial_Estatal.pdf

³³ <http://trenecuador.com/es/tren-de-la-libertad/>

Annex 17

Location of airports of Ecuador



Source: Mapas del mundo³⁴

Annex 18

Port Infrastructure of Republic of Peru



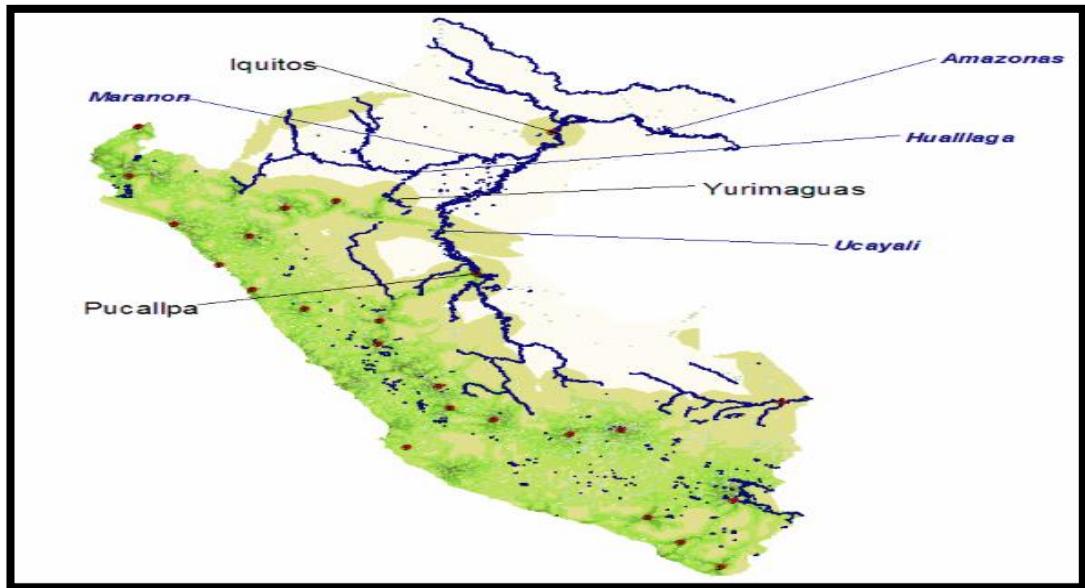
Source: CulturaInca³⁵

³⁴ <http://espanol.mapsofworld.com/continentes/sur-america/ecuador/aeropuertos-de-ecuador.html>

³⁵ http://laculturainca-cusi.blogspot.com/2012/11/01_archive.html

Annex 19

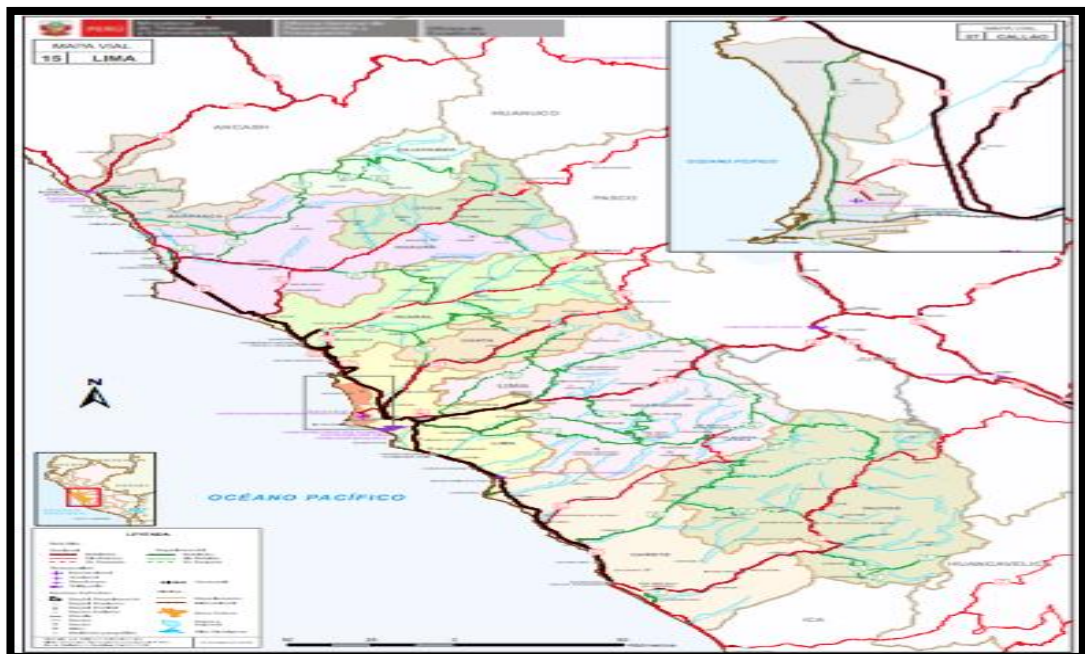
Peru: Fluvial Port



Fuente: CEPAL³⁶

Annex 20

Republic of Peru: Road Sytem

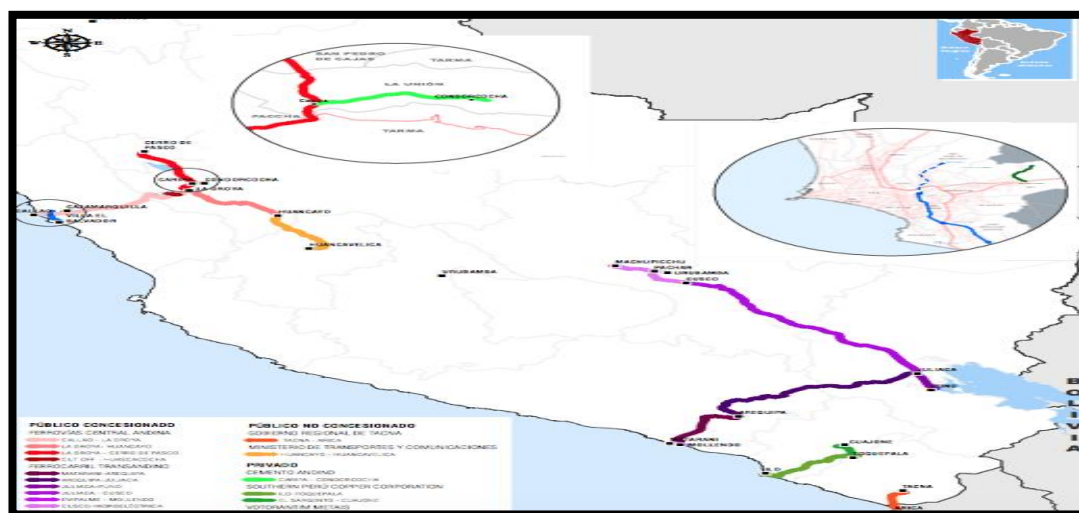


Source: Ministerio de Transportes y Comunicaciones³⁷

³⁶ http://repositorio.cepal.org/bitstream/handle/11362/6307/S0600405_es.pdf?sequence=1

Annex 21

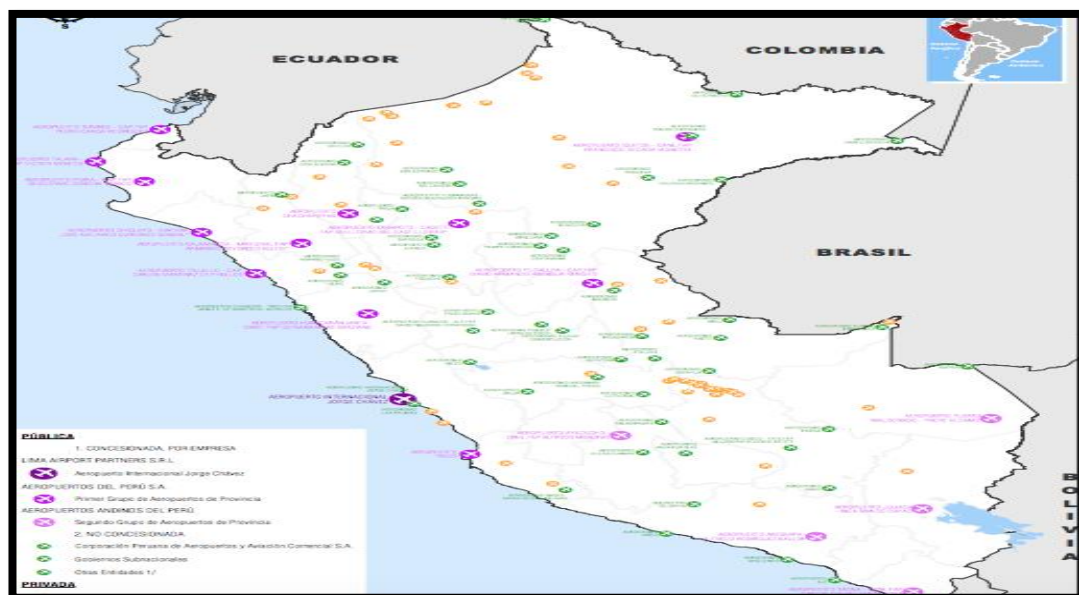
Republic of Peru: Railway System



Source: Ministerio de Transporte y Comunicaciones³⁸

Annex 22

Airport Infrastructure of Peru



Source: Ministerio de Transporte y Comunicaciones³⁹

³⁷ <http://www.proviasnac.gob.pe/docroot/mapas/lima.pdf>

³⁸ https://www.mtc.gob.pe/estadisticas/files/mapas/transportes/infraestructura/02_feroviaria/infraestructura_feroviaria.pdf

³⁹ https://www.mtc.gob.pe/estadisticas/files/mapas/transportes/infraestructura/03_aeroportuaria/infraestructura_aeroportuaria.pdf

Matrix of International Physical Distribution

MATRIZ DE COSTOS DE D.F.I. POR MODALIDAD DE TRANSPORTE			
INFORMACIÓN BÁSICA DEL PRODUCTO	I	PRODUCTO: Nombre Técnico o Comercial	cuero
	II	POSICIÓN ARANCELARIA (PAÍS EXPORTADOR)	
	III	POSICIÓN ARANCELARIA (PAÍS IMPORTADOR)	
	IV	UNIDAD COMERCIAL DE VENTA	
	V	VALOR EX-WORKS POR UNIDAD COMERCIAL USD \$ <input type="text"/>	
INFORMACIÓN BÁSICA DEL EMBARQUE	VI	EMPAQUE	
	VII	DIMENSIONES	
	VIII	ORIGEN: / PAÍS - PUNTO DE CARGUE - PUERTO DE EMBARQUE	
	IX	DESTINO / PAÍS - PUERTO DE DESEMBARQUE - ENTREGA	
	X	Puertos en Países de Destino	
	XI	PESO TOTAL KG/TON	
OTRA INFORMACIÓN DE IMPORTANCIA	XII	UNIDAD DE CARGA	
	XIII	UNIDADES COMERCIALES POR UNIDAD DE CARGA	1
	XIV	VOLUMEN TOTAL EMBARQUE CM3 - M3	
	XV	TERMINO DE VENTA (INCOTERM)	
XVI	FORMA DE PAGO Y TIEMPO		
XVII	TIPO DE CAMBIO UTILIZADO		

Campos Modificables
Campos con Formulas
Campos Con Información Vinculada

MENU INICIO SIMULADOR DE COSTOS

LISTA DE CHEQUEO

IMPUESTOS EN DESTINO	
GRAVAMEN	0
IVA	0
OTROS IMPUESTOS	
OTROS	
SUMATORIA IMPUESTOS	0

[Info Aranceles](#)

CONCEPTO COSTOS EXPORTACIÓN		MARÍTIMO			AÉREO			TERRESTRE			
		Costo Unitario	Costo Total	TIEMPO (DÍAS)	Costo Unitario	Costo Total	TIEMPO (DÍAS)	Costo Unitario	Costo Total	TIEMPO (DÍAS)	
PAIS EXPORTADOR	A	VALOR EXW	0,000	-	-	0,000	-	-	0,000	-	-
		<i>Costos Directos</i>									
	1	EMPAQUE	0,000	-	-	0,000	-	-	0,000	-	-
	2	EMBALAJE	0,000	-	-	0,000	-	-	0,000	-	-
	3	UNITARIZACIÓN	0,000	-	-	0,000	-	-	0,000	-	-
	4	MANIPULEO LOCAL EXPORTADOR	0,000	-	-	0,000	-	-	0,000	-	-
	5	DOCUMENTACIÓN	0,000	-	-	0,000	-	-	0,000	-	-
	6	TRANSPORTE (HASTA PUNTO DE EMBARQUE)	0,000	-	-	0,000	-	-	0,000	-	-
	7	ALMACENAMIENTO INTERMEDIO	0,000	-	-	0,000	-	-	0,000	-	-
	8	MANIPULEO PREEMBARQUE	0,000	-	-	0,000	-	-	0,000	-	-
	9	MANIPULEO EMBARQUE	0,000	-	-	0,000	-	-	0,000	-	-
	10	SEGURO	0,000	-	-	0,000	-	-	0,000	-	-
	11	BANCARIO	0,000	-	-	0,000	-	-	0,000	-	-
	12	AGENTES	0,000	-	-	0,000	-	-	0,000	-	-
	<i>Costos Indirectos</i>										
13	ADMINISTRATIVOS - Costo Indirecto	0,000	-	-	0,000	-	-	0,000	-	-	
14	CAPITAL-INVENTARIO	0,000	-	-	0,000	-	-	0,000	-	-	
	COSTO DE LA DFI PAIS EXPORTADOR	0,000	-	-	0,000	-	-	0,000	-	-	
B	VALOR : FCA.No Incluye Embarque	0,000	-	-	0,000	-	-	0,000	-	-	
C	VALOR : DAP*		N/A			N/A		0,000			
D	VALOR : FAS No Incluye Embarque	0,000	-	-		N/A			N/A		
E	VALOR : FOB	0,000	-	-		N/A			N/A		
TRANSITO INTERNACIONAL	1	TRANSPORTE INTERNACIONAL	0,000	-	-	0,000	-	-	0,000	-	-
	F	VALOR CFR	0,000	-	-		N/A			N/A	
	G	VALOR CPT	0,000	-	-	0,000	-	0,00	0,000	-	0,00
	1	SEGURO INTERNACIONAL	0,000	-	-	0,000	-	-	0,000	-	-
	H	VALOR CIF	0,000	-	-		N/A			N/A	
	I	VALOR CIP	0,000	-	-	0,000	-	0,00	0,000	-	0,00
	1	MANIPULEO DE DESEMBARQUE	0,000	-	-	0,000	-	-	0,000	-	-
		<i>Costos Indirectos</i>									
	2	CAPITAL-INVENTARIO	0,000	-	-	0,000	-	-	0,000	-	-
		COSTO DE LA DFI EN TRANSITO INTERNACIONAL	0,000	-	-	0,000	-	-	0,000	-	-
C	VALOR DAP** No Incluye Desembarque	0,000	-	-		N/A			N/A		
J	VALOR DAT	0,000	-	-	0,000	-	0,00	0,000	-	0,00	
PAIS IMPORTADOR	1	TRANSPORTE LUGAR CONVENIDO COMPRADOR	0,000	-	-	0,000	-	-	0,000	-	-
	2	ALMACENAMIENTO	0,000	-	-	0,000	-	-	0,000	-	-
	3	SEGURO	0,000	-	-	0,000	-	-	0,000	-	-
	C	VALOR DAP***	0,000	-	-	0,000	-	-	0,000	-	-
	1	DOCUMENTACION	0,000	-	-	0,000	-	-	0,000	-	-
	2	ADUANEROS (IMPUESTOS)	0,000	-	-	0,000	-	-	0,000	-	-
	3	AGENTES	0,000	-	-	0,000	-	-	0,000	-	-
	4	BANCARIO	0,000	-	-	0,000	-	-	0,000	-	-
		<i>Costos Indirectos</i>									
	5	CAPITAL-INVENTARIO	0,000	-	-	0,000	-	-	0,000	-	-
	COSTO DE LA DFI PAIS IMPORTADOR	0,000	-	-	0,000	-	-	0,000	-	-	
K	VALOR DDP TOTAL	0,000	-	-	0,000	-	-	0,000	-	-	

Source: ProColombia, 2015

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