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Impacts of the expansion of the Panama Canal for foreign trade of the United States

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ABSTRACT

This paper will discuss which routes have impacted United States trade through the Panama Canal, mainly determining an impact after the expansion of the canal, It was used data before and after the expansion to make a comparison, mainly data from the years 2015 and 2019, where it was identified that the route between Asia-United States obtained a positive variation of 2.03% in the thousands of tons transported, with respect to the route between South America-United States the variation was 1.10% and for the route between Europe-United States it was -1.66%.

For the analysis and determination of the information mentioned above, the work begins with data on exports and imports from the United States to and from each of the mentioned routes, for that reason a commercial profile was also presented with information on countries in specific as Chile, China, South Korea, Japan and the European Union.

Lastly, the changes in times and in the performance of the Panama Canal in the years before and after the expansion will be discussed, in addition, information on the logistical and infrastructure changes that this expansion has generated for the United States will be presented.

Finally, it was determined that the expansion of the canal has caused the routes between the United States with Asia and with South America to present an increase in tons transited, however, the western route of the United States-Europe has decreased the transit of tons in recent years. In addition, it was determined that the expansion of the canal represented major logistical changes for the ports of the eastern United States.

Key words: Panama Canal, United States, Exports, Imports, Logistics.

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INTRODUCTION

This degree work is intended to make known what was the impact that the expansion of the Panama Canal had on the international trade in the United States. For this, it is important to know that the expansion was carried out with the aim of responding to the new demands posed by the most competitive canals worldwide (the Suez Canal) and how the large economies have been benefited. A good example of this is that due to the expansion, the transit of goods to and from the United States increased, improving the value chain of merchants who make routes from China to the east coast of the United States, from eastern Europe and from western South America, since costs and time are reduced by passing through the Panama Canal. Likewise, the research will take into account data on costs and port capacity that the Panama Canal had and how these changed from 2016, data that will serve as a support to make a comparison of how it was before and show the changes that such expansion have had.

For this reason, it is important to know the logistical changes brought by the expansion of the Panama Canal, changes that consisted mainly of the expansion of the locks to allow the passage of ships of more than 8.000 TEU's, which benefited one of the main economies of the world and America such as the United States, since the North American country is the main user of the Panama Canal (Milano, 2014), and the expansion of the canal offered new opportunities such as transporting more merchandise for the import and export, in less time and in the same larger ship.

Accordingly mentioned above for the study it will be considered different scientific articles and books, which give great support to the research conducted, an example of this are the articles, "*the panama canal expansion and its impact on east-west liner shipping route selection*" (Pham, kim, & YEO, 2018), "*The role of Panamá Canal in global shipping*" (Wang, 2017), "*Widening the Panama Canal and U.S. ports: historical and economic impact analyses*" (Park, Richardson, & Park, 2020). In these sources, the aim is to disclose relevant data that will be of vital importance for the development of the work, since they talk about what were the opportunities of international trade that the United States had with Asia Pacific, because this expansion allowed the entry of vessels with greater capacity, increasing freight traffic, since 68% of these have as an origin or destination the different ports of the United States.

In addition to this, the purpose of this research is to provide greater knowledge on economic issues such as the increase in exports and imports of companies that use the canal to arrive or leave the United States, these belong mainly to primary economic sectors such as oil and its derivatives, grains, mineral coal and coke, chemicals and petrochemicals, among others. Logistical contributions are also estimated to reduce time and costs in trade between the United States and the rest of the world. In order to obtain this information, it is important to lean on the theory of competitive advantage carried out by Michael Porter, which will serve as the basis for this research and way or another, reaffirm the concepts presented by the author for this research, since it is based in determining the reasons of how some companies manage to be competitive in the world market.

To carry out this work is also very important to consider what will be the method used because this allows systematic and structured reasoning in obtaining knowledge. For this, the development of research will be qualitative and quantitative, since it is based primarily on describing in detail the events, facts, data, and situations observed through a study, and serve as elements to give greater clarity. Finally, this will have deductive, analytical and data collection elements, since it begins from the macro to micro and that is what is desired in the research, to respond to how the expansion of the Panama Canal brought with it various opportunities to the United States economy.

To finish the development at work, it will be possible to show how important the expansion of the locks was to stimulate trade and logistics development in most of the countries of America, especially those of the United States since they had to comply with the requirements that this expansion required to continue being an important user of it and take advantage of all the opportunities that could arise after said expansion.

In its structure the work begins by talking about the formulation of the project where the main articles to be discussed will be considered since these will serve as a guide to develop the work in an appropriate way. In turn, different conceptual issues will be considered that will be of vital importance to adequately establish the objectives of the work, the control of information and the scope of this.

Second, it will be proceeded with the development of the work where different topics will serve to give greater support to the main objective. These issues are related to the expansion of the Panama Canal locks and how these changes have impacted the trade routes of the United States and the logistics of its ports.

To finish, the conclusions and recommendations will be considered what where the changes and opportunities that the United States could obtain with said expansion. Finally, the researchers will make recommendations regarding the research topic.

1. PROJECT FORMULATION

1.1 State of the art

In this section are mentioned three scientists articles and two master's thesis that make important contributions to the research topic, the first thesis is entitled "The Expansion of the Panama Canal: A study of consequences in the container shipping industry" (Brevik & Melleby, 2014), this thesis main function to inform the reader about one of the bibliographic backgrounds used in the present research, the content of this thesis talks about how is the container transport industry and the possible macroeconomic consequences of the Panama Cana expansion.

This thesis mentions the different routes, like the route of the Suez Canal, the intermodal system of United States, Strait of Magellan, and the Cape of Good Hope.

In addition to what was previously mentioned, the work also mentions the history of the Panama Canal and the expansion plans, with this information the initial part of this degree work will be complemented, since it is mainly necessary to know the Panama Canal and all its implications in topics like transportation, costs and time.

Likewise, in this article are mentioned the ports of Los Angeles, New York and Hog Kong, ports that are important to stablish a relation regarding the impact of the Panama Canal to United States.

The second master's thesis that will be used to support the elaboration of this work is entitled "Un análisis de costo-beneficio en lo económico, lo social y lo político: La percepción de los panameños sobre el papel de la ampliación del Canal de Panamá" (Grondel, 2018). Its purpose is to develop what was the cost-benefit of the Canal with the expansion of the locks. Likewise, to make known what the economic, social, and political impact was, based on the opinions of the Panamanians, in polls and interviews.

Expanding the canal meant sustainability for the country and according to Omesio Sánchez, the canal is more than a canal, since this has had many direct and indirect impacts in the economy, Due to the fact that this expansion increased a significant percentage in the gross national product and it was possible to identify new activities related to the canal, also an increase in learning and a management of human capital, causing more wages to be paid for the hiring of new personnel and a greater collection of taxes.

In addition to this , it is important to note that this expansion opened new opportunities for companies that aimed to settle in peripheral areas to the canal, generating new jobs and income for the economy that are reflected as benefits to the Panamanian economy. It can be concluded that these reasons influenced Panamanians to support the project, on the grounds that this expansion would have great direct and indirect economic benefits. “

Adicional a esto, es importante destacar que esta ampliación abrió nuevas oportunidades a empresas que tuvieran como objetivo instalarse en áreas periféricas al canal, generando así nuevos empleos e ingresos a la economía que se ven reflejados como beneficios a la economía panameña. Se puede concluir que estas razones influyeron a que los panameños apoyaran el proyecto, basándose que esta ampliación tendría grandes beneficios económicos tanto directos como indirectos. “A talking indirect reference is made to the contribution through wages, insurance, goods and services used and contributions to other entities of the government, while the direct benefit is measured by the contribution to the National Treasury” (Grondel, 2018).

The first article taken into account for the state of art, is entitled “*the panama canal expansion and its impact on east–west liner shipping route selection*” (Pham, kim, & YEO, 2018), the main function of this article is to show to the reader the bibliographic antecedents used in the elaboration of the present work, it will be referenced with the intention of making a better investigation guided with quality information, for this reason the present article talks about the importance of the Panama Canal expansion for the commerce between Pacific Asia and United States.

The present article mentions how the Panama Canal expansion benefited the commerce and transport of goods between the United States and Pacific Asia, shortening the time between both regions, allowing the entry of vessels of a greater size, achieving the entry of more merchandise.

Furthermore, the above named, the article is based in an investigation about the best transportation routes that could be the Panama Canal and the Suez Canal, also taking into account all the factors involved in the selection of the route for those that send merchandise from Hong Kong to New York.

Likewise, this transportation routes and important facts like the expansion of the Panama Canal have not only benefited all the international traders, it has also been possible for the carriers to be more competitive, since logistics and transport strategies must be improved.

The second article is from the journal *Maritime Policy & Management*, entitled “Widening the Panama Canal and U.S. ports: historical and economic impact analyses” (Park, Richardson, & Park, 2020), the present article talks about the impact of the Panama Canal to the ports of the United States.

In this article its presented information about how the expansion of the Panama Canal could make that the ports of the west coast of the United States become less important and the ports of the east and golf coast increased the transit of merchandise, besides mentioning how the expansion can impact the transportation of land cargo, maritime cargo, cargo distribution, port development supply chain and logistic.

In addition, this article mentions the history of the Panama Canal, statistics of commerce in the ports of the west and east cost of the United States, as well as information about the congestion problems that the ports of Los Angeles. Long Beach had due to the quantity of merchandise that entered the country.

The information mentioned before gives antecedents to know not only how the Panama Canal has impacted the United States after the expansion, but to also know how the situation before the expansion was.

The third and last article is entitled, “The Effects of Panama Canal Expansion on US Dairy Trade Flows: West, East, and Gulf District Regions” (Vorotnikova & Davadoss, 2016), this article talks about how the expansion of the Panama Canal has impacted the United States, changing the quantity of the exports on the Gulf, West and East Coast.

Affirming that, due to the expansion of the canal, the transportation costs from the Gulf to the Northeast of Asia will decrease by 13% and by 10% from the East Coast of the United States to the East of Asia, this reduction is attributed to the possibility that the post Panamax ships (366 meters long and 15 meters draft), are the vessels that will cross the Panama Canal. (Vorotnikova & Davadoss, 2016). This article also mentions how some sectors of the United States have grown due to the expansion, those are the industries of powder milk and butter.

That is why this article makes important contributions for research topics, not only because it talks about what the expansion of the Panama Canal brought, but also because it analyzes the implications that this has had for the ports and the productive industries of the United States.

1.2 Problem Statement

After 2016, once the expansion of the Panamal Canal was complete, major changes in trade and international logistics happened due to the opportunities that this canal provided, impacting all the countries that made use of this canal, among them specifically the United States, causing effects for the country in reducing transport costs, reducing logistics times, increasing the passage of merchandise, which generated an increased competitiveness.

Therefore, this expansion was made due to the high competitiveness and demand of the canals worldwide, in addition , the Panama Canal became obsolete for the transit of last-generation ships, which generated loss of opportunities, both for the canal, as for the different countries that used this type of ships to mobilize their merchandise.

Due to the expansion of the canal, good changes have been evidenced in the region and the competition represented by the Suez Canal has been mitigated. One of these great changes is the increase in the transit of merchandise to and from the United States, also improving value chain of merchants who make the route from China to the east coast of the United States , since, by using the Panama Canal, they reduce time and costs.

As evidence of the problems that they had with the Panama Canal before expansion an article by the International Food and Agribusiness Management Review (Vorotnikova & Davadoss, 2016), the US exports over the last decades have increased about 13%, specifically in products such as milk powder and butter, which made essential an increase in the transport of goods, but this transport was hampered by the capacity of the ships that crossed the canal, since the ships owned a capacity of 4,500 TEUs , therefore an increase in the capacity to receive large ships was necessary.

Another problem that could be evidenced was about the speed with which ships passed through the Panama Canal, taking into account that before the expansion the processes could not be carried out quickly due to the reduced space of the canal, for this reason according to the article “A Study of the Impacts of the Panama Canal Expansion on the U.S. Northeast Ports and Strategy of the Port of Boston” (Yu, 2015), US entrepreneurs only transported 20% of their merchandise through the Panama Canal from China to the east coast of the United

States, making decisions such as taking the merchandise to the west coast of the United States and continuing by train to the east coast, since this path reduced time by about 3.3 days.

From these evidenced problems, it is hoped that through this work, it will be possible to demonstrate a contrast of the changes that have occurred since the expansion and how said expansion managed to overcome most of the problems that the US importers and exporters.

1.2.1 Question

What impacts did the expansion of the Panama Canal bring to international trade in the United States?

1.3 General objective

Analyze changes in infrastructure, logistics and international trade that have impacted the United States once the expansion of the Panama Canal was completed.

1.3.1 Especifics objectives

To point out how the increase in exports from the United States to East Asia, Western Europe, and the countries of the west coast of South America has been with the expansion of the Panama Canal.

Identify how has been the increase in imports from East Asia, western Europe, and the countries of the west coast of South America to the United States after expansion of the Panama Canal.

Present the logistical and infrastructure changes that the expansion of the Panama Canal has entailed to the United States.

1.4 Justification

1.4.1 Theoretical

This research is carried out in order to expand knowledge about the impact that the expansion of the Panama Canal has had on international trade in the United States, therefore it is expected that with the information obtained through this work, greater contributions will be made in relation to economic issues, such as the increase in exports or imports of companies that use the Panama Canal to arrive or leave the United States, logistical contributions are

also expected, such as making known the great benefits of reduction of time and costs in international trade through the expansion of the Panama Canal.

Therefore, to take advantage of the information obtained from the research, a support will be made based on the theory of competitive advantage of Michael Porter, in order to support the research and in one way or another reaffirm the concepts exposed by the author in his theory.

1.4.2 Social and/or business

With this research, it is expected that companies that maintain commercial relations with the United States obtain more information to delve into issues about imports or exports of the United States through the Panama Canal, therefore, it is expected that companies based on the data that will be presented in this work can analyze the viability of their operations through the Panama canal, find support in decision-making of their commercial relations and observe the reasons why it is better to operate through the canal to commercialize with United States.

Therefore, it is expected that the work will be a source of knowledge for all those interested in world trade, since from the research it is hoped to make it easier to understand the importance of the Panama Canal for world trade between the United States and the rest of the world.

In addition, for people who are starting a business or already have a company established in the foreign trade sector, the research will be of great support to identify the benefits of the Panama Canal, whether or not its use is necessary and how the expansion has impacted the world of international business.

1.4.3 Personal

This work contributes knowledge for the labor world of the three researchers, in relation to a better understanding of United States trade and its close relationship with the Panama Canal.

This topic was of great attention, since the United States as a power has been increasing its trade in both exports and imports and it is of great interest to know a little more about the benefits, advantages, disadvantages and everything that the expansion of this has brought with it.

This work is not only intended to provide exclusive information to the expansion of the Panama Canal, but also offers information to other countries about industries in the United States and also be able to become aware of how is the national industry of said country and how it relates to the rest of the world.

In addition, for the students who carry out the work, it is important to know the relationship between the United States and Asia, since one of the members lived and worked in a company in Shanghai, China, so it is appropriate to know which transport route will be more efficient for trade between the two countries.

1.5 Framework

1.5.1 Theoretical framework

In this research, will be an analysis of the theory of competitive advantage of Michael Porter, to explain some aspects that will be in this work, according to the author, the theory is made with the aim to determine why some companies manage to be competitive in the world market. (Porter, 2011).

“Porter analyzes in detail the characteristics of production factors, recognizing differentiation and hierarchy between factors, distinguishing between basic factors (natural resources, climate, location, topography, and population), and avant-garde factors (skilled labor, technological knowledge). To these he gave the highest preponderance and affirmed that they are the most relevant for determining competitive advantage, because he considers that they are the product of the investment of both the same company and third parties, and even the government.” (Mayorga Sánchez & Martínez Aldana, 2008, pág. 7).

In addition, according to other authors, the competitive advantage of countries is not only given through the different factors of production and the differentiation of their industries, competitive advantage is also a theory applicable to the customs of the countries, since these facilitate trade between countries, that is why the participation of customs must be efficient to generate competitive advantages in international trade, so the government plays an important role as a regulator of merchandise traffic. (Zamora & Lenin, 2015).

In addition to explaining what Michael Porter's competitive advantage is, in his research he also makes important contributions as Porter's well-known diamond model. This is divided

into four parts, the first refers to the conditions of the factors, the second mentions the conditions of demand, the third deals with related and support industries, that is, industries that are in the same productive sector and the last talks about strategy, structure and rivalry of the firms. For the present investigation, a greater emphasis will be placed on the conditions of the factors, since this helps to explain a little more about the topic addressed in the research. The condition of the factors is defined as, “The position of nations in the factors of production, such as skilled labor or infrastructure, necessary to compete in certain industries”. (Porter, 2011).

The factors conditions relates to the research addressed in the present and work since this model talks about the importance of specialized infrastructure for companies or nations, this issue of infrastructure seamlessly connects with the expansion of the Panama Canal, since the expansion of that canal has been of great importance for the trade of the United States to improve and obtain different types of benefits in the economic and transportation fields, as well as an important factor such as infrastructure of the Panama Canal complements the value chain of US exporters, in the field of logistics, since these US companies have a good product in which they are highly specialized, and an important factors such as good logistics and the facility found in the Panama Canal, it is possible to increase the competitiveness of the American companies exports.

1.5.2 Conceptual framework

Given that this research revolves around the great changes in trade and logistics of the expansion of the Panama Canal for international trade in the United States, which has generated positive effects in the reduction of transportation, logistics and an increase in the movement of merchandise generating a competitiveness for the country. For this, it is necessary to propose some parameters that serve as conceptual axes on which the research is based.

For starters, one of the most important concepts is the competitive advantage as this supports the importance that the expansion of the Panama Canal had to the expansion of the United States, this definition can be found in the article “Enfoque de Porter y de la teoría basada en los recursos en la identificación de la Ventaja Competitiva: ¿contraposición o conciliación?”

(Diaz, 2009), which is defined as the differentiation that companies offer to identify themselves in a market and be more competitive.

Another concept that is fundamental for this research is the condition of factors, since this refers to "the creation of specialized factors (specialized labor, creation of infrastructure, etc.) necessary to make a nation competitive". (Buendia, 2013), these factors are not only necessary in nations but also in companies through the effectiveness and relationships established with the environment. Thanks to Porter's diamond model it is important to mention and consider the concept of factor endowment, which is defined as,

“comparative advantages in industries for which the required factors of production are relatively abundant locally. Inputs that are locally abundant will drive down the costs in that industry in the country relative to other countries where the inputs are locally scarce.” (Ragland, Widmier, & Brouthers, 2015).

The previous concept is a support for the theories that will be applied in this research, since it explains the fact that the United States is one of the countries in the world that trades the most in the world, due to its production factors, with which is necessary for said country to require the use of the Panama Canal to reach many of its destinations.

It is important to take into account the concept of globalization since it allows us to understand more clearly how integration or interdependence occurs among the countries of the world, this definition clearly connects with important events such as the expansion of the Panama Canal and how it benefited the United States, since the expansion of the canal was clearly due to the demand of the current world to improve the transport of goods between countries, this expansion not only brought solutions in terms of transport but also better integration between the United States and the rest of the world, by increasing merchandise trade. This concept is defined by the author (Bravo, 2012):

“Changes in spatial and time relationships, as a result of the communications and information revolutions sustained by changes in knowledge, innovations and changes in the paradigms of production and world trade, with modifications in the relations of the world political and economic power” ... (pág. 4).

In addition, another concept to take into account is the definition of international business, this because the cause that the United States imports or exports merchandise worldwide is

due to the negotiations that North American companies do with other countries abroad, therefore, this concept is defined as “carrying out commercial activities beyond national borders. These activities normally include the transition of economic resources such as goods, capital services (which include technology, skilled labor and transportation, etc.) and international production” (Vyuptakesh, 2010).

Likewise, if it takes into account a concept such as international business, it must also speak of another concept that is closely related to this and that is international relations, where according to an article by the Esumer University Institution, the definition of international relations could have arisen in the time of the world war, with which this concept has been defined as a discipline that “arises to study, analyze and understand the interactions between States.” (Acosta, Londoño, & Gonzalez, 2016, pág. 175). This concept is important because in one way or another it helps to explain why countries interact and the facts that make them make certain diplomatic decisions.

Logistics in international shipping is also another important concept to consider, because logistics is that part of international trade that ensures that the transport of goods occurs almost perfectly, with which the term could be defined as:

“the use and adoption of such performance criteria as the reduction in total transport costs per unit carried in a port to- port or door-to-door context... This may be achieved by designing more efficient route networks and may also be made possible by the increase in the size of the ships that service such networks.” (Panayides & Song, 2013).

1.6 Methodological framework

1.6.1 Method

The method that will be used for the development of the research will be qualitative and quantitative, since the research is based on describing in detail the events, facts, situations that are observed through a study.

In addition, thoughts, and opinions that the authors experience, are attached, also the research will contain important statistical and comparative data that will support the developed topic.

In accordance with the above, it can be seen that the most suitable methods for the research are deductive and analytical, because by means of these different data and information will be obtained for the research, in addition, the mentioned methods are the most appropriate, since this starts from the macro to micro and that is what is desired to achieve with the research, to answer how the expansion of the Panama Canal brought with it better commercial opportunities for the countries of the region, specifically the United States.

1.6.2 Methodology

Now, once the general methodological aspects have been defined, the specific aspects of the investigation are established below, such as: techniques, sources, bias control, and the way to process and present the information.

These sources of information were collected through journals or scientific articles that were found through official or academic platforms via the Internet, each of the articles was selected through a previous reading that was made of these in order to determine their importance and truthfulness related to the topic, in addition the collection of statistical data was obtained through these scientific articles and databases, the selected data will be used to support all other topics to work in the research.

Instruments used throughout the investigation:

- Official news
- Decrees
- Laws
- Scientific journals
- Books
- Databases

1.6.3 Risk of bias

To avoid using erroneous information, it is essential to collect information in search engines specialized in academic content such as Redalyc, SciELO and Google Scholar. In addition to this, so that the investigation does not take another direction and can have control over it, it

is important to keep in mind that not only should one source be trusted, but also several authors who confirm the first information found.

Therefore, for the continuation of the development of the work, the information treated will be based mainly on books, journal articles, reports and other texts found in academic, official and database sources. These search engines will allow the research to have more precise data about the objectives set and this information to be true, since information based on tables and graphs will be used, that will allow a greater explanation of the information found. In addition to this, it was possible to find platforms called Scimago and Latindex where it can be verified that the origin of the information is scientific. This allows us to discard information or data that blur the direction of the research objectives, since this will have more rigorous control. Taking these tools into account, it is necessary to establish and give priority to the objectives established at the beginning of the work, since these will serve as a pillar to give good use to the information or discard it in the event that it is intended to disorient the objectives of the investigation.

1.7 Scope of the investigation

With the present investigation it is tried to know specifically the impact of the expansion of the Panama Canal for the commerce of the United States, approaching subjects that only include the North American country, not the impact that had the canal for the other countries of the region, by focusing the research solely on the United States, it is expected to show growth in its exports, imports, opportunities in terms of transportation and infrastructure of the ports of the North American country, and the improvement of its system logistical, in order to determine the impacts of the expansion of the canal.

This research will be of help to all those who wish to know about the international trade of the United States through the Panama Canal and to obtain a better knowledge about the importance of the use of the canal for that country, however, it should be taken into account that this work is not intended to teach whether or not to export or import to and from the United States, and it is not a work that can be used as an import and /or export guide.

This investigation will also have a deductive scope, since information from before and after the expansion of the Panama Canal will be compared, where the researchers of this work will present their ideas based on these data

2. INVESTIGATION DEVELOPMENT

2.1 Causes of the expansion of the Panama Canal

The Panama Canal has been operating for more than a century, since 1903 the United States has had administrative control over the Canal, which is why, in its first years of operation, it was the North American country who was in charge of investment in terms of everything related to infrastructure. Finally, in 1999, through a bilateral agreement, the administrative power of the Panama Canal was transferred to the Panamanian authorities, through which the administration of the Canal changed.

“On January 1, 2000, the Mixed Commission of the Panama Canal ceased to exist and was replaced in the administration, operation and maintenance of the Canal by a new fully Panamanian entity, regulated by the current Political Constitution of the Republic of Panama.” (Cerezo de Diego, 2010).

As a result, all the income received by the Panama Canal would remain in the country, thus making the United States stop receiving income from its operation.

After this, in 2006, the Panamanian government made the decision to hold a referendum to carry out the expansion of the Panama Canal. The causes that led to the application of a referendum in the Central American country by the government are specifically because article 325 of the Panamanian Constitution so dictates:

“The international treaties or conventions that the Executive Body concludes on the Canal of locks, its adjacent area and the protection of said Canal, as well as the construction of a Canal at sea level or a third set of locks, must be approved by the Legislative Body and, after its approval, they will be submitted to a national referendum, which may not be held before three months after the legislative approval” (Constitución política de Panamá (con reformas de noviembre de 2004), 2018).

That is why in 2006 President Martin Torrijos announced the proposal for the expansion of the Panama Canal, making the decision subject to a national referendum, where 76.83% of the votes were in favor and 21.76% against. (Cerezo de Diego, 2010).

Likewise, according to a survey carried out for Panamanians, the expansion of the Canal was considered necessary because they considered said expansion as a driver for the economic

growth of the country, due to job creation and the latent competition with other canals worldwide. (Grondel, 2018).

The main reasons why it was decided to start an expansion of the Canal were related to the fact that this is one of the best interoceanic routes for world trade, and improvements were also required in terms of its capacity and its years of use, since that there was a limit capacity of the locks, so that the passage of ships could not be carried out in an agile way. These same locks had a limited size with which only the passage of Panamax ships was possible, once the expansion was completed, it allowed the passage of Pospanamax ships that have a size of,

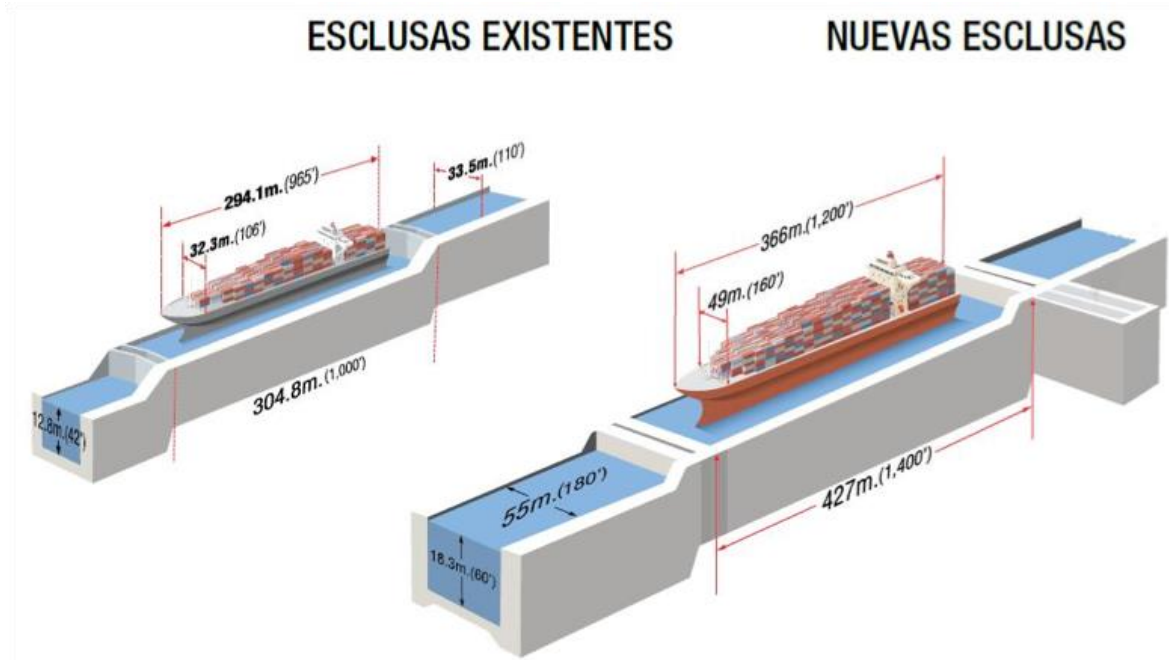
"43 meters wide, this is 17 rows of containers on deck, with a capacity of 6000 to 8500 TEU."(Panamax type container ships, Neopanamax type and others, 2017) and Neopanamax "with a length of 366 m, a beam of 49 m, a maximum draft of 15m and a capacity of 14,500 TEUs." (Ametller, 2019).

This was because the Panama Canal competed in terms of costs, times, and capacity with the Suez Canal route and the United States intermodal system. On many occasions, exporters and importers preferred to use other routes than the Panamanian because of its lack of capacity. When making the route through the Panama Canal, the ships took 21.6 days, and the size of the ships that passed through the Canal was 294 meters long with a draft of 12 meters and a capacity of of 4,500 TEUs, which put the Panama Canal at a disadvantage since its locks did not allow the passage of 8,500 TEU, 10,500 TEU, and 12,500 TEU ships that did transit through the Suez Canal. (Vorotnikova & Davadoss, 2016).

This is how the expansion of the Panama Canal makes this route more competitive, since, according to (Pham, kim, & YEO, 2018), despite the fact that the United States intermodal route has a reduction of time by 26%, transportation costs continue to be very high, as well as the route through the Suez Canal, which makes the Panama Canal become the best route in terms of capacity and costs.

The following illustration can better show the changes that have occurred in the Canal due to its expansion:

Ilustración 1 Size of the locks of the Panama Canal.



Source: (Escuela de organizacion industrial, 2015).

On the left side of the image, the previous locks of the Panama Canal can be observed; they are evidently smaller in size and capacity when compared to the image on the right, which shows the new locks of the Panama Canal with a capacity of “container ships with 366 meters length, 49 meters beam, and capacity to transport 13,200 TEU.” (Sabonge, 2014).

“The Canal has a total length of almost 80 kilometers and extends from the Atlantic Ocean to the Pacific Ocean through the Isthmus of Panama. Entering the Atlantic side, the boats first transit through the Gatun Locks. These raise ships 26 meters above sea level in Gatun Lake. After crossing Gatun Lake, the boats enter the Chagres River, which leads to the second and third series of locks, the Pedro Miguel Locks and the Miraflores Locks. These take the boats to sea level on the Pacific side.” (Brevik & Melleby, 2014).

The construction of the new locks took place on the Gatún lake side. As can be seen in the image previously shown, the locks are 427m long, 55m wide and 18.3m deep.

Knowing the main causes of the expansion of the Panama Canal, it is important to identify its relationship with the United States to give way to the contextualization of this paper. The importance of the Panama Canal for that country is due to the large amount of merchandise

that arrives to the east coast of the United States from Asia and some countries in the west of South America, and also the route from Europe to the west of the North American country. Therefore, the importance of the Panama Canal will be explained in the next chapter of this paper

2.2 Influence of the Panama Canal for the United States

The expansion of the Panama Canal since its inception has had the objective of shortening maritime communication in time and distance, thus stimulating commercial and economic exchange between the two Atlantic and Pacific oceans. This expansion boosted the economic growth of developed and developing countries, and by 2012 the United States, China, Chile, Japan, and South Korea were the five main users of the Canal. (Milano, 2014).

As can be seen in the following image, the United States is one of the most important countries in the region in terms of merchandise movement, since cargo flows in the Panama Canal have always happened between corridors from Asia and South America to the east coast of the United States, and from Europe to the west coast of the United States.

Ilustración 2. Cargo flows through the Panama Canal.



Source: (Canal de Panamá, 2020).

It is important to highlight that the expansion of the locks had a particular objective for the United States since it has been possible to perceive a growth in the transport of containers

and especially in what the multimodal transport of the United States represented. "This North American multimodal system is a combination of direct trans-Pacific shipping between Asia and the East Coast ports and ground transportation, primarily rail" (Sabonge, 2014). However, it is important to keep in mind that this system, being faster, is more expensive, and therefore, it is used for more time sensitive or delicate merchandise. Likewise, it should be noted that the use of this system had some flaws since there was a risk in the distribution of the load among the multimodal system and that this type of inconsistencies (delays or interruption in the supply chain) have financial consequences for the shipping company or importers. Thus, users of the port network on the east coast of the United States became the main users of the Panama Canal and any interoceanic route.

After the financial crisis in the United States, the demand had not been able to recover at the growth rates that these represented before, and this has to do with the high rates of indebtedness, the loss of value in homes and stocks, which affected the consumption habits of the population. Furthermore, "the increase in the aging of the population meant that the demand between the Asia-United States route did not have the same growth rates that they experienced in the first five-year period of the 21st century" (Sabonge, 2014).

The United States economy remained solid during 2018 with a growth of 4.1% in its second quarter thanks to consumer confidence, high investment in public spending such as infrastructure and business investment; these events allowed a rise in wages, higher profits for merchants and a drop in unemployment.

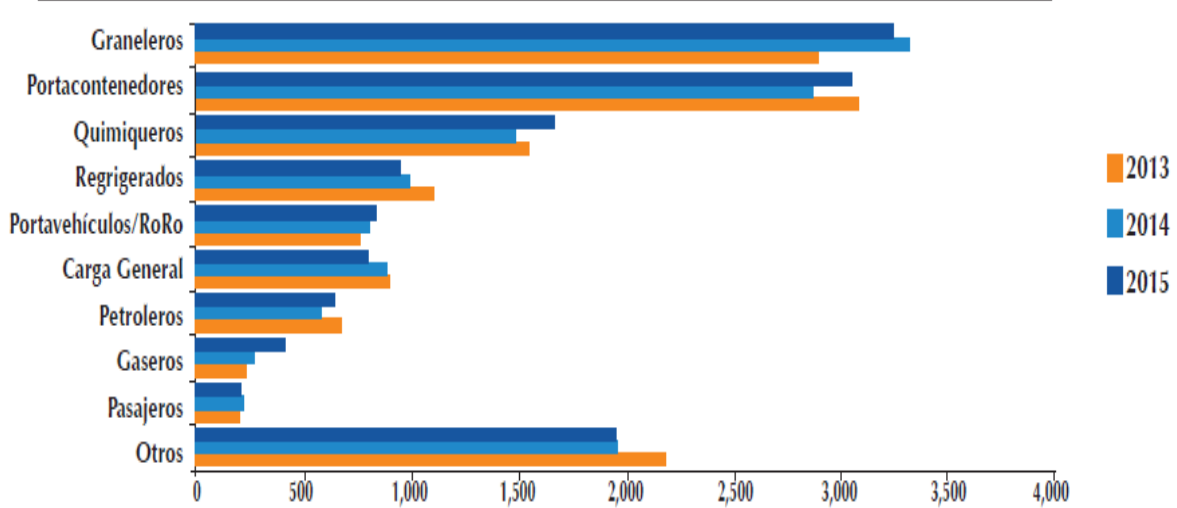
Furthermore, according to the 2018 report,

“The commercial exchange between Asia and the east coast of the United States was the most important route in fiscal year 2018 for the Panama Canal with 43 percent of the transits, 54 percent of the volume of TEU capacity, Container ship in the Miraflores locks 61 percent of the TEU loaded and 56 percent of the segment's revenues, with a total of B / .648 million.” (Canal de Panamá, 2018).

Below, are presented two graphs where it is possible to demonstrate, in a general way, how the tons that transit the Panama Canal have behaved annually. Graphs from 2015 and 2018:

Ilustración 3. Transit of merchandise in 2015.

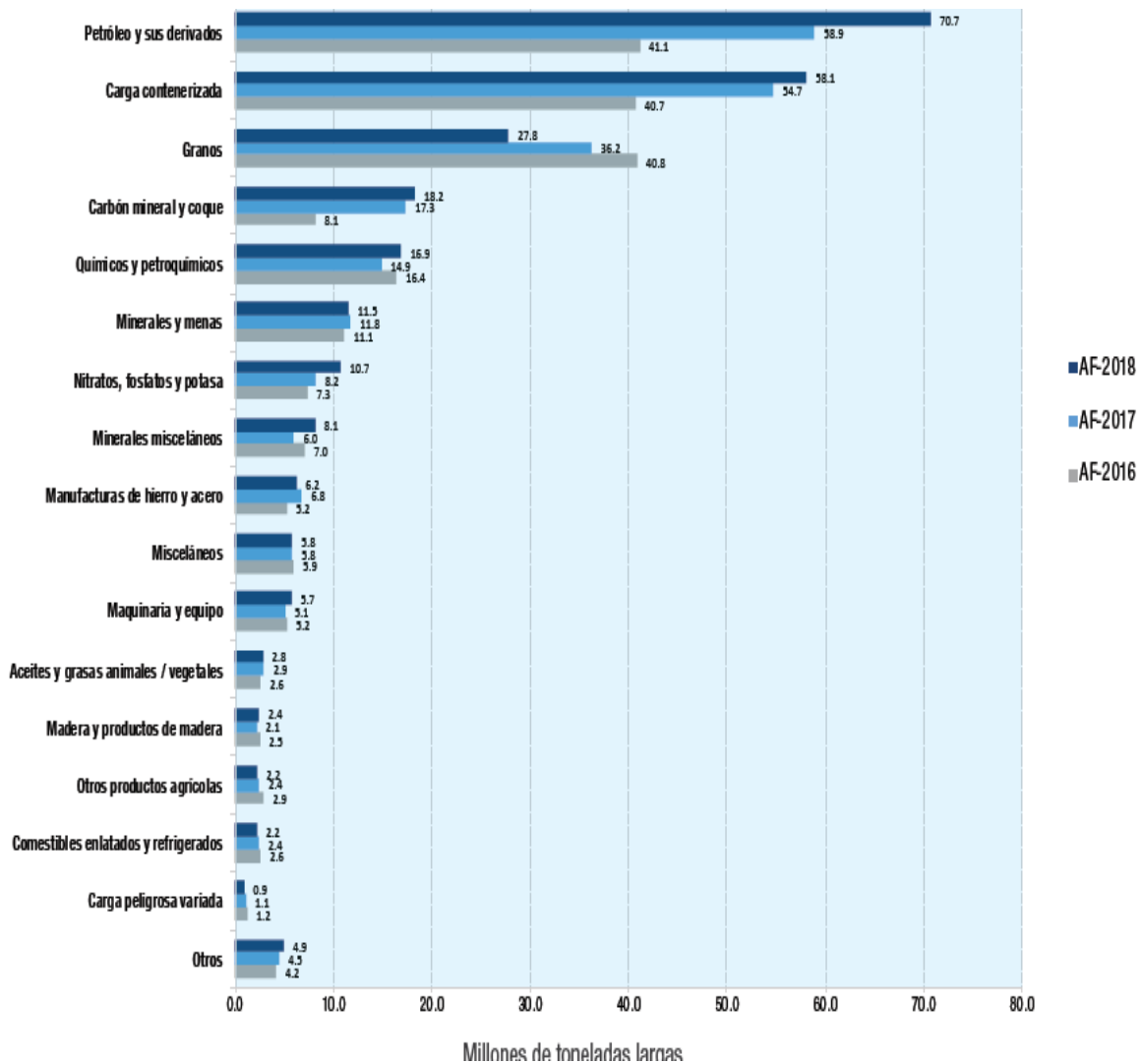
TRÁNSITOS POR SEGMENTO DE MERCADO



Sources: (Canal de Panamá, 2015).

The previous image refers to the thousands of tons of cargo transited by the Canal during the years 2013, 2014, 2015, where it can be clearly seen how the largest transits have occurred in most segments in 2015. Taking into account that the main ships that transit the Canal are bulk carriers, container ships and chemical tankers, these three segments can be analyzed as the first three because, according to what the Canal affirms, most of these ships are destined for or originated from the United States, from or to the Asian continent. (Canal de Panamá, 2015).

Ilustración 4. Merchandise that crossed the canal.



Source: (Canal de Panamá, 2018).

The previous image shows the cargo segments that traveled during the years 2016, 2017, 2018, where it can be seen that in most segments there was an increase year after year, except for the grain segment which has been the only one that decreased since 2016. In this graph, unlike the one for 2015, it is evident that the list of the three main segments changed, positioning oil as number one, then containerized cargo and grains.

2.2.1 Major US Cargo Ports

Knowing the movement of goods and their types, it is of great support for the investigation to know the main ports of the United States, taking into account that 68% of the merchandise that passes through the Panama Canal is destined for the North American country (Wang,

2017).For this reason, the location of the ports will be shown below, as well as the most important aspects of one of them.

Ilustración 5. United States ports.



Sources: (Principales puertos y aeropuertos de carga en Estados Unidos, 2020)

- **Port of Los Angeles:** Located on the northwest coast of the United States in San Pedro Bay, in the extreme south of Los Angeles County, it is one of the ports responsible for most of the trans-Pacific trade. This port in 2018 moved 9.5 million TEUs and, in this same year, around 1,891 ships arrived at the port. In addition, in 2019 the main routes corresponded to 74.4% from Northeast Asia and Southeast Asia, 19%. (Port of Los Angeles, 2020).
- **Long Beach Port:** Located 40 km from downtown Los Angeles, it represents 12.1% of the market share of the United States, the movement that this port carries out during a year is valued at more than 180 billion dollars. It has 10 loading docks, 71 cranes and 140 shipping lines with connections to 217 international ports. Currently, there is talk of an investment of approximately \$ 5 million for its expansion, since they

must be prepared to receive ships from Asia and have the ability to load and unload faster. (Ximenez, 2014).

- **Port of New York and New Jersey:** It is located on the east coast and runs from the Statue of Liberty monument and ending in northwestern New Jersey, this marina is known as the port of New York and New Jersey, located exactly in a port district that encompasses the New York-Newark metropolitan area. This port has 6 container terminals and 54 cranes, receives nearly 4,800 and handles 7 million containers a year. (Cifuentes, Torres, & Frias , 2013).
- **Ports of Georgia (Port of Savannah and Port of Brunswick):** The port of Savannah has one of the best container facilities in the North American country. The Port of Brunswick has the best facilities for car imports with more than 202 hectares of land rented or sold to the automotive industry. “At the cargo operational level, in February the ports handled a record 2.9 million tons of cargo, an increase of 1.5% compared to the same month in 2017” (Todologica News, 2020).
- **Seattle-Tacoma Port:** In 2010, around 2.14 million containers passed through this port, in addition to be a port that has the capacity to handle 3 million TEUs. In addition, according to port data, two railway lines are located two miles from the port, which facilitates the transportation of goods nationwide. (Port of Seattle, 2020).
- **Virginia Port (Norfolk):** Located on the east coast, it has a rail system that allows a third of the cargo to enter and leave by this means, it has 6 trains that depart to 28 different cities every day. It moves about 253,000 containers a year. An expansion was made in 2019 by opening 60 new cranes for the efficiency of the port. It is expected that they will continue to expand their capacity to increase their competitiveness in the country. (Portal Portuario, 2019).
- **Port of Houston:** It is the largest port in Texas and on the Gulf Coast of the United States. This port moves around 247 million tons every year, and it is ranked number 1 both in exports and imports that leave or enter the country. Most of the port transports oil and all its derivatives. (Port Houston, 2016).
- **Ports of South Carolina (Charleston and Georgetown):** These ports recorded a movement of 1,996 million TEU's in 2016, are approximately 25 miles long, and have 200 industrial and private terminals. "According to a 2019 study by the University of

South Carolina, port operations create 1 in 10 jobs, which pay almost 32% more than the state's average annual salary". (South Carolina Ports, 2020).

- **Oakland Harbor:** It is one of the largest, best strategically located for entry through the Pacific Ocean. 78% of the trade that moved in 2018 through this port was with Asia, 7% of the trade was national and the rest was with Europe and other foreign economies. This port handles around 99% of all merchandise that enters northern California. (Port of Oakland Seaport, 2020).
- **Port of Miami:** This port is the closest US port to the Panama Canal, which is the main access to the canal for the North American country. This canal invested around one billion USD to improve the infrastructure of the port, which made it the best United States port for the passage of post-panamax ships. In 2015 this port moved a total of 7,980,527 tons and in 2018 a total of 8,777,974. (Port Miami, 2020).

However, it is also important to mention the main export and import destinations of the United States. In terms of the destination of American products, the main destinations are the European Union with 19.2% of products exported, China 7.2%, Japan 4.5% and other countries 35.1%. In relation to the origin of imports from the United States, the main countries from which their products come are China with 21.6%, the European Union with 19.1%, Japan with 5.6% and other countries representing 27.9 %; regarding the products it exports and imports, the segmentation of these is as follows: exports of manufactured products are 72.9%, of fuels and minerals 11.5%, agricultural products 11% and others 4.6%, with respect to importing these same product segments. (World Trade Organization, 2020).

2.3 Imports from eastern Asia, Europe, and western South America.

According to the annual reports made by the administration of the Panama Canal, two of the routes that are made the most through the Panama Canal are between Asia and the east coast of the United States, and between the west coast of South America and the east coast of the United States. However, another route is also made through the Canal, which is that of Europe and the Western United States; it is important to clarify that this route is not the one where the most merchandise is traded and is not one of the main ones for the Canal regarding the number of transits.

It is important to mention these countries and these regions given that, according to statistical data, the number of ships that cross the Panama Canal has shown an increase over the past few years: “the total number of ships in the Panama Canal in 2016 was 13,114, and the number of ocean-going vessels was as high as 11,688. After the expansion, there were 13,584 ships and 12,000 ships in 2017, and 13,795 ships and 12,000 ships in 2018.” (Fan & Gu, 2019). In relation to the previous information of this total number of transits in 2018, 43% correspond to the route between Asia and the United States.

The following graph shows a comparison of routes towards the United States, showing data on tons in 2015 and 2019:

Tabla 1. Transit of US exports via the Panama Canal

Ruta	2015	2019	Variación %
Costa este de Estados Unidos-Asia	55.151.075	51.393.301	-6,81%
Costa este de Estados Unidos-costa oeste Sudamérica	21.198.768	25.454.120	20,07%
Costa oeste de Estados Unidos-Europa	2.177.007	2.604.426	19,63%

Source: Own elaboration with data from (Mi canal de Panamá, 2015), (Mi canal de Panamá, 2019).

In the previous table, it can be seen that the greatest load flow through the Canal moves from the east coast of the United States to Asia and the west coast of South America, which clearly confirms the importance of the Canal regarding exports from the North American country. However, it is also shown that exports from Europe and the east coast of South America represent a large flow of cargo to the west coast of the United States.

In addition, as can be seen on the table, the only route that has had a negative variation is the one from the United States to the Asian continent. This reduction in the transported goods has not occurred only through the Panama Canal but also at a general level. According to Comtrade data, the United States has reduced its exports to China, which affected all maritime routes to Asia from the North American country. (UN Comtrade, 2020).

Next, a profile of China, Korea and Japan will be presented, which includes at a general level their relationships with the United States regarding imports made by these countries, to finally conclude with the aspects that involve the route from Asia and the United States through the Panama Canal before and after the expansion.

2.3.1 East Asia

Since 2006, when the Central American country made the decision to expand the Canal locks, the interest of the countries of the region and other parts of the world has been noticeable, not only the United States been during the government of George W. Bush, but also countries such as Japan, China and South Korea located in the east of the Asian continent, have shown since the beginning of the expansion project a great interest in everything to be carried out, this is because the main route through the Panama Canal is from East Asia to the East of the United States.

This great interest in the expansion of the Canal is due to the fact that one of the main trade partners of the Asian countries is the United States, and an expansion of the Canal would facilitate the transport of merchandise between both regions: “in 2009, nearly 28 percent (\$ 431.5 billion) of US imports came from China, Japan, and South Korea.” (Guevara, 2011). An expansion of the Canal would represent a growth between exports and imports between these countries and the United States.

However, for many authors, the Asian interest, specifically from China, is explained not only because of the trade route with the United States but also because of the constant efforts that the Asian country has made to become one of the main merchants worldwide. (Lewis, 2010).

The Asian countries are of great importance for the commerce of the United States, mainly because they represent the majority of the merchandise that enters through the ports of the North American country, as much of the east coast as of the west coast and the gulf, as indicated by data from Maritime Policy & Management magazine,

“as of 2013, five ports on the West Coast (Oakland, Los Angeles, Long Beach, Seattle and Tacoma) accounted for over 54% of the total international cargo transported to and from U.S.A. and most of the trade with Asia Pacific Economic Cooperation (APEC) countries such

as China. The remaining (approximately 47% in 2013) of cargo moves in and out of ports on the East Coast and the Gulf Coast of the U.S.A.” (Bhadury, 2016).

Data published by the Panama Canal shows the different tons that crossed the Canal on the United States-Asia route in 2015 and 2019 are indicated, this data includes the total transit of the route without differentiating imports from exports:

Tabla 2. Transit of Asian imports through the Canal.

Ruta	2015	2019	Variación %
Costa este de Estados Unidos-Asia	55.151.075	51.393.301	-6,81%

Source: Own elaboration with data from (Mi canal de Panamá, 2015), (Mi canal de Panamá, 2019).

As can be seen on the table above, the United States' exports to Asia through the Panama Canal have suffered a decrease when comparing these two years. This may be due to different reasons such as the trade war between China and the United States, which has decreased trade between the two countries. This is an extremely important factor to explain the variation in tons transited, since China is the main economy of this maritime route from the United States to the Asian continent, which means any decrease or increase in trade between these two countries will directly and largely affect this trade route.

Next, a general profile of the three most important countries in terms of route use from East Asia to the East and Gulf of the United States will be elaborated.

- **China**

According to the World Trade Organization, in 2018, China ranked in the world trade ranking as number one in terms of merchandise exports and number two in world imports, with a GDP (million USD \$) of 13,407,398.

Of the total Chinese imports, 13.3% come from the European Union, 9.7% from South Korea, 9% from Japan, 8.4% from the United States, and the rest of the imports come from other countries of the world (World Trade Organization, 2020). In addition to this, according to TradeMap, the Asian country in the last ten years has imported goods from the United States such as electrical and mechanical machines

and apparatus, aircraft, optics or automobile vehicles, being able to analyze by means of this information that most of the important products are manufactured.

The following graph illustrates, with information from the United Nations Comtrade database, the total value of merchandise imported from China with the United States as a trading partner:

Tabla 3. Value of imports from China

Periodo	Flujo comercial de China	US\$
2011	importación	104,121,382,985
2012	importación	110,516,535,986
2013	importación	121,721,075,508
2014	importación	123,675,622,756
2015	importación	116,071,708,830
2016	importación	115,594,770,317
2017	importación	129,797,515,346
2018	importación	120,147,865,723
2019	importación	106,626,645,076

Source: Own elaboration with data from (UN Comtrade, 2020).

As shown in the previous table, Chinese imports during 2011 and 2014 had an increase, in 2015 and 2016 there was a decrease, but in 2016, once the expansion of the Canal was finished, there was a growth in exports. However, during the last two years, imports from the Asian country have decreased, this is because the trade war between this country and the United States has made trade relations between both countries go through moments of tension in which both, in order to defend their national market, have decided to impose taxes on the entry of certain products and have decreased their imports. However, these facts can also be explained by means of the information presented above, in which several authors affirm that China has not only its eyes on the United States but also on Latin America, which has made the Asian country increase its imports from the countries of that region. (Canal de Panamá, 2018).

- **South Korea**

According to the World Trade Organization, in 2018 Korea positioned itself in the world trade ranking as number six in merchandise exports and number nine in imports, with a GDP (millions of USD \$) of 1,619,424. Of the 100% of Korean imports, 20.5% come from China, 12% from the European Union, 11.5 from Japan, 10.7% from the United States and the rest come from other countries in the world. (World Trade Organization, 2020).

Most of the goods that Korea imports from the United States are mineral fuels, mechanical machines and apparatus, electrical machines, optical devices, and chemical products and aircraft. (TradeMap, 2020).

To better understand the total value of merchandise imported by the Asian country from the United States, the following table shows the values from 2011 to 2019:

Tabla 4. Korean imports from the United States

Periodo	Flujo comercial de Corea del sur	US\$
2011	Importación	43,461,393,727
2012	Importación	42,282,528,918
2013	Importación	41,686,042,109
2014	Importación	44,470,809,208
2015	Importación	43,444,787,481
2016	Importación	42,260,903,972
2017	Importación	48,350,051,984
2018	Importación	56,504,532,086
2019	Importación	56,894,210,754

Source: Own elaboration with data from (UN Comtrade, 2020).

As shown in the previous graph, Korean imports from 2011 to 2016 remained constant without very significant changes. Since 2017, one year after the opening of the expansion of the Panama Canal, it can be seen how there was an increase of imports, and for the last two years they have been maintained at a constant value.

- **Japan**

Another country of great importance on the route from East Asia to the East of the United States is Japan. According to the World Trade Organization, this country was ranked number 4 in both imports and exports in the 2018 world trade ranking. The country has a GDP (millions of USD \$) of 4,971,929. Of the total Japanese exports, 23.3% come from China, 11.7% from the European Union, 11.2% from the United States and the rest of other countries in the world. (World Trade Organization, 2020). Among the main merchandise that the Japanese country imports from the United States are mineral fuels, aircraft, optical instruments, mechanical machines and apparatus, electrical machines, and pharmaceutical products.

The following table illustrates the total value of goods imported from the Japanese country from 2011 to 2019.

Tabla 5. Japanese imports from the United States.

Periodo	Flujo comercial de Japón	US\$
2011	Importación	65,791,776,716
2012	Importación	69,971,994,968
2013	Importación	65,213,790,409
2014	Importación	66,825,973,370
2015	Importación	62,441,249,701
2016	Importación	63,245,045,907
2017	Importación	67,582,504,041
2018	Importación	75,226,085,623
2019	Importación	74,650,662,375

Source: Own elaboration with data from (UN Comtrade, 2020).

As can be seen in the graph above, during the years prior to the expansion of the Panama Canal, Japanese imports decreased, although not significantly. However, in 2017, one year after the completion of the expansion, imports increased, and for the last two years they have remained at a similar value. It is important to clarify that Japanese imports decreased in 2019 compared to the data presented in 2018.

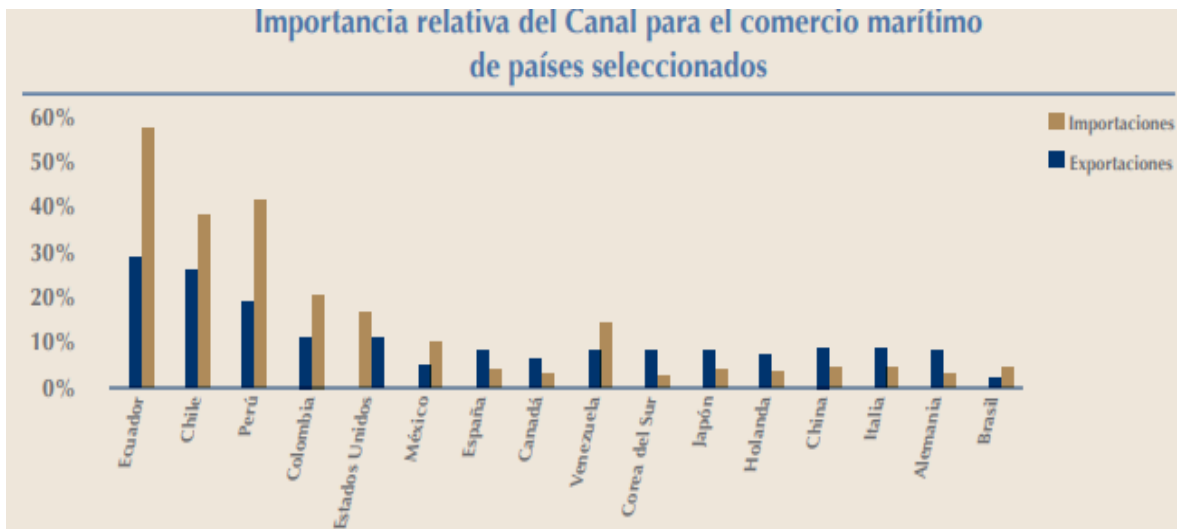
Finally, when analyzing the three countries presented, it can be seen that in 2019 the United States decreased its exports to China and Japan, which makes it possible to analyze that the decrease in trade between these two routes has affected the transit from the United States to Asia. According to data previously presented, the variation of this route was -6.81%, this one being the only route of US exports with a negative variation.

2.3.2 Western South America

Thanks to the expansion of the Canal, Panama aimed to increase its potential as a transshipment center to the rest of the Latin American and Caribbean region, allowing these regions to have a broader alliance with the rest of the world, since these are generally small and focused only on the local market (East-West Coast of Latin America). “But it is important to mention that relations in Latin America have changed dramatically in recent years, as it has been creating alliances with new shipping lines linking Asia with the American West Coast.” (Milano, 2014).

Next, the Latin American markets and the importance of transit through the Panama Canal for the development of its economy will be illustrated.

Ilustración 6.Importance of the Canal for trade.



Source: (Canal de Panamá, 2013).

The previous illustration reflected the importance of the Canal in 2013 for countries such as Ecuador, Chile, and Peru. This is because the Canal is largely used by these countries to reach the United States and Europe, which means that the route through the Canal is of great importance for the exports and imports of these countries.

In this same year, according to the annual report of the Panama Canal, an increase in miscellaneous products such as diesel and gasoline was evident. These came from US refineries located in the Gulf of Mexico that were destined for countries such as Chile and Peru. But for the year 2015 the effect was the opposite, since Ecuador experienced an increase in its oil exports to the Gulf of Mexico, especially destined for the United States, since this type of Ecuadorian oil, according to data from the Canal report, was a product widely used in the refineries of the North American country to be mixed with light crudes. (Canal de Panamá, 2015).

Before the expansion of the Panama Canal, South American economies such as Ecuador, Chile and Peru represented an important transit for the canal, since most of these benefited from the export and import of oil and raw materials with countries such as the US. However, for years after the expansion, the country that has made the most use of the Panama Canal has been Chile, this is because, according to data from the Canal, the country has been one of the main South American countries that imports LNG and LPG. Chile has become one of the main users due to the increase in these imports. On the other hand, Peru and Ecuador continue to use the Canal, but not to the same extent as Chile. (Canal de Panamá, 2018).

The following table specifically shows the traffic in millions of tons through the canal on the United States-South America route:

Tabla 6. Transit of South American imports through the Canal

Ruta	2015	2019	Variación %
Costa este de Estados Unidos-costa oeste Sudamérica	21.198.768	25.454.120	20,07%

Source: Own elaboration with data from (Mi canal de Panamá, 2015), (Mi canal de Panamá, 2019).

As can be seen in the table above, the variation that this maritime route had through the Canal was quite positive, this may be mainly due to the fact that, in Canal reports for 2018, it has been ensured that Chile has increased its imports in certain products that come from the United States, including liquefied natural gas and liquefied petroleum gas. (Canal de Panamá, 2018).

In addition, in recent years Chile has been growing in the region, which has allowed it to create alliances or sign treaties with Panama and the United States, which allows for greater economic interaction with these countries and, in turn, greater transit of merchandise through the Panama Canal.

- **Chile**

It is important to carry out an analysis about its commercial relationship with the United States and as a customer of the Panama Canal since, according to the authorities of the Canal, in 2017, Chile was the first Latin American user and the third client in the world of the Canal after the United States and China. (Canal de Panamá, 2017).

According to the World Trade Organization, in 2018 Chile positioned itself in the world trade ranking as number 44 in terms of merchandise exports and imports, with a GDP (million USD \$) of 298,172. In addition, it is important to emphasize that 18.9% of the goods imported into the country are originated in the North American country. These without differentiating the coasts that are used to reach the North American country, are data on the total percentage imported from the United States. (World Trade Organization, 2020).

The following graph will explain, with information from the United Nations Comtrade database, the total value of merchandise imported from Chile with the United States as a trading partner.

Tabla 7. Value of imports from Chile.

Periodo	Flujo comercial de Chile	US\$
2011	Importación	\$15,993,031,002
2012	Importación	\$18,773,079,445
2013	Importación	\$17,517,675,084
2014	Importación	\$16,512,735,498
2015	Importación	\$15,444,314,017
2016	Importación	\$12,931,529,742
2017	Importación	\$13,632,498,580
2018	Importación	\$15,376,505,101
2019	Importación	\$15,776,197,124

Source: Own elaboration with data from (UN Comtrade, 2020).

2.3.3 Europe

According to data from the World Trade Organization, in 2018 the European Union had a GDP of \$ 18,750,052 million, and a GDP per capita of \$ 34,461, which positioned it as one of the most important communities worldwide. This is due to its economic capacity and the purchasing power of most of the inhabitants of the European Union, which has allowed this community to become a very important partner for the United States in recent years.

At a general level, it is important to mention how the export and import segments of the European Union work, considering what are the main origins of imports from this community. Although the European community exports manufactured products, they are also large importers of this type of merchandise with 65.8% of its imports, followed by fuels and their derivatives 22.2%, and finally agriculture 8.4%. The remaining percentage of imported products occupies 3.6%. The origin of the goods that enter this economic alliance are China (20.1%), the United States (13.7%), Russia (7%), Switzerland (6%), Turkey (3.7%), and the

rest of the goods come from different countries (49.4%). (Trade profile: European Union, 2018).

The next graph illustrates the European Union imports from the United States from 2011 to 2019, according to information from the United Nations database.

Tabla 8. Value of imports from the European Union.

Periodo	Flujo comercial de la Unión Europea	US\$
2011	Importación	268,232,457,647
2012	Importación	267,312,025,884
2013	Importación	263,112,469,040
2014	Importación	274,711,046,819
2015	Importación	273,012,770,536
2016	Importación	274,102,052,274
2017	Importación	288,403, 331,544
2018	Importación	315,206,602,199
2019	Importación	326,237,673,711

Source: Own elaboration with data from (UN Comtrade, 2020).

It is possible to identify that between 2011, 2012 and 2013 there was a noticeable decrease in imports made in this region, in 2014-2017 they retake their position and exceed it, increasing their imports from the United States, but in 2018 and 2019 there is a significant increase in imports.

The following table shows the information on the transit of US exports to Europe, data that is expressed in millions of tons:

Tabla 9. Transit of European imports through the Canal.

Ruta	2015	2019	Variación %
Costa oeste de Estados Unidos-Europa	2.177.007	2.604.426	19,63%

Source: Own elaboration with data from (Mi canal de Panamá, 2015), (Mi canal de Panamá, 2019).

As shown in the table above, the variation in US exports through this route was positive, which may be due to factors such as those presented in previous tables where it is possible to see a total increase in US exports to Europe. In addition, as the Canal report for the year 2019 confirms, in segments such as container ships, the third route with the most participation has been exports from the United States to Europe. (Canal de Panamá, 2019).

2.4 United States imports from East Asia, Europe, and West South America

As mentioned in the previous point, the routes between the United States to East Asia, Europe and western South America continue to be the main routes for the transport of merchandise, which is why it is also important to talk about the imports from the United States and not only about their exports.

It should be emphasized which are the main countries from which the United States imports merchandise, with China representing the 21.6% of the origin of its merchandise, the European Union 19.1%, Japan 5.6%, and the rest of the world 27.9%. 77.8% of these products are manufactured, 10.7% fuels and minerals, and 7% are agricultural products. (World Trade Organization, 2020).

In the following table, data provided by the authority of the Panama Canal shows the millions of tons of cargo that transit the routes destined for the United States:

Tabla 10. Transit of US imports via the Panama Canal.

Ruta	2015	2019	
Europa-Costa oeste de Estados Unidos	4.720.976	4.199.401	-11,05%
Asia-costa este de Estados Unidos	26.306.729	32.414.424	23,22%
Costa oeste Sudamérica-costa este de US	15.084.953	11.564.565	-23,34%

Source: Own elaboration with data from (Mi canal de Panamá, 2015), (Mi canal de Panamá, 2019).

As shown in the table above, US imports from the route of South America and Europe presented a negative variation, since, as can be seen when comparing 2015 with 2019, there

was no increase in imports; in the variations of the export route of the United States, the data was as follows: -6.81% for the route to Asia, 20.07% for the route to South America and 19.63% for the route to Europe. However, when comparing the variations of the imports of the United States in the previous table, they were like this: 23.22% of the route from Asia, -23.34% from South America and -11.05% from Europe; it is evident that the variations were different for each commercial operation. (Canal de Panamá, 2018).

On the other hand, there is the route from the United States to Europe that obtained a positive variation, this may be directly related to the fact that total US exports have been increasing towards Europe in recent years, but the opposite happened with the route from Europe to the United States through the Canal, which presented a negative variation. This may be due to a low use of the Panama Canal by Europe, given that to send their products to the North American country, ships can use the route from Europe to the east coast of the United States directly. Another example that shows this reduction is the case of vehicle-carrying vessels, where, according to data from the Canal in 2015, imports from Europe in this segment were 0,6 million tons and in 2019 they were 314.3 thousand tons. This data clearly reflects a decrease in imports by the United States of this type of products through the Canal. (Canal de Panamá, 2018).

Regarding the route from the United States to South America, the variation was positive, which may be due to the fact that the North American country is a large exporter of gas ships from the Gulf coast, and a large part of these exports are destined for the countries of the South America region, which makes it necessary to use the Canal to reach this destination. However, the opposite case occurred with the route of US imports from South America where the variation was negative, which may be explained by the fact that countries like Chile decreased their exports to the United States, which has also affected the tons that pass through the Canal. (Canal de Panamá, 2018).

Next, an analysis of each of the mentioned regions will be made, which shows the relationship between the expansion of the Panama Canal and the products they export to the United States.

2.4.1 East Asia

The following information shows a profile of China, Korea and Japan in terms of their exports to the United States, concluding with the commercial aspects that have changed at a general level in the East Asia region and the route through of the Panama Canal.

The following table will specifically show the tons transited by this route in 2015 and 2019:

Tabla 11. Transit of Asian exports through the Canal.

Ruta	2015	2019	
Asia-costa este de Estados Unidos	26.306.729	32.414.424	23,22%

Source: Own elaboration with data from (Mi canal de Panamá, 2015), (Mi canal de Panamá, 2019).

In the previous table, it can be seen how exports from Asia through the Panama Canal have been increasing. This increase is explained mainly by the commercial growth that the Asian continent has had, in addition to reasons such as the increase in the capacity of the Canal that allows the increase of the passage of merchandise coming from Asia. As an example, Canal reports state that the segments of container ships transit mostly by this route; another important segment in Asian exports has been the carrier ships, given that in 2015 1.1 million tons were exported to the United States and in 2019 it was 1.8 million tons, making this segment an example of how Asian exports have increased. Likewise, it must be considered that most vehicle-carrying ships originate from Japan.

This increase can also be related to the exports of countries such as Korea and Japan since, as it will be shown in the following trade profiles, the exports of these countries towards the United States have increased. However, it is important to clarify that other countries such as China have decreased its exports to the United States. It can be said that the positive change in the transit of Asian exports to the United States has occurred because exports from Korea and Japan have strengthened and sustained this trade route.

- **China**

In the world trade ranking, China is the country that makes the most exports in the world. In addition, according to the World Trade Organization, 93.9% of the goods it

exports are manufactured, 3.4% agricultural products and 2.7% are mining products and fuels, being that the products it exports the most are radio or telephone devices, machinery, vegetables, plants, among others. The main destinations of its exports are 19% the United States, 16.5% the European Union, 4.6% South Korea, and exports to the rest of the world represent the remaining 41.5%. (World Trade Organization, 2020).

The total of Chinese exports to the United States in recent years is shown below:

Tabla 12. Value of imports from China.

Periodo	Flujo comercial de China	US\$
2011	Exportación	325,010,987,549
2012	Exportación	352,438,221,016
2013	Exportación	369,063,858,557
2014	Exportación	397,099,249,674
2015	Exportación	409,979,244,393
2016	Exportación	385,677,759,424
2017	Exportación	430,328,146,524
2018	Exportación	479,701,580,548
2019	Exportación	418,584,250,000

Source: Own elaboration with data from (UN Comtrade, 2020).

Regarding the previous table, an analysis can be made on how the values of Chinese exports changed over the years. From 2011 to 2015 it can be seen how Chinese exports were in a constant rise, however, in 2016 there was a decrease in these exports. In 2017 they increased again, and finally, in 2018, there was a new decrease in imports. This phenomenon occurs for the same reasons that have been previously explained: in recent years, the trade conflicts between the United States and China have had an increase due to the fact that decisions such as the imposition of tariffs have been made in the Donald Trump administration. This is because the internal policies of the American President have been based on growing the national industry

of his country, lowering the deficit of the trade balance and restraining China in its intentions to become the most important power in the world.

Furthermore, as it has been mentioned in previous points, the same authorities of the Panama Canal have determined that the trade war between these two countries also affects the transit of the Canal, due to the amount of products that are traded between the two countries through it.

- **South Korea**

The country is ranked 6th in the world trade ranking for merchandise exports. Regarding the export segments, 89.1% are manufacturing exports, 8.4% are fuels and minerals, and 2.2% are agricultural products, the main products being cigarettes, electrical equipment, car engines, among others. The main countries it exports to are China with 24.7%, the United States with 12%, the European Union with 9.5%, and other countries with 38.6%. (World Trade Organization, 2020).

Tabla 13. Valor exportaciones de Corea.

Periodo	Flujo comercial de Corea del sur	US\$
2011	Exportación	56,421,431,345
2012	Exportación	58,806,901,088
2013	Exportación	62,326,03,271
2014	Exportación	70,598,279,902
2015	Exportación	70,117,307,228
2016	Exportación	66,748,306,308
2017	Exportación	68,852,265,159
2018	Exportación	73,043,815,673
2019	Exportación	73,598,903,629

Sources: Own elaboration with data from (UN Comtrade, 2020)

When analyzing the previous table, it can be identified that from 2011 to 2014 there was an increase in Korean exports to the United States, from 2015 to 2017 there was a decrease, and finally in 2018 and 2019 they achieved an increase compared to previous years. In addition, when comparing this table with the one that shows

imports information, a positive trade balance is clearly reflected for Korea, given that its imports from the United States have never exceeded 60 trillion dollars in the last 8 years, while Korean exports have become more than more than 70 billion dollars.

- **Japan**

This country is ranked 4th in terms of exports in the world trade ranking. The product segments percentages are divided as follows: agricultural products represent 1.6% of its exports, mining, and fuel products 4% and manufactures 86.6%, the main export products are prepared foods, vehicle engines, electrical devices, machinery, among others. Regarding the countries to which it exports, the main ones are China to which it exports 19.5% of goods, the United States with 19.1%, and the European Union with 11.3%, South Korea 7.1%; the exports to the rest of the world represent 37.2%. (World Trade Organization, 2020).

Tabla 14.Export value of Japan.

Periodo	Flujo comercial de Japón	US\$
2011	Exportación	132,558,803,222
2012	Exportación	150,447,022,903
2013	Exportación	142,136,718,167
2014	Exportación	137,503,838,009
2015	Exportación	135,023,800,046
2016	Exportación	135,071,040,323
2017	Exportación	139,733,004,183
2018	Exportación	145,902,252,542
2019	Exportación	146,974,311,374

Sources: Own elaboration with data from (UN Comtrade, 2020).

Regarding the exports of the Japanese country, it is clear how these change each year. In 2011 and 2012 there was an increase in the exports, but from the year 2013 to 2016 they decreased and then increased in 2017, and, finally, from this year on its exports have been increasing.

When comparing imports with exports, Japanese exports in several years exceeded 140 trillion dollars, while their imports from the United States did not reach 80 trillion dollars in recent years, which clearly reflects a positive balance for the Japanese country.

To make a relationship of these exports and the transit through the Panama Canal, information was collected from the administration of the Canal, taking data from before and after the expansion of the canal.

In 2014 the Panama Canal presented data on the relative importance of the Canal for both imports and exports of each country, where it was concluded that China the canal has an importance of 3.3% in its exports and 1,6% in imports; for the United States it has an importance of 15.7% in its exports and 7.1% in its imports; for Korea it has an importance of 5.1% in its exports and 1.4% in its imports; and, finally, the importance for Japan's exports is 3.2% and for its imports it represents a 1.7%. It can be said that in 2014 the Canal had a greater importance for the United States in terms of its exports. (Canal de Panamá, 2014).

2.4.2 Western South America

The next table shows information from the United Nations Comtrade database, where Chilean exports in recent years are reflected:

Tabla 15.Export value of Chile.

Periodo	Flujo comercial de Chile	US\$
2011	Exportación	9,030,712,815
2012	Exportación	9,596,375,333
2013	Exportación	9,786,031,469
2014	Exportación	9,261,360,043
2015	Exportación	8,181,200,792
2016	Exportación	8,468,396,079
2017	Exportación	10,052,545,977
2018	Exportación	10,411,626,133

2019	Exportación	9,494,259,296
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Source: Own elaboration with data from (UN Comtrade, 2020).

As previous table states, Chilean exports from 2011 to 2013 had an increase; from 2014 to 2015 they presented a fall, but from 2016 to 2018 they showed growth again. However, in 2019 they presented a decrease, which, as mentioned above, has also impacted with a decrease in the route from Chile to the United States through the Canal.

The following table shows the transit of exports from western South America to the United States, comparing 2015 with 2019 in tons:

Tabla 16. Transit exports from western South America through the Canal.

Ruta	2015	2019	
Costa oeste Sudamérica-costa este de US	15.084.953	11.564.565	-23,34%

Source: Own elaboration with data from (Mi canal de Panamá, 2015), (Mi canal de Panamá, 2019).

Comparing this data where the South American exports have had a negative variation, with the US exports that have had a positive variation, it can be said that the contrast in the variations occurs mainly because the exports from the United States to Chile have increased, while the imports from the South American country have decreased, which makes the different commercial operations have different variations from each other.

2.4.3 Europe

In 2017, the European Union exported about 15.07% of the total merchandise that is exported annually around the world, its most important product is manufacturing, which represents almost 80.8% of the exports, followed by agricultural products representing 8.1%, fuels and mining products 7.5%, and other products 3.6%. These goods are sent to its main trading partners, which are the United States (19.7%), China (10.4%), Switzerland (4.6%), Russia (4.6%), and Turkey (4.5%). The remaining percentage is distributed around the world (52.8%). (Trade profile: European Union, 2018).

The following graph illustrates the total value of exports from the European Union to the United States, from 2011 to 2019:

Tabla 17.Export value of the European Union.

Periodo	Flujo comercial de la Unión Europea	US\$
2011	Exportación	360,118,256,616
2012	Exportación	372,643,708,060
2013	Exportación	379,626,839,690
2014	Exportación	409, 554,683,065
2015	Exportación	408,446,988,584
2016	Exportación	399,688,415,982
2017	Exportación	418,922,254,878
2018	Exportación	472,894,492,071
2019	Exportación	494,598,580,000

Source: Own elaboration with data from (UN Comtrade, 2020).

From 2011 to 2014 we can see an important increase, but in 2016 we see how there was a small decrease. According to the 2016 Canal report, this may be due to events such as Brexit and the elections in the United States, which increased the country’s risk and generated a reduction in trade. It is important to take this fact into account because the United Kingdom is one of the most important economies of the European community. In 2017, European exports rose, showing a great improvement in recent years.

To reflect the importance of the United Kingdom for trade between the European Union and the United States, the following table expresses the total value of the United Kingdom's exports to the North American country:

Tabla 18.UK exports value.

Periodo	Flujo comercial del Reino Unido	US\$
2011	Exportación	52,149,820,173
2012	Exportación	56,004,751,199
2013	Exportación	53,728,268,470
2014	Exportación	55,316,558,838
2015	Exportación	58,887,110,546
2016	Exportación	55,147,156,285
2017	Exportación	54,171,521,570
2018	Exportación	61,748,826,091
2019	Exportación	64,133,144,834

Source: Own elaboration with data from (UN Comtrade, 2020).

As the table above shows, and as it was mentioned previously, from 2016 to 2017, exports from the United Kingdom decreased, which was due to all the speculation generated from Brexit. Then, in 2018, exports grew again, which may be since the Britain's departure from the United Kingdom was no longer a speculation, it was a fact, and the consequences it would bring were widely known. In addition, this table about the United Kingdom is highly consistent with the previous table that showed the total exports from the European Union since both have shown an increase in exports in the last two years.

The following table contains data on the tons transited by the route from Europe to the United States through the Canal:

Tabla 19.Transit of European exports through the Canal.

Ruta	2015	2019	
Europa-Costa oeste de Estados Unidos	4.720.976	4.199.401	-11,05%

Source: Own elaboration with data from (Mi canal de Panamá, 2015), (Mi canal de Panamá, 2019).

As the data shows, European exports to the United States have increased. However exports made through the canal have shown a decrease, which can be explained due to several reasons, such as the fact that the route through the Panama Canal is not one of the main routes used by European countries to reach the United States. Rather, in most transits, merchandise reaches the east coast without having to cross the canal. Other reasons may include Brexit, which was already explained.

In order to analyze how the three different routes that have their origin or destination in the United States have been impacted, data was collected about the thousands of tons that have crossed the Canal in 2015 and 2019, taking into account different segments such as Containerized cargo, oil, grains, minerals, and chemicals. In addition, to adequately carry out the comparison, information was obtained on the total of thousands of tons that crossed the routes of Asia-United States, South America-United States and Europe-United States.

The following table shows the traffic through the different routes in thousands of tons. The following data represents the total traffic without differentiating imports from exports:

Tabla 20. Variation of the routes you pass through the Canal

Ruta	2015	2019	Variación %
Costa este de Estados Unidos-Asia	82.144	83.808	2,03%
Costa este de Estados Unidos-costa oeste Sudamérica	36.618	37.019	1,10%
Costa oeste de Estados Unidos-Europa	6.919	6.804	-1,66%

Source: Own elaboration with data from (Mi canal de Panamá, 2015), (Mi canal de Panamá, 2019).

As the table above shows, the routes between Asia-United States and South America-United States presented a positive variation, while the routes to and from Europe obtained a negative variation. This can be analyzed through the fact that the use of the canal is not necessary in this route, because the ports of the east coast of the United States can receive merchandise that goes to the west coast or that comes from the east coast. As a result, it is more common for the Europe-United States routes to use the US intermodal route. This is clearly reflected in that if we consider the tons transported by this route compared to the others, the quantity is very low.

The following table shows the transits in thousands of tons of different products through the Canal. The table above will also be considered to make an analysis of the percentage of the different products that transit through the three different routes:

Tabla 21. Variation of routes and products that transit by routes through the Canal

Año	2015	2019	Variación %
Carga contenerizada	40.012	57.250	43,08%
Petróleo	46.485	73.460	58,03%
Granos	52.023	27.075	-47,96%
Minerales	14.314	10.640	-25,67%
Químicos	13.725	16.786	22,30%
Total, transportado	168.574	187.230	11,07%
% transitado entre Asia-Estados Unidos.	48,7%	44,8%	
% transitado entre Sudamérica-Estados Unidos.	21,7%	19,8%	
% transitado entre Europa-Estados Unidos.	4,1%	3,6%	

Source: Own elaboration with data from (Canal de Panamá, 2015), (Canal de Panamá, 2019).

The reason why these different product segments were taken to perform an analysis regarding the different routes was the fact that these products are the ones that travel the most through the Canal and the ones that the United States trades the most, either for export or import.

Important data was obtained from the previous table, such as the percentage of each product that transits through the different routes, in addition to the variation that each segment had in the two years compared. This data was obtained by performing different operations where the information of the total tons transported by route was compared with the total of the products that were transported. This was done in order to identify, by way of deduction, what is the percentage that these goods represent for each of the routes, which shows that the total of these transported products represent a higher percentage for the Asia-United States route.

However, it can be seen that these percentages decreased in 2019 for all three routes, which allows us to analyze that the main reason why this percentage decreased was the reduction in the transport of goods such as minerals and the grains that had a variation in 2019 compared

to 2015 of -47.96% and -25.67% respectively. The different factors that can influence the decrease of these product's transit, may include the possibility of the use other routes to transport these products or, simply, a reduction in trade between different routes. An example of this is trade between China and the United States, since, according to Comtrade, imports and exports between these countries have decreased in recent years, , with which it is possible that this decrease has affected the variation of the different product segments.

2.5 Logistics and infrastructure changes

2.5.1 Logistical changes of the Panama Canal

The expansion of the Panama Canal has represented logistical changes in terms of the times and size of the ships that travel through it. It is important to first determine which were those changes that occurred in the Panama Canal, and then relate all these changes with the United States and determine how it has impacted the North American country.

The following table compares the performance of the Canal in different years, specifically before and after the expansion:

Tabla 22.. Panama Canal Performance Comparison.

Desempeño en la prestación de servicio	2015	2018
Buques que pasaron por el canal	12.386	12.209
Buques de tamaño super (= o mayor a 91')	8.973	6.987
Buques de tamaño regular	3.413	2.734
Buques panamax	7.771	5.713
Buques neopanamax	-	2.444
Millones de toneladas transitadas	340,8	442,1
Ingresos por peajes en millones de dólares	2.441	2.929

Source: Own elaboration with data from (Canal de Panamá, 2015), (Canal de Panamá, 2018).

The table above shows that the transit of the ships through the Canal all decreased without differentiating by ship size. However, the Neopanamax ships are the only ones that cannot be compared with previous years, given that it was the expansion that allowed the passage of this type of ships, which year after year have presented an increase in their traffic. If its traffic

in 2018 was of 2,444 ships in 2019 it was 2,854. This allows us to identify a constant growth of this type of ships.

Even though transits in other types of ships have decreased after the expansion, the tons transited, and revenues have increased. This is because Neopanamax ships can carry more tons in one ship.

Below, we can see the change in transit and water times during and after the expansion:

Tabla 23. Comparison of times in the Panama Canal.

Tiempos	2015	2018
tiempo en aguas del canal por horas	30,58 horas	26 horas
tiempo en aguas del canal con reserva por horas	16,72 horas	15.73 horas
tiempo de transito desde el ingreso a la primera esclusa	12.26 horas	10.87 horas
tiempo de transito desde el ingreso a la primera esclusa neopanamax	-	14,03 horas

Source: Own elaboration with data from (Canal de Panamá, 2015), (Canal de Panamá, 2018).

This table shows that the changes in the locks of the Panama Canal have brought about good changes in the times traveled and in water times, since, as can be seen in each of the times, there was a reduction in hours. According to Canal data, the reduction in water times is due to the reduction in demand for panamax vessels, improvement in the closing times of neopanamax vessels and an increase in the crews in the panamax vessel lock. Regarding the reduction of transit times, the Canal affirms that this was due to the decrease in the cut-off navigation times. (Canal de Panamá, 2018).

2.5.2 Changes for the United States

After the inauguration of the Panama Canal and until the Second World War, there was a growth in trade that was reflected in Canal traffic. This allowed the shipping industry to undergo technological changes, like the construction of new ships with special characteristics to transport different types of goods such as oil and its derivatives, different types of chemicals, bulk products such as coal, grains and iron minerals, perishable goods, vehicles, and manufactured goods. The creation of new ships is accompanied by port development that

has forced different ports in the world to make a greater investment in access canals so that the world's largest ships can transit through them.

In addition to this, the canal expansion will allow shippers to take advantage of economies of scale, as new and more efficient post-Panamax ships with greater capacity can be used to cross shorter routes, thus reducing fuel costs. They would also have the opportunity to take advantage of the connectivity offered by this route with different points or lines that move cargo between high-density markets (such as the routes of Asia- East coast of the United States, West coast of South America- East coast of the United States), allowing these shipping companies to embrace new clients and make their services more dynamic. (Sabonge, 2014).

As it was previously mentioned, one of the routes that will have the highest frequency of transit will be the Asia-East coast of the United States, however, it is important to note that before the expansion of the canal, only the ports of Norfolk and Baltimore had the necessary conditions to receive these ships. But, according to the ECLAC report, other ports, such as New York / New Jersey, Savannah, Charleston, Jaxport and Miami, were in the process of carrying out projects that would allow them to receive the post-Panamax ships that would transit this route. The success of this route depends partly on the Panama Canal allowing the passage of larger ships, but it is also closely linked to the expansion and infrastructure development of these previously mentioned ports.

In order to develop a pre-post comparison about the infrastructure and logistics changes experienced by some of the ports of the United States, it is important to mention one of the transit routes from Asia to the east coast of the United States, which in this case has its origin in the port of Hong Kong its destination in New York, since this is one of the largest markets in terms of transit of goods. According to an article on the expansion of the Panama Canal and its impact on the east-west shipping route, it can be affirmed that the expansion of the locks contributed to the improvement in times and costs on the aforementioned route, since before this expansion the traffic “on average was 8-10 hours to pass through the canal and 26-28 hours of additional waiting time and after the expansion this time became 18 hours in total”. (Pham, kim, & YEO, 2018).

In addition to this, the following image can illustrate how the expansion of the Panama Canal compared to other routes was chosen by many shipping companies since it gave them an advantage by allowing to transit larger ships and a reducing costs such as fuel.

Ilustración 7. Maritime alternatives comparison

Table 9. The ranking of the alternatives.

Alternatives	A*	A⁻	FC_i	Ranking
Scenario 1: Vessel size: 8600 TEU; Load: 7850 TEU				
Via the Panama Canal	1.74	7.09	0.80	1
Via the Suez Canal	3.65	5.13	0.58	2
Using U.S. intermodal system	5.94	2.84	0.32	3
Scenario 2: Vessel size: 10,000 TEU; Load: 8900 TEU				
Via the Panama Canal	1.74	7.22	0.81	1
Via the Suez Canal	3.64	5.14	0.59	2
Using U.S. intermodal system	6.06	2.97	0.33	3
Scenario 3: Vessel size: 13,000 TEU; Load: 11,500 TEU				
Via the Panama Canal	1.74	7.45	0.81	1
Via the Suez Canal	3.60	5.18	0.59	2
Using U.S. intermodal system	6.29	3.20	0.34	3

Source: (Pham, kim, & YEO, 2018).

The previous image shows that the route through the Panama Canal is higher than the others since it has greater reliability and a comparative advantage in terms of cost, given that it is less expensive compared to the rest of the routes. Even though the cost of toll is higher than that of the Suez canal, this is still the most selected route since it is shorter and easier to travel through this route that connects Asia to the east coast of the United States.

Thanks to the expansion of the Panama Canal locks, this gap between Asia's trade with the west coast of the United States could be broken, giving greater prominence to the ports on the east coast and the Gulf of Mexico. Besides, according to a report on trade in the ports of the east coast of the United States by the Merchant Shipping Association (PMSA), “29 services of the main shipping companies en route from the ports of the East Coast of the United States to Asia go through the canal. Out of these, 15 are Neopaamax services” (iContainers, 2019).

The following image demonstrates the increase in merchandise traffic in the ports of the east coast of the United States in recent years.

Ilustración 8. Traffic via the Panama Canal.



Sources: (iContainers, 2019).

The data from the previous report assures that there was a massive increase in 2018 of 8.6% compared to 2017, given that there was a strong investment in infrastructure expansion in recent years in order to have a greater adaptation with mega ships and be able to stay competitive.

Next, the advances and developments that some of the ports mentioned above have had will be discussed:

Ports of New York and New Jersey: It is estimated that these ports manage a third of the North Atlantic trade, which made them have a greater development. To date the port has deepened its dock to 50 feet, which has allowed the transit of ships up to 18,000 TEUs. (iContainers, 2019).

Savannah Port: It is currently undergoing expansion processes and it is estimated that this year it will have a capacity of up to 14,000 TEUs. At the same time, the US intermodal system is being improved, and it is estimated that 40% of the international transportation costs of the transit of goods that leave through this canal can be saved. (iContainers, 2019).

Virginia Port: This port is in expansion work and it is estimated that it will increase 40% of its total capacity, allowing a depth of 5 feet at its docks, which would make it the deepest

water port on the east coast. This expansion will allow the port to have a greater capacity so that post-Panamax ships can transit through it, thus providing further growth to this port. (iContainers, 2019).

Charleston Harbor: The increase in container traffic through this port with destination to the Asian continent has allowed it to currently have a capacity of 14,000 TEUs. It is currently undergoing works to receive mega ships of 18,000 TEUs. (iContainers, 2019).

The information above allows us to see that the expansion of the Panama Canal managed not only to meet the objective of expanding its locks, but also opened opportunities for other countries such as the United States. It also achieved a development in its portuary infrastructure so that it could have greater connectivity and, in turn, became more competitive with the demands of foreign trade.

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

- As it could be seen throughout the work, the routes that have presented an increase after the expansion of the canal have been the east coast of the United States-Asia and the United States-West of South America, this has been mainly due to the increase in exports to South America and an increase in imports from Asia, which it can be concluded that the expansion of the canal has been favorable for these two routes and generated a real impact, to the increasing trade and transit between these.
- The route between the United States and Europe has shown a decrease, since it can be seen that the traffic after the expansion of the canal has been showing decreases, and note that the expansion facilitates the passage of Neopanamax ships, which in turn it allows a transit of more tons, for the route with Europe this does not represent any change since simply other routes such as the arrival of the merchandise to the east coast of the United States are more efficient.
- Thanks to the development of the work, it was possible to demonstrate the great importance that the expansion of the locks of the Panama Canal played for international trade, especially for the areas mentioned above. And as for the United States it was an important pillar for its economic and logistical development, since as mentioned in the development of the research, this expansion made the United States have a great adaptation and investment in some of its ports on the east coast, adapting to those changes that required being one of the main users of the Panama Canal, and that due to this has allowed it to have a great world position in terms of foreign trade.

3.2 Recommendations

In order for the United States to benefit much more from the expansion of the Panama Canal, it must make greater use of the United States-Europe route through the canal, since this is the route that makes the least use of the canal, with which an increased on the imports and exports of the United States through the canal would beneficially increase the impact that the

expansion of the canal brings to the North American country and all the routes used by the United States through the canal would be obtained.

Another recommendation in logistics is about preparing ports, because although the United States has improved the infrastructure in some of its ports others still are in the process of improvement, which in the beginning generated logistical problems due to delays in starting infrastructure changes, so it is highly recommended that in the future when changes occur in the canal, the ports of the United States should align with these canal projects and start them at the same time so that these ports have changes that are adjusted with the ships that pass through the canal, since this would avoid logistics problems and generate advances for North American ports.

Bibliography

- Acosta, J. A., Londoño, G. A., & Gonzalez, C. H. (2016). Pertinencia de los aportes teóricos para el análisis internacional desde la periferia. *Escenarios: empresa y territorio*, 172-193.
- Ametller, S. (2019). Construcción del tercer juego de esclusas del Canal de Panamá. *Ribagua*, 1-19.
- Barcos portacontenedores tipo Panamax, tipo Neopanamax y otros.* (8 de 4 de 2017). Obtenido de Gruas y transporte: <https://gruasytransportes.wordpress.com/2017/04/08/barcos-portacontenedores-tipo-panamax-tipo-neopanamax-y-otros/>
- Bhadury, J. (2016). Panama Canal expansion and its impact on East and Gulf coast ports of U.S.A. *Maritime Policy & Management*, 1-18.
- Bravo, E. (2012). Globalización, innovación tecnológica y pobreza. Aproximación a las nuevas conceptualizaciones en Latinoamérica. *Espacio Abierto.* , 1-15.
- Brevik, T., & Melleby, C. (2014). *The Expansion of the Panama Canal: A study of consequences in the container shipping industry.* Tesis de maestría, Norwegian School of Economics, Bergen.
- Buendía, E. A. (2013). El papel de la Ventaja Competitiva en el desarrollo económico de los países. *Revista analisis economico*, 1-25.
- Canal de Panamá. (2013). *Informe anual 2013.* Obtenido de <https://wpeus2sat01.blob.core.windows.net/micanaldev/informes%20anuales/Informe-Anual-2013.pdf>
- Canal de Panamá. (2014). *Informe anual 2014.* Obtenido de <https://wpeus2sat01.blob.core.windows.net/micanaldev/informes%20anuales/Informe-Anual-2014.pdf>

- Canal de Panamá. (2015). *Informe anual 2015*. Obtenido de <https://wpeus2sat01.blob.core.windows.net/micanaldev/informes%20anuales/Informe-Anual-2015.pdf>
- Canal de Panamá. (2015). *Principales Mercaderías Transportadas a Través del Canal de Panamá*. Obtenido de <https://micanaldepanama.com/wp-content/uploads/2015/10/2015-Tabla07.pdf>
- Canal de Panamá. (2015). *Principales Rutas Comerciales del Tráfico por el Canal de Panamá*. Obtenido de <https://micanaldepanama.com/wp-content/uploads/2015/10/2015-Tabla00.pdf>
- Canal de Panamá. (2017). *Informe anual 2017*. Obtenido de <https://wpeus2sat01.blob.core.windows.net/micanaldev/informes%20anuales/Informe-Anual-2017.pdf>
- Canal de Panamá. (2018). *Informe Anual 2018*. Obtenido de <https://micanaldepanama.com/wp-content/uploads/2019/07/informe-anual-2018.pdf>
- Canal de Panamá. (2019). *Informe anual 2019*. Obtenido de <https://micanaldepanama.com/wp-content/uploads/2020/01/InformeAnual-2019-2.pdf>
- Canal de Panamá*. (2020). Obtenido de Georgia tech Panama: <https://logistics.gatech.pa/es/assets/panama-canal/statistics>
- Canal de Panamá. (2019). *Principales Mercaderías Transportadas a Través del Canal de Panamá*. Obtenido de Principales Mercaderías Transportadas a Través del Canal de Panamá
- Cerezo de Diego, P. (2010). El Canal de Panamá y su régimen jurídico. *Anuario Jurídico y Económico Escurialense*, 1-18.
- Cifuentes, J. L., Torres, P., & Frias, M. (2013). *Trasporte marítimo mundial*. Obtenido de El océano y sus recursos XII. EL futuro de los océanos.: http://bibliotecadigital.ilce.edu.mx/sites/ciencia/volumen2/ciencia3/100/html/sec_9.html

- (2018). *Constitución política de Panamá (con reformas de noviembre de 2004)*. Constitución política, Ciudad de Panamá.
- Díaz, I. (2009). Enfoque de Porter y de la teoría basada en los recursos en la identificación de la Ventaja Competitiva: ¿contraposición o conciliación? *Economía y desarrollo* , 1-15.
- Escuela de organización industrial. (01 de 06 de 2015). *Influencia de la próxima inauguración de la ampliación del Canal de Panamá en las rutas transoceánicas del transporte de mercancías*. Obtenido de <https://www.eoi.es/blogs/madeon/page/5/>
- Fan, H., & Gu, W. (2019). Study on the Impact of the Panama Canal Expansion on the Distribution of Container liner routes. *Journal of Transportation Technologies*, 204-214.
- Grondel, L. (2018). *Un análisis de costo-beneficio en lo económico, lo social y lo político: La percepción de los panameños sobre el papel de la ampliación del Canal de Panamá*. Tesis de maestría , Leiden University , Leiden.
- Guevara, C. (2011). National Security or Special Interests? US Support for the Panama Canal expansion programme. *Global Society*, 1-25.
- iContainers. (12 de 02 de 2019). *Los mayores puertos de la Costa Este de Estados Unidos*. Obtenido de <https://www.icontainers.com/es/2019/02/12/los-mayores-puertos-de-la-costa-este-de-estados-unidos/>
- Lewis, L. (8 de 2 de 2010). Panama Canal revamp boosts China and puts Buffett bet at risk. *The times*. Obtenido de <https://www.thetimes.co.uk/article/panama-canal-revamp-boosts-china-and-puts-buffett-bet-at-risk-f65vjhgczjh>
- Mayorga Sánchez, J. Z., & Martínez Aldana, C. (2008). Paul Krugman y el nuevo comercio internacional. *Criterio libre* , 1-14.
- Mi canal de Panamá. (2015). *Estadísticas de tránsito 2015 -Atlántico al pacífico*. Obtenido de <https://micanaldepanama.com/wp-content/uploads/2015/10/2015-Tabla08.pdf>

- Mi canal de Panamá. (2015). *Estadísticas de tránsito 2015-Pacífico al atlántico*. Obtenido de <https://micanaldepanama.com/wp-content/uploads/2015/10/2015-Tabla09.pdf>
- Mi canal de Panamá. (2015). *Principales Rutas Comerciales del Tráfico por el Canal de Panamá*. Obtenido de <https://micanaldepanama.com/wp-content/uploads/2015/10/2015-Tabla00.pdf>
- Mi canal de Panamá. (2019). *Estadísticas de Tránsito 2019- Atlántico al pacífico*. Obtenido de <https://micanaldepanama.com/wp-content/uploads/2019/10/07-FlujoDeCarga-ATLaPAC-1.pdf>
- Mi canal de Panamá. (2019). *Estadísticas de Tránsito 2019 -Pacífico al atlántico*. Obtenido de <https://micanaldepanama.com/wp-content/uploads/2019/10/08-FlujoDeCarga-PACaATL-1.pdf>
- Mi canal de Panamá. (2019). *Panama Canal Traffic Along Principal Trade Routes*. Obtenido de <https://www.pancanal.com/eng/op/transit-stats/2019/Table-00.pdf>
- Milano, M. (2014). *Desarrollo del Mercado Contenerizado en Las Américas tras la expansión de Canal de Panamá*. Barcelona: Universitat politècnica de Catalunya.
- Panayides, P., & Song, D.-W. (2013). Maritime logistics as an emerging discipline. *Maritime Policy & Management*, 1-16.
- Park, C., Richardson, H., & Park, J. (2020). Widening the Panama Canal and U.S. ports: historical and economic impact analyses. *Maritime Policy & Management*, 1-16.
- Pham, T. Y., Kim, K. Y., & YEO, G.-T. (2018). The Panama Canal Expansion and Its Impact on East–West Liner Shipping Route Selection. *Sustainability*, 1-16.
- Port Houston. (14 de 11 de 2016). *Overview*. Obtenido de <https://porthouston.com/about-us/>
- Port Miami. (2020). *Cargo*. Obtenido de <https://www.miamidade.gov/portmiami/cargo.asp>
- Port of Los Angeles. (2020). *Facts & figures*. Obtenido de <https://kentico.portoflosangeles.org/getmedia/a43d3038-7713-4ebd-8c6a-dc72195a65f1/2019-facts-figures>

- Port of Oakland Seaport. (2020). *Facts & Figures*. Obtenido de <https://www.oaklandseaport.com/performance/facts-figures/>
- Port of Seattle. (2020). *Global Connections*. Obtenido de <https://www.portseattle.org/community/global-connections>
- Portal Portuario. (11 de 03 de 2019). *Estados Unidos: Puerto de Virginia finaliza primera fase de su plan de expansión*. Obtenido de <https://portalportuario.cl/estados-unidos-puerto-de-virginia-finaliza-primer-fase-de-su-plan-de-expansion/>
- Porter, M. (2011). *La ventaja competitiva de las naciones*. The free press.
- Principales puertos y aeropuertos de carga en Estados Unidos*. (2020). Obtenido de DSV: <https://www.es.dsv.com/transporte-internacional-mercancias/5-puntos-clave-exportar-importar-estados-unidos/principales-puertos-aeropuertos-usa>
- Ragland, C., Widmier, S., & Brouthers, L. (2015). A factor endowment approach to international market selection. *Journal of Strategic Marketing*, 1-17.
- Sabonge, R. (2014). *La ampliación del Canal de Panamá Impulsor de cambios en el comercio internacional*. Santiago de Chile: Comisión Económica para América Latina y el Caribe (CEPAL).
- South Carolina Ports. (2020). *About the port*. Obtenido de <http://scspa.com/about/>
- Todologica News. (2020). *Puertos de Georgia generan importantes ingresos y puestos de trabajo*. Obtenido de <https://www.todologica.com/index.php/ee-uu/7311-puertos-de-georgia-generan-importantes-ingresos-y-puestos-de-trabajo>
- Trade profile: European Union*. (2018). Obtenido de World Trade Organization: https://www.wto.org/english/res_e/statis_e/daily_update_e/trade_profiles/E28_e.pdf
- TradeMap. (2020). *Comercio bilateral entre Estados Unidos de América y Corea*. Obtenido de [https://www.trademap.org/\(X\(1\)S\(zu4qjy3v5sqyj1rycqsulhus\)\)/Bilateral_TS.aspx?nvpm=3%7c842%7c%7c410%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1](https://www.trademap.org/(X(1)S(zu4qjy3v5sqyj1rycqsulhus))/Bilateral_TS.aspx?nvpm=3%7c842%7c%7c410%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1)

- UN Comtrade. (2020). *Trade data*. Obtenido de <https://comtrade.un.org/data/>
- Vorotnikova, E., & Davados, S. (2016). The Effects of Panama Canal Expansion on US Dairy Trade Flows: West, East, and Gulf District Regions. *International Food and Agribusiness Management Review*, 1-20.
- Vyuptakesh, S. (2010). *International Business: Concept, Environment and Strategy*. Pearson.
- Wang, M. (2017). The role of Panama Canal in global shipping. *Maritime Business Review*, 247-259.
- World Trade Organization. (2020). *Japan*. Obtenido de https://www.wto.org/english/res_e/statis_e/daily_update_e/trade_profiles/JP_e.pdf
- World Trade Organization. (2020). *Korea, republic of*. Obtenido de https://www.wto.org/english/res_e/statis_e/daily_update_e/trade_profiles/KR_e.pdf
- World Trade Organization. (2020). *Chile*. Obtenido de https://www.wto.org/english/res_e/statis_e/daily_update_e/trade_profiles/CL_e.pdf
- World Trade Organization. (2020). *China*. Obtenido de https://www.wto.org/english/res_e/statis_e/daily_update_e/trade_profiles/CN_e.pdf
- World Trade Organization. (2020). *United States of America*. Obtenido de https://www.wto.org/english/res_e/statis_e/daily_update_e/trade_profiles/US_e.pdf
- Ximenez, P. (12 de 10 de 2014). *California compite con el canal de Panamá*. Obtenido de El Pais: https://elpais.com/economia/2014/10/10/actualidad/1412957330_123816.html
- Yu, C. W. (2015). *A Study of the Impacts of the Panama Canal*. Bridgewater.
- Zamora, A. I., & Lenin, J. C. (2015). Competitividad de la administración de las aduanas en el marco del comercio internacional. *Contaduría y administración*, 1-24.