



Faculty of Legal Sciences

School of International Studies

**ANALYSIS OF THE COMPETITIVENESS OF
MARITIME TRANSPORT LOGISTICS IN LATIN
AMERICA PERIOD 2017-2021**

**Degree work prior to obtaining the degree of
Bachelor of International Studies**

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DEDICATION

This degree work is dedicated to:

My family for their unconditional support to complete this
important stage in my life.

Eduardo, for walking together in this process.

My friends from my program that allowed me to share the best
moments in these years of study.

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My deep gratitude to God for
allowing me to get here.

To my parents for their effort and sacrifice,
and to my brothers and uncles for being
part of this achievement.

To my grandfather, Rogelio, who always
looked out for me.

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RESUMEN:

La presente investigación analiza la competitividad de la logística del transporte marítimo en América Latina en el periodo 2017-2021, con enfoque en Brasil, Colombia, Chile, México y Panamá, países latinoamericanos con los mayores índices de movimiento portuario. Entre los hallazgos más significativos están: la importancia de una infraestructura portuaria adecuada, la existencia de una mayor coordinación entre los actores del sector logístico, la trascendencia de la eficiencia en el despacho aduanero y la debida calidad de los servicios logísticos. Se abordaron los índices de competitividad global, de conectividad marítima y de desempeño logístico, índices que presentaron fluctuaciones positivas y negativas en relación a los demás continentes que conforman el globo. En este contexto, se da uso a una metodología de investigación descriptiva basada en datos secundarios cuantitativos mediante el análisis de documentos y estudios relacionados con variables seleccionadas en cuanto a la competitividad logística del transporte marítimo en la región.

Palabras clave: América Latina, competitividad, eficiencia, logística del transporte, transporte marítimo.

ABSTRACT:

This research analyzes the competitiveness of maritime transport logistics in Latin America in the period 2017-2021 focusing on Brazil, Colombia, Chile, Mexico, and Panama, which are Latin American countries with the highest rates of port movement. Among the most significant findings, are the importance of an adequate port infrastructure, the existence of greater coordination between the actors of the logistics sector, the importance of efficiency in customs clearance, and the due quality of logistics services. The indices of global competitiveness, maritime connectivity and logistics performance were addressed; indices that presented positive and negative fluctuations in relation to the other continents that make up the globe. In this context, a descriptive research methodology based on quantitative secondary data was used through the analysis of documents and studies related to selected variables regarding the logistics competitiveness of maritime transport in the region.

Keywords: Latin America, competitiveness, efficiency, maritime transport., transport logistics



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Analysis of the competitiveness of maritime transport logistics in Latin America in the period 2017-2021

1. Introduction

This research analyzes the competitiveness of maritime transport logistics in Latin America from 2017 to 2021, focusing especially on Brazil, Mexico, Colombia, Chile, and Panama. These countries were selected due to their outstanding performance according to ECLAC's Port Movement Index. To assess competitiveness, three main indices were used: the Logistics Performance Index, the Maritime Connectivity Index, and the Global Competitiveness Index. These indices provided a comprehensive perspective on the competitiveness of the selected countries. Also, comparisons were made with the performance of other continents in the world.

International trade is considered by many as the basis for development. Strong trade promotes industrialization, training, competitiveness, quality, as well as the creation of new jobs and strengthening of physical and digital infrastructure at the national level. Considered as one of the pillars for development, commercial activities are consolidated as a complex system that requires the coordinated participation of many actors and procedures. One of the most important processes within this system is the transport of goods, since without it, the countless commercial transactions that are carried out daily in the world could not be completed. Due to this situation, there are several types of transport; however, in international trade, maritime transport continues to be the most used for the transfer of goods in Latin America for many years, allowing commercial relations, increasing production, improving the economy and with it, the growth and welfare of the inhabitants.

Trade, as an activity, has considerable importance in all nations and plays a crucial role in economic growth both nationally and globally, as it contributes to strengthening the economy. In Ecuador, export activities of primary goods have been maintained, based on different products at different times. This generates situations that maintain the generation of jobs, innovation of services and goods offered, skills and productive competencies that have kept the country as one of the main referents of growth thanks to these activities.

The competitiveness of maritime transport logistics in Latin America is an important and interesting topic to explore. It refers to the ability of a country to compete effectively in terms of costs, delivery times, safety, quality, and other characteristics that influence the selection of a maritime transport company in order to meet the needs of customers (Munguía et al., 2018). The activity in question is usually affected by factors such as maritime transport network design, fleet size, level of technology, efficiency of fleet management services, fuel cost, port infrastructure and government incentives (Castañeda, 2020).

Competitiveness allows us to understand the factors and situations that generate modifications in the different levels of logistics management, how the amounts are adapted to the services offered and the different regulations or legislations that ensure the functioning of the sector; so it is important to recognize how competitiveness achieves and impacts foreign trade in a globalized environment, especially as a result of the Covid-19 pandemic, in which these vital activities for foreign trade were affected and had to have a redesign with which to respond to the new requirements.

In recent years, maritime transport in Latin America has been subjected to a series of challenges such as process interruption, infrastructure failures, innovation in procedures and efficient logistics measures, which are some of those that threaten to compromise competitiveness within an increasingly demanding global market (Pereira y Díaz, 2021). This is particularly relevant for the continent, as maritime trade plays a key role in economic activity. Therefore, to ensure the competitiveness of this sector, structural improvement measures such as investment in infrastructure, improved intermodal coordination and worker training are required. These actions would help allow Latin American countries to compete on a level playing field in the global market (Vargas et al., 2022).

1. Objectives

General Objective

Analyze the competitiveness of Maritime Transport logistics in Latin America in the period 2017-2021.

Specific Objectives

Identify the parameters of competitiveness in maritime transport in Latin America – focus on infrastructure.

Identify the level of competitiveness in maritime transport in Latin America – focus on infrastructure.

1.1. Theoretical framework

International trade has long been part of human civilization; however, in recent decades it has witnessed an accelerated development in the different activities that make up cross-border trade. Imports and exports have contributed greatly to GDP (gross domestic product) growth through the development of imports and exports (Velásquez & Losada, 2019).

Trade has been studied and interpreted in various ways by different philosophers and economists as they have presented different theories that provide explanations and definitions of the concept of international trade.

The classical theory of international trade is one of the main postulates that explain international trade through supply and demand. This theory explains how countries exchange goods and services with other states and how these exchanges can improve the global economy. This theory is also important for understanding how countries relate to each other and how trade agreements between states can affect prices and trade between them. This is why it is important to talk about the classical theory of international trade when discussing trade (Segovia et al., 2019).

The theory of mercantilism is the first classical postulate proposed around the XVII-XVIII century. This economic current is one of the most debated by researchers, since it focuses as a matter of priority, on the fact that countries must look after their own well-being, and as a result, exports must be expanded and imports discouraged. The theory in question determined that one should try to ensure that only the necessary raw materials are imported and nothing else. He also proposed the view that the first thing a nation should focus on is the accumulation of wealth in the form of gold and silver, thus strengthening the nation's treasury (Ortiz, 2019).

The current trend in international trade should also be acknowledged thanks to the technological advances that together, with port changes and new markets, maintains the predominance of electronic commerce through ICT, allowing it to easily obtain the necessary information between buyers and suppliers, which benefits operability. This drives the trend of cross-border e-commerce, by being the change maker of imports and exports, thus facilitating the acquisition of products and goods, and reducing times and costs that also affect the logistics process (Valbuena & Montenegro, 2017).

Within foreign trade, there are a large number of activities that make it possible. Among these are transport and storage which are the two main functions of logistics; where transport management focuses on the planning, optimization and execution of the use of vehicles to move goods between warehouses, points of sale and customers. Transport is multimodal and can include sea, air, rail, and roads, for which it must be recognized that transport management is a complex process that involves the planning and optimization of shipping routes and loads, order management, auditing, and payment of freight.

Carrier management is an important aspect as the price, availability, and capacity of carriers can vary widely. Logistics companies often use transportation management system (TMS) software to help meet the demands of transportation-related logistics. Warehousing, or warehouse management, includes functions such as inventory management and order fulfillment, plus it considers the management of warehouse infrastructure and processes. Suppliers, manufacturers, distributors, and retailers have had to improve their logistics processes to meet the demand for faster and more convenient delivery of a wider variety of products. They have also had to better integrate their processes and systems to improve supply chain visibility (Alemán de la Torre et al., 2021).

Procurement logistics describes a supply chain as a complete system of production and delivery of a product or service, from the initial stage of sourcing raw materials to the final delivery of the product or service to final users. Among the risks that have arisen in the supply chain, the COVID-19 pandemic stands out, which has caused the greatest impact on it in recent times. Similarly, Russia's invasion of Ukraine has caused the worst humanitarian crisis in Europe since World War II, resulting in supply chain disruptions in critical sectors

such as agriculture, automotive, energy, and food. Changes in the environment and the global economy have increased the frequency and magnitude of these shocks.

Getting a product to arrive on time, without damage and effectively is one of the most important parts of success, mainly benefiting large corporations as unique subjects. However, the truth is that distribution logistics benefits three groups of people, the seller of the product, the market, and the consumer. Whether the company is a large cooperative or the owner of a local small business looking to grow, distribution logistics can benefit the company.

Shipping is one of the oldest forms of transportation and remains one of the most popular and widely used ways of transporting goods globally. Although maritime transport is slower than other means of transport, such as air, it has many advantages. First of all, it is cheaper, which makes it ideal for transporting large quantities of goods. Secondly, maritime transport is safer and less accident-prone than other modes of transport (Munguía Vázquez, Canales García, & Becerril-Torres, 2018). It also requires great coordination between the different actors involved. The main players are shipowners (shipping companies), shipping agents, port operators, logistics service providers, and service users (importers and exporters).

Shipowners are the shipping companies that own and operate ships. Shipping agents are companies that represent shipowners and are responsible for coordinating the movement of cargo and passengers. Port operators are companies that are responsible for the management and operation of ports. Logistics service providers are companies that offer specialized cargo transportation, storage, and handling services. Users of services are companies that import or export goods by sea (Laxe et al., 2019).

The indicators of operations, authorities and port planning allow an improvement in the structure of maritime transport, informing and helping local, regional, and national authorities. These indicators are measured in the processes and time taken by ships and vessels to carry out port operations, in addition to the tonnage transferred daily by them. The permanence in the port from the arrival and next departure must also be considered. The time of permanence is calculated by dividing the total annual hours by the total number of ships circulating in a year. The number of movements carried out by cranes in ports considers container movements and other operations necessary to ensure ship services and container transfers according to the movements included in the process (Freire-Seoane et al., 2020).

Among the main competitiveness indicators stand out:

Container Port Movement

Container Port Movement has revolutionized global shipping by introducing standardized containers for freight trade. This system has improved efficiency in the loading and unloading of ships, reducing waiting times in ports, and streamlining logistics. In addition, containers facilitate cargo planning and optimize storage space on ships and ports, generating benefits in terms of efficiency, safety, and cost reduction in international trade (Notteboom & Rodriguez, 2019).

The Port Movement of Containers has improved safety and reduced costs in the transport of goods globally. The use of closed and sealed containers protects goods and facilitates tracking and monitoring. This has led to greater efficiency and economic savings in the transport of large volumes of goods. However, it has also posed challenges in terms of infrastructure and port congestion (Brooks, 2018).

Logistics Performance Index (LPI)

It was developed by the World Bank, and it is based on a series of key indicators that evaluate different aspects of the supply chain. It uses key indicators such as customs efficiency, quality of logistics infrastructure, transport competence and ease of doing business (Arvis et al., 2019). The LPI uses a scale of 1 to 5, where 1 represents the lowest logistics performance and 5 the highest. This scale makes it possible to identify areas for improvement and establish priorities in investment in infrastructure and logistics policies. In addition, the LPI provides a historical perspective, allowing countries to assess their progress in terms of logistics efficiency over time (World Bank, 2021).

The Global Competitiveness Index (GCI)

Developed by the World Economic Forum, it is based on a wide range of indicators grouped into 12 main pillars. These pillars include institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, labor market efficiency, financial market development, technology availability, market size, business sophistication, innovation, and technological absorptive capacity. These indicators capture both the quantitative and qualitative aspects of competitiveness. (World Economic Forum, 2022).

The Global Competitiveness Index (GCI)

This tool uses a scale from 1 to 7 to measure the competitiveness of countries, allowing comparisons and monitoring over time. It provides detailed reports that analyze specific strengths and weaknesses, thus, helping countries identify areas for improvement. The ICG is also useful for companies, since it allows them to assess the competitiveness of the countries in which they wish to operate and make strategic decisions based on that data (Hausmann & Hidalgo, 2020).

The Maritime Connectivity Index (MCI):

This indicator evaluates the connectivity of ports using different indicators, such as maritime shipping, ease of doing business, customs efficiency, quality of port services, and ability to attract trade and investment. With a scale of 0 to 100, it allows them to compare connectivity and measure progress in port efficiency. It provides a detailed analysis of strengths and weaknesses, identifying areas for improvement and guiding policies and strategies to strengthen port capacity (UNCTAD, 2021).

The MCI is not only useful for governments and port authorities, but also for companies operating in international trade. Companies can use the MCI as a tool to assess the efficiency and connectivity of the ports in which they wish to operate. This allows them to make informed decisions about the selection of shipping routes and the choice of ports of call, which can have a significant impact on costs and delivery times (UNCATD, 2021).

2. State of the art

Achieving competitiveness requires numerous factors, according to Munguía et. al. (2018) Competitiveness has evolved over time, especially in recent years, when tariff and non-tariff barriers have been eliminated, markets have become increasingly compacted and companies have better possibilities to access other markets and transcend. The objective of the study was to analyze and contrast the main variables used to evaluate the logistics competitiveness of maritime transport among the member countries of the Pacific Alliance. The results of this analysis are of particular importance to identify areas of strength or weakness in the operation of transport logistics in these countries; information that may be relevant in the formulation of public policies, the generation of a regional cooperation framework or in business decision-making. In addition, the study highlighted the negative factors in which certain trends that affect the performance of unit trade are evident, such as the cost of fuel consumption, increase in the size of ships, standards and controls, regulatory evolution, among others.

Cortés (2018) analyzed, through a descriptive study, how infrastructure development was an important element of competitiveness during the period 2006-2016. This research compared the behavior of investment in transport infrastructure against variables that measure the results of its competitiveness, such as: costs, time, quality and logistics performance for each of the member countries of the Pacific Alliance, based on information sources such as the World Bank, World Economic Forum (WEF), Economic Commission for Latin America and the Caribbean (ECLAC) and Infralatam. From this analysis, it was possible to demonstrate the close relationship between the quality of the transport infrastructure and the level of competitiveness of the countries studied.

Álvarez et. al. (2019) and López et. al. (2019) presented preliminary results of their research project entitled *Deficit of maritime transport in Colombia. Estimation of its determinants*. The need to understand the reasons for one of the structural imbalances that Colombia presents with the external sector, specifically in the current account and in the balance of non-factor services, is evident. In this sense, the main objective of the research was to analyze the deficit behavior of the account of income and expenses of maritime transport in Colombia from Latin American structuralism, which focuses on demonstrating the slowness and inequality of the technical process between developed and developing countries. The approach was explanatory, based on the inductive method through documentary analysis. The results indicated that in addition to Colombia's geopolitical condition, there are micro and macroeconomic factors that affect the performance of maritime transport. It was concluded that, in the central and periphery instances, Colombia presents a significant lag in international trade transport; while the countries of North America gain competitiveness due to technical progress in the construction of shipping fleets, an industry developed mainly in the United States.

On the other hand, another country in Latin America which has shown the importance of the use of ICTs in international transport is Peru. In these sense, Barrutia (2020) presented an article that reviews the importance of the use of ICTs in the evolution of international transport logistics and its relationship with the economic development of Latin America, with emphasis on Peru. The methodology used for the writing of this article included the review of several bibliographic sources composed of specialized texts, and consultations

made in virtual logistics journals. The results of these article showed that in Latin America it is necessary for logistics operators to implement new information and communication technologies (hardware, software, and communication) according to the countries with which they plan to have some economic exchange, with the aim of optimizing their tracking methods in the transport and distribution processes, thus generating the reduction of costs and security.

Whereas Sánchez et. al. (2021) analyzed the existing situation caused by the Covid-19 pandemic, which requires new ideas to face the obstacles that have arisen in logistics systems and supply chains. Their work aimed to analyze the challenges of logistics and the supply chain post Covid-19. The methods used were a bibliometric analysis that allowed to determine the main lines of research on the subject, a bibliographic review that makes it possible to make a contrast with other top-level journals from different areas of knowledge, and the work with experts for the validation of the challenges obtained. With the application of the aforementioned methods, it was determined that the main lines of research are the training of new professionals who know how to face current situations with renewed engineering and inventory management to avoid resource depletion and chaos purchases.

Similarly, Carvache (2021) presented an analysis of the impact of the COVID-19 pandemic in the main ports of South America by making a comparison between 2019 and 2020. The analysis allowed to obtain data through secondary sources through official web pages, scientific journals, port authority, port portals, and competent ministries. The comparative analytical method was used, with mixed approach and longitudinal experimental design, which served to reach the conclusion presented at the end of this work. The results obtained showed that in three of the seven ports studied there were percentage increases in the comparison with the previous period, while in three others, there was a negative variation of between 2 and 8%, and one of the ports remained relatively the same as in 2019.

Bello y Torres (2021) focused on the first studies on international trade by Thomas Mun, director of the English East India Company in 1664, who, in his work *The Treasure of England Created by Foreign Trade*, asserted that trade was the only way to increase the country's wealth. As a doctrine related to international trade, the mercantilists—with their idea of achieving a favorable balance of trade and hoarding precious metals—provide the first elaborate designs of the phenomenon of international exchanges. Of particular importance is the continuing emphasis on key processes with respect to the development and harmonization of border crossings and the regulation of various modes of transport.

Meanwhile, García et. al. (2021) proposed as the objective of their research to perform the analysis of the Competitiveness of logistics operators through a bibliometric study in the Scopus database, 2017 - 2021. The number of selected documents was 148, with a total of 428 authors, of which 404 registered one document and 24 authors registered between two to more documents; 523 keywords were also identified. It was concluded that current development trends worldwide focus on the balance between economic, social, and environmentally sustainable development. The annual scientific production on the subject is still low, with a record 42 articles published in the journals *Sustainability* (Switzerland), *International Journal of Logistics Management* and *Journal of Cleaner Production* in 2020. The largest cross-country collaboration is between China, the United Kingdom, the United States, and India. The trending topics are oriented towards supply chain management.

López et. al. (2021) analyzed the operational performance in the maritime transport logistics chain in Colombia, based on the current situation, the different deficiencies it has and the approach of indicators that allow observing the differences of interests that exist in the decision-making process between managers and shareholders of an organization, which will help to improve the innovation process and in turn lead to the implementation of new programs. The maritime fleet is used more than air transport because the freight is cheaper, not to mention that the volumes handled are larger and the possibility of handling two modalities, consolidated cargo, which means a container with several types of goods and will only be charged per ton per cubic meter, or the handling of a full container, which makes this transport more interesting.

Finally, for Cordóñez et. al. (2022) the global downturn in the economy with the arrival of COVID-19 affected exports and imports worldwide as transportation mobility was limited due to the sanitary measures implemented to prevent the spread of the virus. The methodology used in this research focused on the bibliographic review. In the case of maritime transport, various guidelines and strategies were implemented that resulted in increased business profitability once the sanitary emergency was balanced. Air transport suffered the most significant setback, but by mid-2020, it achieved an improvement compared to the beginning of the pandemic and, in the case of land transport, it began to implement the use of bicycles and electric vehicles that allowed it to move from one place to another. In addition, businesses offered delivery services to reactivate their commercial activities while complying with containment restrictions.

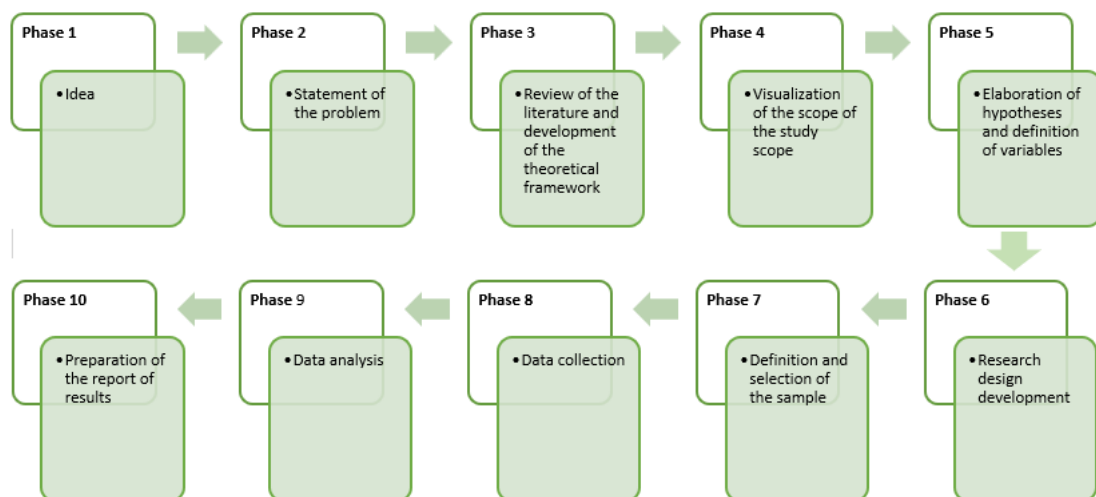
3. Methods

This research was conducted using a descriptive approach based on quantitative secondary data through the analysis of documents and studies related to the selected variables, in regards to transport logistics and focused particularly on the competitiveness of maritime transport in Latin America, its growth and variation in recent years.

According to Hernández Sampieri et. al. (2014) the descriptive research makes it possible to detail how a phenomenon or situation is and manifests itself. Therefore, through these studies we were sought to determine and specify the characteristics, properties and profiles of groups, processes and persons subjected to an analysis, in this case, related to the competitiveness and the physical and digital structure of maritime transport in Latin America in 2019 and 2020.

As mentioned before by Hernández Sampieri et. al. (2014), the quantitative approach represents a set of evidential and sequential processes where each stage precedes the next and these steps cannot be avoided. It has defined steps that can be modified according to the requirements of the research, starting from an idea that is delimited and then derived to the questions and objectives of the research. Supported by a literature review of secondary sources, a theoretical perspective was presented. Subsequently, the variables and how these were measured, were also determined. Finally, by analyzing the results obtained through statistical methods, results were obtained, as can be seen in Figure 1.

Figure 1 Quantitative process



Source: Hernández et. al. (2014).

The phases that made up this investigation included:

Phase 1 idea: in this first phase, the topic to be investigated was determined according to the needs of the study, the researcher's contribution and the requirements set by the institution for the work to be carried out.

Phase 2 - problem statement: in this phase, the current situation regarding the competitiveness of logistics in Latin American maritime transport was presented. Within the topic of international transportation, it was decided to focus on the one carried out in this region because it is important to know the position on how competitive this process is in the continent and what has been the evolution in the period 2017 to 2021.

Phase 3 - literature review and development of the theoretical framework: in this phase, all the theoretical information was collected. Different authors and theories related to the research that support it were also selected.

Phase 4 - visualization of the scope of the study: for this phase, the scope of the research was determined in regard to the information collected and the approach taken, that is, the competitiveness of maritime transport for Latin America in the period 2017-2021.

Phase 5 - development of hypotheses and definition of variables: the variables for the collection of information were defined, that is, competitiveness in the areas of physical structure in the established period of time.

Phase 6 - development of the research design: the design of this research was presented as a descriptive study based on quantitative secondary data.

Phase 7 - definition and selection of the sample: for this stage the field of the population was reduced, in this case, of all the maritime ports around Latin America; the 5 main countries were selected according to the ranking of the Port Movement of ECLAC.

The ports selected according to the Port Movement ranking for the period 2017-2021 were:

1. Brazil
2. Mexico
3. Panama
4. Chile
5. Colombia

Phase 8 - data collection: At this point of the research, data was obtained from official sources such as ECLAC reports, World Bank, United Nations and World Economic Forum data to measure the variables through the different indicators selected.

Phase 9 - data analysis: Through a comparative analysis between the selected countries and the period of time that was established (2017-2020), Office Package Tools were used in order to tabulate, present, and analyze the data collected, and thereby present an interpretation that explains the variations during the selected period with respect to maritime transport.

Phase 10 - preparation of the report of results: Finally, a report was prepared presenting the analysis of the results obtained based on the research objectives.

4. Results

The objective of this empirical article was to analyze the competitiveness of maritime transport logistics in Latin America in the period 2017-2021, through data obtained from the Logistics Performance Index of the World Bank, the Global Competitiveness Index of the World Economic Forum and the Connectivity Index of the United Nations Conference on Trade and Development. We considered the 10 countries in the region with the highest port movement and best logistics performance, according to the data obtained from the ranking of container port movement of the Economic Commission for Latin America and the Caribbean.

As can be seen in Table 1, the data collected from ECLAC shows the 10 countries in the Latin American region with the highest port movement during the period 2017-2021.

Table 1 Latin America Container Port Movement 2017-2018 period

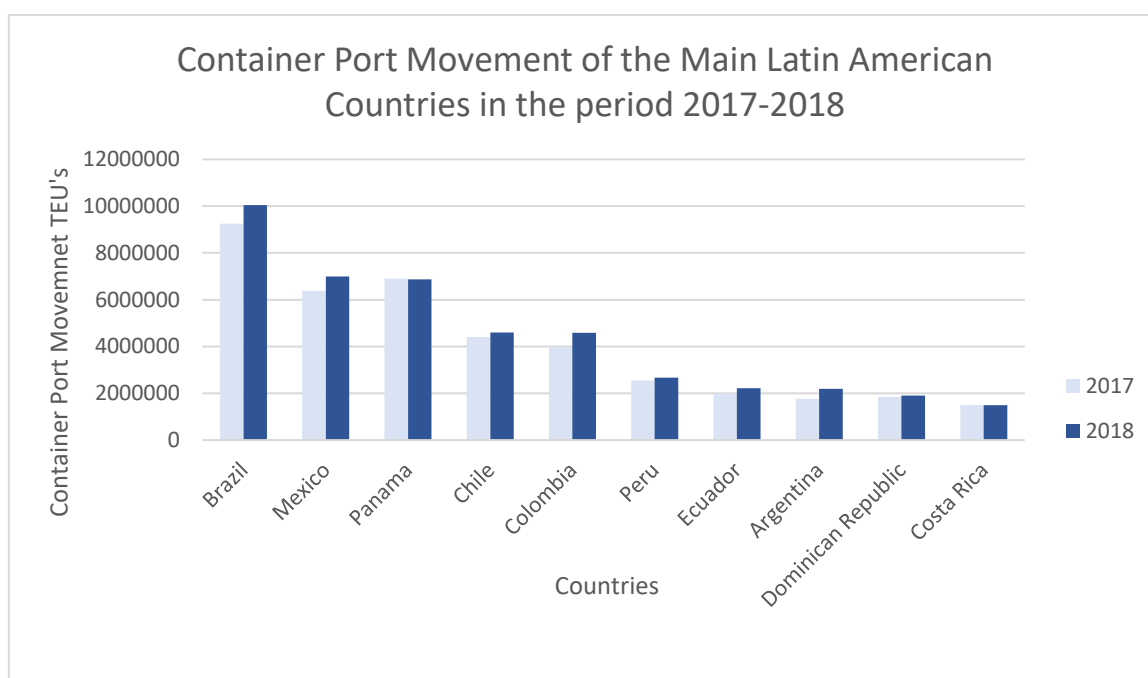
Country	2017	Country	2018
Brazil	9250788	Brazil	10041485
Panama	6898246	Mexico	6987820
Mexico	6375338	Panama	6872369

Chile	4407772	Chile	4596602
Colombia	3956466	Colombia	4582712
Peru	2540960	Peru	2667974
Ecuador	1990094	Ecuador	2212486
Dominican Republic	1842616	Argentina	2194428
Argentina	1765973	Dominican Republic	1906487
Costa Rica	1489210	Costa Rica	1492791

Source: ECLAC, 2023.

Figure 2, shows the behavior of container port movement of the countries mentioned before, during the 2017-2018 period.

Figure 2 Container Port Movement of the Main Latin American Countries in the period 2017-2018



Source: CEPAL, 2023

As shown in Figure 2, Brazil was the country with the highest port movement during 2017 and 2018. In this period, it experienced a growth of 8.55%. Mexico is in second place, followed by Panama in third place. These countries have presented a higher port movement than other countries in this ranking. However, while Mexico experienced a growth of 9.61% in this period, Panama recorded a decrease of 0.38% although it still maintains a higher movement than the other countries. Chile remains among the top countries in this ranking due to its 4.28% growth in 2018. Colombia had the second-best performance in this period, with a growth of 15.83% from 2017 to 2018, compared to the other 10 countries analyzed. Peru experienced a 5% growth but remains in the sixth position in the ranking. Ecuador is the third best performing country in this period and

remained in the same position. Argentina had the highest growth, reaching an increase of 24.26% in 2018, which indicates good management in its ports. Dominican Republic had a growth of 3.47% through 2018, while Costa Rica registered a growth of 0.24%. When comparing the latter country with Brazil, the first in the ranking, it can be mentioned that there is a percentage difference of 85%. This indicates that Costa Rica is still far from achieving a performance like Brazil's.

The Latin American countries selected for this analysis were chosen because of their higher port activity in the period studied. Port activity is a relevant indicator to assess the importance and performance of countries in the logistic and commercial field.

By selecting these countries with the greatest port activity, we analyzed their logistics performance in depth and evaluated the strengths and weaknesses of their port systems. This allowed us to obtain a more complete perspective of logistics in the region and we were able to make comparisons with the main continents of the world, by considering the World Bank's Logistics Performance Index and other relevant factors.

In summary, the selection of these Latin American countries was based on their outstanding port activity, which provides a solid basis for the analysis of logistics performance in the region and allows for global comparisons.

Table 2 Logistics Performance Index of Major Latin American Countries and Continents. 2018

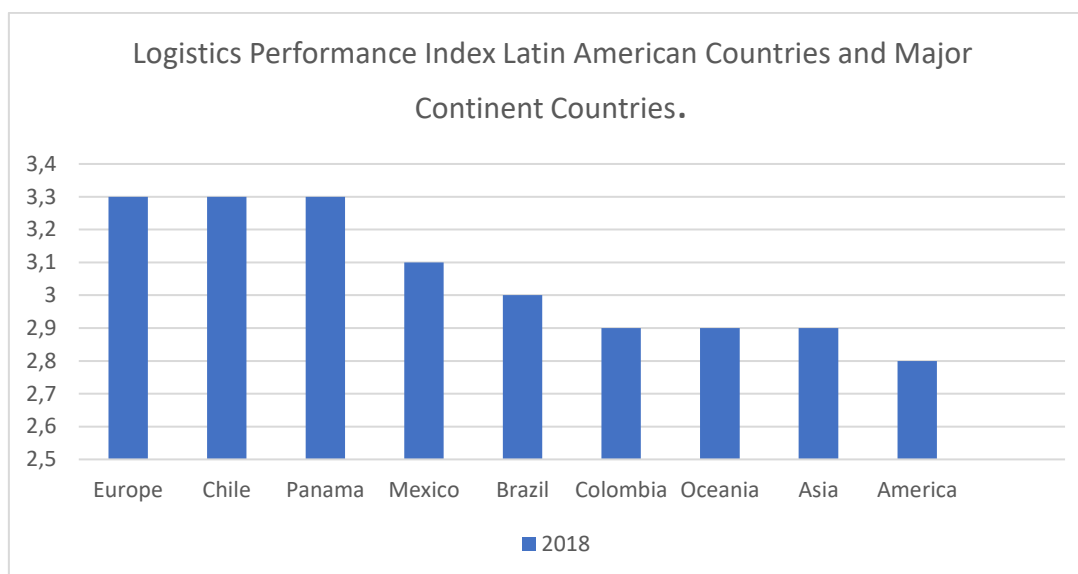
Territory	General	Territory	Shipment tracking	Territory	Boarding arrival	Territory	Infrastructure quality	Territory	Logistics service	Territory	Shipment coordination
Chile	3.3	Panama	3.4	Chile	3.8	Chile	3.2	Panama	3.3	Chile	3.3
Panama	3.3	Europe	3.4	Panama	3.7	Europe	3.2	Europe	3.3	Panama	3.3
Mexico	3.3	Chile	3.2	Mexico	3.6	Panama	3.1	Chile	3.1	Europe	3.2
Brazil	3	Brazil	3.1	Brazil	3.5	Mexico	2.9	Brazil	3.1	Colombia	3.2
Colombia	2.9	Colombia	3.1	Colombia	3.5	Brazil	2.9	Mexico	3	Mexico	3.1
Oceania	2.9	Mexico	3	Africa	3.3	Oceania	2.9	Colombia	2.9	Brazil	2.9
Africa	2.9	Oceania	2.9	America	3.2	Asia	2.8	Oceania	2.9	Asia	2.8
America	2.9	Asia	2.9	Oceania	3.2	Colombia	2.7	Asia	2.8	America	2.8
Asia	2.8	America	2.8	Asia	3.1	America	2.6	America	2.7	Oceania	2.6
Europe	3.3	Africa	2.5	Europe	2.8	Africa	2.2	Africa	2.4	Africa	2.5

Source: World Bank, 2023

Note: This index analyzes logistic performance on a scale of 1 to 5, with 5 being the score that reflects the best logistic performance in consideration of the following variables

Table 2 shows the World Bank Logistics Performance Index (LPI) data for the 5 Latin American countries that presented the highest port movement. These data are compared with the averages of the main continents of the world in 2018. However, it is important to keep in mind that we cannot conclude aspects related to performance or management solely from port movement data. There are many reasons why the number of ships in a country may increase, such as external situations affecting the availability of other ports. In addition, it is important to note that growth in port movement does not necessarily imply better performance, as the data does not provide information on this issue.

Figure 3 Logistics Performance Index Latin American Countries and Major Continent Countries



Source: World Bank, 2023

As shown in Figure 3, Chile and Panama are the Latin American countries with outstanding overall logistics performance in the Logistics Performance Index. Both countries score 3.3, which is above the average for Europe and above the average for America, Africa and Asia. Looking at the sub-indices in Table 3, Chile performs less well in the competitiveness and quality of logistics services, while Panama has room for improvement in the efficiency of customs clearance.

In the case of Mexico, its overall logistics performance ranks third, with an average of 3.1. Customs clearance efficiency is the aspect that shows the lowest performance. Brazil, on the other hand, obtains an overall score of 3.0 and registers a less favorable performance in the customs clearance efficiency sub-index, being the country with the lowest score among the Latin American countries analyzed. Colombia presents an average of 2.9, equaling the average for Asia. In the case of Colombia, it stands out for its less favorable performance in three of the six sub-indexes compared to the other Latin American countries.

Of the five countries analyzed, Chile stands out for its good performance in customs clearance efficiency, surpassing even the continent average. When comparing overall logistics performance with the continents, except for Europe, Latin American countries show a better overall performance. It is important to keep in mind that the continents include countries with high and low levels of performance, which generates a variation in the averages and does not necessarily reflect the reality of the strongest and weakest countries in this area. The analysis of the data provided in this research allows us to understand and evaluate the logistics performance of the selected countries without issuing specific recommendations.

Table 3 Global Competitiveness Index: Latin America

		2017	2018		2019			
Country	Position	Score	Country	Position	Score	Country	Position	Score
Brasil	80	4,14	Brasil	72	59,5	Brasil	71	60,9
Colombia	66	4,29	Panamá	64	61	Panamá	66	61,6
México	51	4,44	México	60	61,6	Colombia	57	62,7
Panamá	50	4,44	Chile	46	64,6	México	48	64,9
Chile	33	4,71	Colombia	33	70,3	Chile	33	70,5

Source: Foro Económico Mundial, 2023

Table 4 shows the position and score of the countries in a global ranking reported annually by the World Economic Forum, which takes into account 142 countries in the world. Considering the position of Latin American countries, Chile holds the best position in this ranking, and has maintained this position during the 3 years analyzed, followed by Panama, which held position 50 in 2017; however, in 2018 and 2019 this country lowered its position and occupied positions in 64 and 66 respectively. Mexico occupied position 51 in 2017, but in 2018 and 2019, raised its score occupying position 46 and 48, being the second country of the group of Latin American countries selected with the best score of this ranking. Colombia, in 2017, occupied position 66, while in 2018 went down 3 positions, and in 2019, reached the 57th place on the table; therefore, going up 9 positions in the ranking. Finally, in 2017, Brazil occupied position 80 in the global ranking, but for 2018 and 2019 raised its position to 72 and 71.

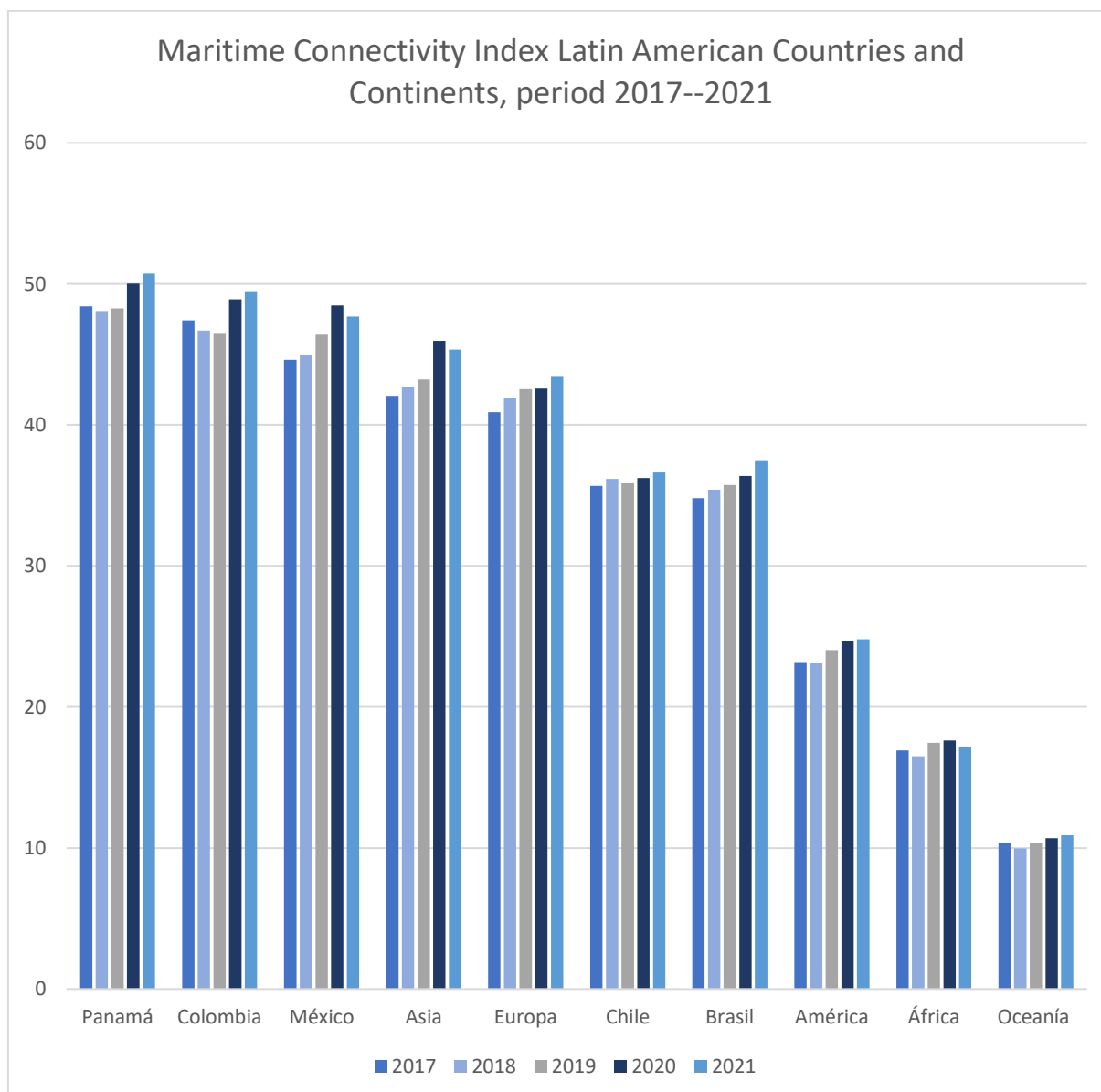
Table 4 Global Competitiveness Index: Top Global Ranking Countries

Global Competitiveness Index: Top Global Ranking Countries						
Year	2017		2018		2019	
	Position	Score	Position	Score	Position	Score
Suiza	1	5,86	4	82,6	5	82,3
Estados Unidos	2	5,85	1	85,6	2	83,7
Singapur	3	5,71	2	83,5	1	84,8
Países Bajos	4	5,66	6	82,4	4	82,4
Alemania	5	5,65	3	82,8	7	81,8
Hong Kong	6	5,53	7	82,3	3	83,1
Suecia	7	5,52	9	81,7	8	81,2
Reino Unido	8	5,51	8	82	9	81,2
Japón	9	5,49	5	82,5	6	82,3
Finlandia	10	5,49	11	80,3	11	80,2

Source: World Economic Forum, 2023

Table 4 shows the ranking in the Global Competitiveness Index. Of the 10 countries that occupy this ranking, 6 countries belong to Europe, 1 to America, and 3 to Asia. Within this ranking, no country is Latin American; however, Chile is the closest to the top positions, as it has maintained number 33 in the ranking for the last 3 years. Panama, Mexico, Colombia, and Brazil are located in the intermediate group of this ranking.

Figure 4 Maritime Connectivity Index Latin American Countries and Continents, period 2017-2021



Source: World Bank (2023)

Note: The numerical data in Figure 4 can be found in Table 1 of the Appendices.

In Figure 4, according to data extracted from the World Bank, Panama is positioned as the country with the best performance compared to the other countries analyzed, even surpassing the average of the continents. Analyzing the years since 2017, Panama has achieved an average in this index that is 6.5% better than in 2018 and 2019. Despite the pandemic, in 2020 it experienced a growth of more than one point in this indicator, and for 2021 it remains in growth.

Colombia, the country with the second-best average in this ranking, shows a higher score in 2017 compared to the following two years, 2018 and 2019. However, from 2020 and 2021 onwards, a significant growth in its efficiency and capacity to connect with the world is observed, as this indicator shows.

Mexico ranks third, and the average in this indicator in 2017 is lower compared to Panama and Colombia. However, this country shows improvements for 2018 and 2019, and continues to grow until 2020; while in 2021, there is a decrease in its average.

Brazil is in fourth place in this indicator and has experienced a steady growth over the five years analyzed. By 2021, it moved up one place in this ranking, surpassing Chile by an average of almost one point.

Finally, among the Latin American countries analyzed, Chile showed an advantage over Brazil in the early years. However, in 2018 it experienced an improvement compared to its average in 2017 but a decrease in 2019. From 2020 and 2021, there was an increase in its maritime connectivity efficiency, but it is still almost 14 points below the first country, Panama.

In terms of regions, Africa and the Americas are well below the average of the Latin American countries analyzed. This indicates an advantage for Latin American countries in terms of their capacity to connect with the world compared to these regions. On the other hand, Asia and Europe are above Brazil and Chile, but below the average of Panama, Colombia, and Mexico, with a difference of no more than 5 points. However, it is important to consider that Asia has China, which, in 2021 was the most connected country with the world, with an average three times higher than the main Latin American country, Panama. It is necessary to consider that when analyzing all these regions and the countries that comprise them, there are countries that are significantly below, which decreases the overall average of the region.

5. Discussion

The results revealed that Panama stands out as the country with the best performance in terms of logistics competitiveness in Latin America, surpassing even the average for the rest of the continents. This finding is consistent with the study by Arvis et. al. (2019), where Panama was also identified as a leader in terms of efficiency and connectivity in maritime transport logistics in the region. Panama's position is attributed to its strategic geographic location, the development of world-class port infrastructure and the implementation of favorable policies to promote trade and investment in the logistics sector (Laxe et al., 2019).

In addition, Colombia was positioned as the second-best performing country in terms of logistics competitiveness in Latin America, showing significant growth in its efficiency and connectivity capacity from 2020 and 2021. These results coincide with research by Castro et. al. (2022), which highlighted the improvements in transportation and logistics policies implemented by the Colombian government, as well as investments in infrastructure and technology in the country's main ports.

On the other hand, Mexico and Brazil ranked third and fourth, respectively, in terms of logistics competitiveness in the region. Although both countries face challenges in customs clearance efficiency, they have shown improvements over the period analyzed. These findings support the conclusions of previous studies such as the one by Álvarez (2019), which highlights reforms in customs processes and investments in logistics infrastructure in Mexico, as well as the development of ports and terminals in Brazil.

It is important to note that the results obtained in this study are consistent with previous research that also analyzed logistics competitiveness in Latin America. However, it is necessary to mention the limitations of this study, such as the lack of detailed analysis of other factors that could influence logistics competitiveness, such as regulation, quality of logistics services, and coordination among the different actors in the sector (Laxe et al., 2019).

In conclusion, the results of this study provide an in-depth view of the competitiveness of shipping logistics in Latin America over the 2017-2021 period. The outstanding positions of Panama, Colombia, Mexico, and Brazil in terms of logistics competitiveness align with previous research and highlight the efforts made by these countries to strengthen their logistics systems. However, it is recommended that future research delve deeper into specific areas for improvement and include a more complete analysis of the factors that influence logistics competitiveness in the region. This will allow the development of more effective strategies to improve logistics competitiveness in Latin America and foster sustainable economic growth.

6. Conclusion

The objective of this research was to analyze the competitiveness of maritime transport logistics in Latin America, considering the countries with the greatest port movement in the region. The results show that the countries with the best performance in Latin America are Brazil, Colombia, Mexico, Panama, and Chile. These countries were analyzed in relation to the average of the rest of the continents. Although the averages are useful data, they do not show the reality of the different countries that make up the continents, as there will be countries with a level of excellence in maritime logistics and some with an extremely low level, which means that the average is not able to reflect these different and distant realities.

This analysis highlights issues such as the importance of port infrastructure, coordination among stakeholders, efficiency of logistics performance and quality of logistics services.

Port infrastructure plays a fundamental role in improving logistics competitiveness in Latin America. This study highlights the importance of having adequate and modernized ports, highlighting the example of Panama as a leader in the sector due to its significant investments in port infrastructure. This underlines the need for other countries in the region to follow this example and invest strategically in their ports to improve their competitiveness.

It also highlights the importance of greater coordination between the different actors in the logistics sector, such as port authorities, shipping companies, and customs. Greater collaboration and synchronization of logistics processes can lead to greater efficiency and competitiveness in maritime transport in Latin America. Therefore, it is necessary to promote cooperation and information exchange between the actors in the sector to improve the quality and speed of logistics services.

Another challenge identified is the efficiency of customs clearance in several Latin American countries. Delays in customs processes can negatively impact the competitiveness of ports and generate additional costs for logistics operators. It is recommended that governments and customs authorities implement measures to streamline and simplify customs procedures, such as digitizing processes and improving coordination between the agencies involved.

In addition to efficiency, the quality of logistics services also plays a crucial role in the competitiveness of ports in the region. Aspects such as customer service, safe operations, risk management and environmental sustainability are important for attracting investment and promoting a competitive and reliable logistics environment in Latin American countries. Therefore, they need to focus on improving these aspects to strengthen their position in the logistics sector.

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Appendix

Appendix 1 Índice de Conectividad Marítima de la Conferencia de las Naciones Unidas principales Países Latinoamericanos y Continentes en el periodo 2017-2021

<i>Índice de Conectividad Marítima de la Conferencia de las Naciones Unidas principales Países Latinoamericanos y Continentes en el periodo 2017-2021</i>									
Territorio	2017	Territorio	2018	Territorio	2019	Territorio	2020	Territorio	2021
Panamá	48.41	Panamá	48.07	Panamá	48.26	Panamá	50.02	Panamá	50.74
Colombia	47.42	Colombia	46.69	Colombia	46.53	Colombia	48.9	Colombia	49.48
México	44.62	México	44.97	México	46.39	México	48.48	México	47.68
Asia	42.05	Asia	42.67	Asia	43.22	Asia	45.97	Asia	45.33
Europa	40.9	Europa	41.94	Europa	42.54	Europa	42.58	Europa	43.41
Chile	35.67	Chile	36.16	Chile	35.85	Brasil	36.38	Brasil	37.49
Brasil	34.8	Brasil	35.41	Brasil	35.74	Chile	36.23	Chile	36.62
América	23.18	América	23.11	América	24.03	América	24.66	América	24.81
África	16.91	África	16.5	África	17.46	África	17.62	África	17.14
Oceanía	10.36	Oceanía	9.98	Oceanía	10,35	Oceanía	10,70	Oceanía	10,91

Fuente: Banco Mundial (2023)