

THE WATER TRANSPORT SCENARIO IN SOUTH AMERICA

Antonio Felipe Gomes Teixeira¹, Andrej Dávid²

Summary: The purpose of this article is to present the current scenario of the economy in the countries of the South American continent. In the second section it presents in general terms how the main countries are organized in relation to inland waterway transport, presenting the main waterways, their characteristics and the main inland ports of the region.

Key words: South America, Waterways, Water Transport

INTRODUCTION

The economy of the countries of South America is going through a troubled moment in recent years. As a strong economy is key to improving the quality of life of the population, all efforts must be taken into account by the countries. The first section of this article discusses the current status of the economies of the countries of South America, presenting the main sources of income of each country and its Gross Domestic Product. To drain their production, each country uses the different modes of transportation and does not always have a balanced transport matrix or uses the natural resources in the best way. The second section discusses the current moment of inland navigation as a way of draining the countries' production.

1. ECONOMIC SCENARIO IN SOUTH AMERICA

The South America comprises the southern portion of the American continent. It is composed by twelve countries: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela. The total area of the sub-continent is about 18 million square kilometers. The estimated population in 2016 were 422.5 million people, corresponding to about 6% of the world population. The economy is diversified in the region, comprehending since agricultural production to extraction of oil, gas and minerals beside industrial production in some countries. The Table 1 shows the Gross Domestic Product (GDP) in 2015 of each country, in billion dollars (1).

¹ Eng. Antonio Felipe Gomes Teixeira, Universidade Federal de Santa Catarina, Centro Tecnológico de Joinville, Marine Engineering, Joinville (Brazil), Tel.: +5547996445298, E-mail: antoniofelipegt@gmail.com

² Assoc. Prof. Andrej Dávid, PhD., Žilinská univerzita v Žiline, F PEDAS, Department of Water Transport, Univerzitna 8215/1, 010 26 Zilina, Tel.: +421415133565, Fax: +421415131527, E-mail: andrej.david@fpedas.uniza.sk

Tab. 1 – GDP from 2015 of each country in South America

South America Ranking	Word Ranking	Country	GDP (billion \$)
1	9	Brazil	1775
2	21	Argentina	583
3	37	Colombia	292
4	41	Chile	241
5	42	Venezuela	239
6	48	Peru	189
7	61	Ecuador	100
8	77	Uruguai	53
9	94	Bolivia	33
10	98	Paraguay	27
11	147	Suriname	5
12	156	Guyana	3

Source: Adapted from Trading Economics (2017).

In Brazil the economy is based in the production of oil and natural gas besides agricultural products such as soybeans, wheat, sugar, among others. The country is also notable for the large production of minerals such as iron and manganese. The industry is also very important, with the production especially of cars and home appliances.

Argentina has its economy based on the food, vehicle, durable consumer goods, textiles, chemicals and metallurgy industry; The economy of Venezuela is mainly based in the oil industry. The country is in a big recession due to the drop of prices in the international market.

In Colombia the GDP is composed by the oil industry, production of coal, coffee, tobacco, cotton and extraction of ores like gold and emeralds; Chile's economy is based in the fishing industry, wine production and copper and iron ore extraction; In Peru also the fishing industry is very developed and contributes a lot to the GDP of the country, besides the agricultural production; Ecuador has oil resources and produces agricultural products such as bananas and flowers; Uruguay has its economy based in the agricultural production; Bolivia exports mainly oil and natural gas; Paraguay's economy depends mainly in the production of soybeans and energy (hydroelectric). Suriname and Guyana bases its economies in ore extraction and agricultural production (2).

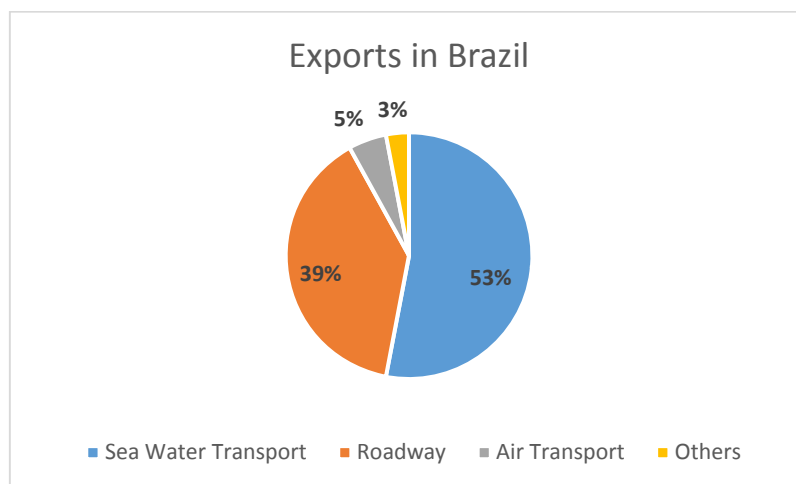
A very recent study from Focus Economics (2017) exposed the scenario of the economy of South American countries during the year of 2016, period in which the economy suffered with the recession (3). According to the report, one of the reasons to its decreasing is that the prices of commodity, such as hydrocarbons, has dropped during the last years. This affirmation is also present in the 2015 report of CEPAL (Economic Commission to Latin America and Caribe), which also reports that the drop of the prices expected in 2016 was about 21% to crude oil, 13% to copper, 23% to iron ore and 14% to soy flour comparing to 2015. As the exportation of oil and agricultural products is important to many countries, the prices drop affected the economy of the entire region (4).

The countries of South America are among them their main economic partners. For example, the main country that import goods from Argentina is Brazil, and Argentina is also one of the most important partners of Brazilian economy, according to the report of the Observatory of Economic Complexity (5).

The governments of Brazil, Argentina, Uruguay and Paraguay created in 1991 the Mercosur (Southern Common Market). Venezuela and Bolivia also integrated the market in 2012 and 2013, respectively. According to its statute, Mercosur's main commercial objective is "The free movement of goods, services and factors of production among countries, by the elimination of customs duties and non-tariff restrictions on the movement of goods (...)", (6). According to Kotschwar (7), the creation of trade arrangements, such as Mercosur helped the countries to develop their economies, showing big growth of nearly 10% per year in exports, increasing from \$147 billion in 1990 to \$895 billion in 2008.

However, the creation of free trade areas was not accompanied by the modernization of infrastructure, especially of transport. Some authors point out the lack of infrastructure (or its precariousness) as one of the great factors for the loss of foreign exchange and trade difficulty between South American countries and foreign countries.

According to the report "The Challenge to the Logistic Integration in South America" (8), prepared by the Brazilian National Confederation of Industry (CNI), the Brazilian economy loses about \$1.5 billion per year due to the lack of transport infrastructure between Brazil and 9 of 11 partners in South America. The exports to Argentina, for example, are 7% lower than they could be due to the bad conditions and lack of infrastructure of all modes of transport (especially roadway, waterway and railway). South Americans countries are the destiny of about 15% of the Brazilian exports, so improving the infrastructure could considerably increase the incoming. In the current scenario the modes used to export from Brazil to their partners in Latin America is divided as shown in the Figure 1.



Source: Brazilian National Confederation of Industry, 2015.

Fig. 1 – Mode of Transport in Brazilian Exports

The Figure 1 shows that the sea water transport, especially by cabotage, is the most used mode of transport from Brazil to their partners in South America. In the category "others" are

included the inland water transport and the railway transport. The participation of the inland water transport is considerably less than it could be. The next section will discuss about it.

2. INLAND WATER TRANSPORT IN SOUTH AMERICA

As presented in the Figure 1, the participation of the inland water transport to the export of goods from Brazil to its partners in South America is represented by less than 3% of the total. The same occurs with the other countries, where the inland transport is not developed as in North America or Europe. The Figure 2 shows the map of the region, presenting mainly the waterways in operation (in blue) and the waterways which have projects to be used in the future to transport goods between South American countries (in red). The map also shows the way in the Pacific and Atlantic Ocean, where the sea water transport – in this case cabotage – occurs. In countries such as Chile and Peru the inland water transport is used just for short distances and represents too little to the transport of goods. This section will discuss about the waterways which are in operation nowadays in Brazil, Argentina and Colombia.



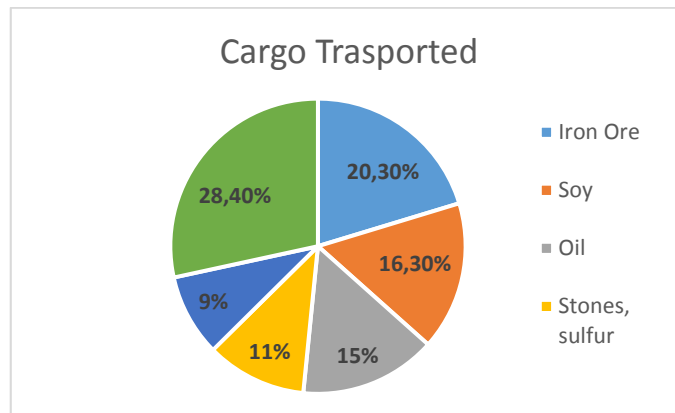
Source: Adapted from Oliva, 2007. (9)

Fig. 2 – Waterways in South America

2.1 Brazil

As it is the biggest country in the region, Brazil has the most extensive waterway network. According to the Research of Inland Water Transport report (10), elaborated by the Brazilian National Confederation of Transport (CNT), the country has about 42,000 kilometers of navigable rivers, but just 50% is been used to economic purposes. In 2014 the

Brazilian waterways transported 27.3 million tons, according to ANTAQ (National Agency of Water Transport). The main type of cargo transported are shown in the Figure 3. It is possible to assume that the main class of cargo transported is solid grain, followed by liquids and containers.



Source: Research of Inland Water Transport, 2013 (10).

Fig. 3 – Cargo Transported in Brazilian Waterways

The main waterways in Brazil are: Madeira, Solimões-Amazonas, Tocantins-Araguaia, Southern Waterways, Paraguai, São Francisco and Paraná-Tietê. Those that are responsible for the transport of goods from Brazil to other countries are especially Paraguai, Paraná-Tietê and Madeira. The Figure 4 shows the main flow of goods in the waterways. The points marked in red are representing the port installations.



Source: National Agency of Water Transport, 2014. (11)

Fig. 4 – Brazilian Waterways

The Table 2 shows the total amount of cargo transported in each waterway in 2014 (in millions of Tons-per-Kilometers). Each one has its characteristic and tries to meet the needs of the region where it is located. Regional transport refers to that which occurs in the same

state of the country, the inter-regional occurs in two or more states and the international is the transport from Brazil to its partners in South America (12).

Tab. 2 – Cargo Transported in Each Waterway in Brazil (million TKU)

Waterway	Regional	Inter-regional	International
Madeira	0	4,8	0,078
Solimões-Amazonas	3,07	7,5	0,16
Tocantins-Araguaia	0,9	2,3	0
Southern Waterways	4,1	0	0
Paraguai	0	0	7,1
São Francisco	0	0,13	0
Paraná-Tietê	3,1	1,01	0,508

Source: National Agency of Water Transport, 2014.

2.1.1 Solimões-Amazonas Waterway

Amazonas river is the most extensive river in the world, with 6780 kilometers. It runs from Peru to the Atlantic Ocean. The part of the river that runs through is 3128 kilometers long. This is the most important waterway in Brazil. Many inland ports are located along the waterway, some of them are considered as sea ports because big vessels coming from the Atlantic Ocean berth on it, it is the case of the ports of Vila do Conde and Manaus. This waterway is connected with Madeira and Tocantis-Araguaia waterways. All classes of products are transported in this waterway, especially oil and grains, besides general cargo provided to the communities which lives along the rivers. The main port in this waterway is the port of Manaus, which is considered the largest floating port in the world, with extension of near 370 meters. It is able to operate with 4 barges simultaneously in every season

2.1.2 Madeira Waterway

This waterway is located only in the North region, transporting mainly soybeans, corn, containers and sugar. The extension of the waterway is 1086 kilometers. It is the second most important way of transport in the Amazon state. Between the mounts of July and October the river is with low draught, so the navigation is not allowed in some parts. It is the main mean of flowing of grain production such as soybeans and corn produced in the center east region of the country. The main port in this waterway is the port of Itacoatiara, which has capacity to operates up to 40 barges a week.

2.1.3 Tocantins-Araguaia Waterway

This waterway is composed by rivers that connect the North region, North East and Center West region of the country. It has extension of 1900 km. The main type of cargo transported there are ore (especially bauxite) and oil and its sub products. One important port in this waterway is the Ecoporto Praia Norte, which began operations in 2015 and is supposed to handle up to 1,5 million tons per month until 2020.

2.1.4 Southern Waterways

This waterway is responsible to connect the rivers, canals, lagoons and the industrial production of the state of Rio Grande do Sul to the Atlantic Ocean (or sea ports). In order to enable the operation of the waterway, 4 locks were built along the waterway. According to a report of ANTAQ (2010), the main cargo transported was soybeans (15% of total) followed by cellulose, coal and fuel. It has 4 public ports and 15 private terminals. The main port of this waterway is the port of Porto Alegre, which is considered the biggest inland port in Brazil. It has good connection between the port and the other modes of transport, with an airport located only 4 kilometers away, railways and roadways coming to the port and exit to the Atlantic Ocean. I have 3 docks with total extension of 8000 meters.

2.1.5 Paraguai Waterway

This waterway crosses half of the South America continent. It starts in Brazil (in the state of Mato Grosso) and flows until Uruguay. The Brazilian extension of this waterway is 1272 kilometers. The main types of cargo are soy, rice, corn, wood, iron ore and manganese. The main port in the Brazilian part of the waterway is the port of Corumbá/Lendário in the state of Mato Grosso do Sul. It has a 200m long dock, where the main type of cargo operated is iron ore and manganese.

2.1.6 São Francisco Waterway

Located in the south east, north east and center west regions this waterway has 2350 km of navigable rivers. It is important to transport different types of cargo and products, mainly grain products, fruits and ore, produced in the regions where the river flows. The only inland port of this waterway is the port of Petrolina, which is able to handle general cargo and grains.

2.1.7 Paraná-Tietê Waterway

This waterway is located in the region responsible for 75% of the GDP of Brazil. It also runs through Argentina, Paraguay, Uruguay and Bolivia. In Brazil its extension is 1653 kilometers, connecting five states: Goiás, Minas Gerais, Mato Grosso do Sul, Paraná e São Paulo. The main cargo transported is soy, sand, and corn. Along this waterway 12 terminals are operating. One of the most important is the port of Pederneiras, which have installations able to store up to 30,000 tons of grains (such as soybeans and corn).

2.2 Argentina

The waterways in Argentina are composed by the rivers Rio de la Plata, Paraná and Paraguay. The country has about 3000 kilometers of navigable rivers, in the waterway called Paraguay-Paraná. According to Fleitas (13) 80% of the total production of Argentina is transported by this way. To further encourage inland waterway transport, the country has reduced applicable tariffs by up to 20% in 2016 (14).

2.2.1 Paraguay-Paraná Waterway

This waterway is the same that was discussed shortly in 2.1.5. It is of great importance to Brazil, Argentina, Bolivia, Paraguay and Uruguay. These countries signed an agreement in 1969 to provide investments to carry out works, promote feasibility studies for the implementation of new terminals and to guarantee the sustainability of the use of the waterway. In Argentina it transports mainly the agriculture production along the country and in its export to the other countries (15). The ports located in this waterway in the country are Barranqueras, Reconquista, Santa Fe, Diamante, San Lorenzo, Rosario, Villa Constitución, San Nicolás and San Pedro. The waterway has the advantage of not needing constant works of dredging or overturning, it has natural draft suitable for navigation. The rivers of this waterway are used to transport goods from the time of the colonization of the region. One of the most important ports in the Argentinian part of the waterway is the Port of Rosario, which is that located in the northern region of the country. It is a multi-purpose port, operating since containers to grain and liquid cargo. The dock of attraction is 1600m long, divided in 3 docks. It is one of the most equipped inland ports of South America (16).

2.3 Colombia

In Colombia the rivers are divided in different regions or basins, called Atrato and Magdalena basin – which flows to the Antillean sea – the Orionco and Amazonas basin – flowing to the Atlantic Ocean – and a region of smaller rivers which flows to the Pacific Ocean. The total length of the rivers is 24,000 kilometers, but just only 7,000 are navigable during the entire year and during the floods the total navigable extension is 18,000 kilometers. In the Magdalena basin a canal had to be built to enable the navigation. This canal is called Canal del Dique. The main ports in the Colombia waterways are: Cartagena, Barranquilla, Santa Marta, Turbo and Buenaventura (17).

According to Hernandez (18) the rivers were more used in the past to transport goods throughout the country, but nowadays it has lost its importance and the roadway transport became most used. The distribution of the transport of cargo in Colombia is 96% by roadway and less than 4% by waterways.

The main river is the Magdalena, which is responsible for 80% of the water transport in Colombia. Every year 1.7 million tons of hydrocarbons are transported in the river. According to Galindo (19) if the infrastructure of the river was improved, it could transport five times more cargo. The most recent port of the waterway is the port of Barrancabermeja, which started its operations in 2017 and is specialized in handling of oil (one of the most important exports of Colombia). It has capacity to handle 80,000 barrels per day.

CONCLUSION

As presented throughout the paper, the potential of South American waterway transport is not fully explored. Of the countries focused on the study, only in Argentina the most used mode of transport is not road transport. In general, the transport matrix of the South American

countries is completely unbalanced, governments invest in solutions that in the short term seem more economically viable, but according to several studies in the medium and long term are not the best choice. It is also true that not all the rivers present on the continent could be used for the transport of goods and to drain the production of the countries. Some rivers run through mountainous regions, others in low lying regions or facing long periods of drought throughout the year. There is an environmental concern that must also always be taken into account before undertaking any work of course change, channel building or increased depth. However, taking into account only the rivers that are fully navigable without the need for major works, still the potential is not used. Comparing the waterways of the countries studied, it is possible to conclude that in Brazil, waterway transport is of vital importance mainly to the North region (Amazon region). In the rest of the country this mode of transport is still important, but it is less used than highways or railways. The same happens in Colombia where river transport was once widely used but has lost its importance to other modes. It can be said that Argentina is the country that best uses the rivers to transport goods.

Finally, it is worth emphasizing that the countries of South America should not have a competitive approach between them. As shown, the economy of each country depends heavily on the economy of the other. Improvements in logistics and especially in waterway transport can bring gains to the economies of the countries, which is very important especially in times of economic crisis as the majority of countries currently cross. So countries must continue to take action together, mirroring what is happening in Europe, North America and Asia, so that the South American economic bloc can thrive.

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