

# OVERVIEW OF THE **LOGISTICS SECTOR IN BRAZIL**

ABRIDGED VERSION



**Innovation  
Norway**



Norwegian Embassy  
*Brasilia*

**PRODUCED BY**

 **FGV TRANSPORTES**



Norwegian Embassy  
*Brasilia*

**NOVEMBER 2020**



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ABRIDGED VERSION

The full version of this Report is available only to Norwegian organisations,  
and may be requested directly from the Norwegian Embassy or Innovation Norway.

**PRODUCED BY:**



**IN COOPERATION WITH**



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# 1

CHAPTER

# INTRO DUCTION







In simplified terms, logistics may be defined as a set of actions focused on planning, operating and controlling resources that underpin the efficiency of the physical and logistical flows (data and information) of input materials from suppliers to the production system and then, as the process continues, warehousing and storage, transport (by land, water and air) and the distribution of finished goods to the end consumer.

Logistics may also be understood as the operating pillar that upholds expanded supply chains that interlink all the players involved, in order to efficiently service end consumers with the right products, at the right places, and at the lowest possible costs.

Driven by globalization and the high-speed development of technologies, in parallel to rising global competitiveness, logistics has become the strategic foundation for the economic development of the nation, allowing homogenous services nationwide. Logistics underpins improvements in the income distribution processes, lessening inequalities, boosting production system capacities and endowing foreign trade with a keener competitive edge, thus lowering the costs of national impediments.

In Brazil, these national impediments are called the Brazil Cost, encompassing excessive red tape, trade barriers, high and complex taxation, poor transport infrastructure, together with juridical and

regulatory risks, among other hurdles. According to a survey by the Ministry of the Economy, and conducted in partnership with the Competitive Brazil Movement (MBC – *Movimento Brasil Competitivo*), the Brazil Cost is equivalent to 22% of its Gross Domestic Product (GDP). On the other hand, the World Economic Forum calculates that Brazil's logistics costs account for more than 12% of its national GDP, ranking Brazil 65<sup>th</sup> for transport infrastructure in a list of 137 countries.

The Global Competitiveness Index (GCI) drawn up by the World Competitiveness Yearbook, noted in its 2020 edition that Brazil ranked 56<sup>th</sup> in the GCI, out of 63 nations, with gains in competitiveness for four consecutive years. As an international reference, the other BRICS countries (Brazil, Russia, India, China and South Africa) did not progress this latest yearbook, while the USA – which is an international competitiveness benchmark – ranked tenth.

Along the same lines, the 2019 Global Competitiveness Report presenting data and information compiled by the World Economic Forum, presented the Global Competitiveness Index 4.0 (GCI 4.0) on the economic outlooks for 141 economies, with Brazil in the 71<sup>st</sup> position. Before the COVID-19 pandemic, Brazil's Ministry of the Economy posted a target of reaching the 50<sup>th</sup> position in 2022. Among the 110 variables analysed in the national infrastructure assessment, Brazil stands 78<sup>th</sup>; specifically, for transport, it drops

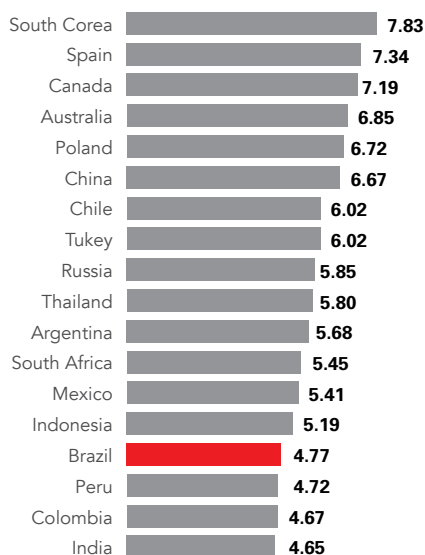
to 85<sup>th</sup> position, despite being one of the world's ten largest economies. For this issue, poor highway quality has been relegated to 116<sup>th</sup> position.

Specifically with regard to logistics, the 2018 Logistics Performance Index (LPI) – which is drawn up every two years by the World Bank – shows Brazil ranking 56<sup>th</sup> (LPI = 2.99), among the 160 countries assessed dropping three places to 50<sup>th</sup> position (LPI = 2.93) for the infrastructure item. As a comparison, Germany heads this ranking with LPI = 4.20, with Afghanistan bringing up the rear at LPI = 1.95, which is the only figure below 2.00. The highest LPI score is 5.00.

According to the overall 2019 – 2020 Competitiveness ranking, among 18 countries, Brazil ranks next to last, ahead only of Argentina. In addition to Brazil and Argentina, the lowest-ranking countries in this index are Indonesia, India, Colombia and Peru, with Chile and Mexico in 8<sup>th</sup> and 12<sup>th</sup> place, respectively. The most competitive economies in this ranking are: South Korea, Canada, Australia, China, Spain and Thailand. For the infrastructure and logistics items, considering all the modes of transport assessed (road, rail, water and air), Brazil is in the lower third of this ranking in the 15<sup>th</sup> position, out of the 18 countries selected for this listing.

## FIGURE 1 – COMPETITIVENESS OF BRAZIL: INFRASTRUCTURE AND LOGISTICS FACTOR

(Maximum score = 10)



Source: National Confederation of Industry (CNI) 2019-2020





Consequently, in this dynamic context swept by the COVID-19 pandemic, investors, entrepreneurs and businesses all over the planet are seeking markets through competitive edges, pinpointing opportunities that could add value, demonstrating clear, firm possibilities of paybacks.

With this end in view, this report provides data and information that could underpin strategic decision-making processes on Brazil's logistics sector, highlighting changes resulting from the COVID-19 pandemic, together with trends and outlooks for the next ten years.

The adopted methodology follows bibliographic research precepts, examining theoretical materials that might record basic data and information, with qualitative analysis based on interpretative and reflective treatment, and quantitative assessments using empirical and analytical approaches. An explanatory survey will be presented, listing factors that define Brazil's logistics conditions. Furthermore, descriptive research will also be used, organizing data in ways that allow exploratory hypotheses.

“

*According to the overall 2019 – 2020  
Competitiveness ranking, among 18 counties,  
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”

# 2

CHAPTER

# BRAZILIAN LOGISTICS: PRODUCTIVITY





Viewed as a connecting link within systemic logistics, cargo transport is a means-activity handling input and finished materials in logistics flows. In Brazil, cargo transport developed as a response to the European colonization process, prompted by the need to export primary products, shipped out mainly by water. As demands for these products rose, with overland access difficult, Brazil's first railways were laid, connecting mining areas with ports.

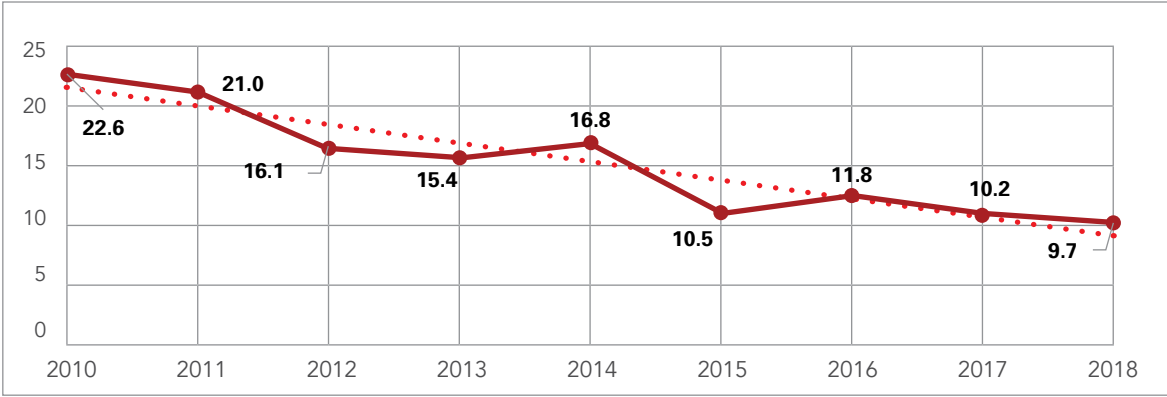
Although Brazil has 1.72 million kilometres of

highways, only 214,000 kilometres are asphalted, equivalent to 12.4% of the entire road network. Among these hard-surfaced highways, just over 10% have been assigned to private enterprise, under concessions. Most highways are still administered by the government and the latest survey by the National Transport Confederation (CNT) rated 66% of them as fair, poor or extremely poor.

Declining since 2010, investments in transport infrastructure continue downtrending in 2020, due to the COVID-19 pandemic, as shown in Graph 1.

**GRAPH 1 – PROGRESSION OF INVESTMENTS IN TRANSPORT**

by year (billion BRL)



Source: National Transport and Logistics Observatory (ONTL) / Brazilian Planning and Logistics Enterprise (EPL)

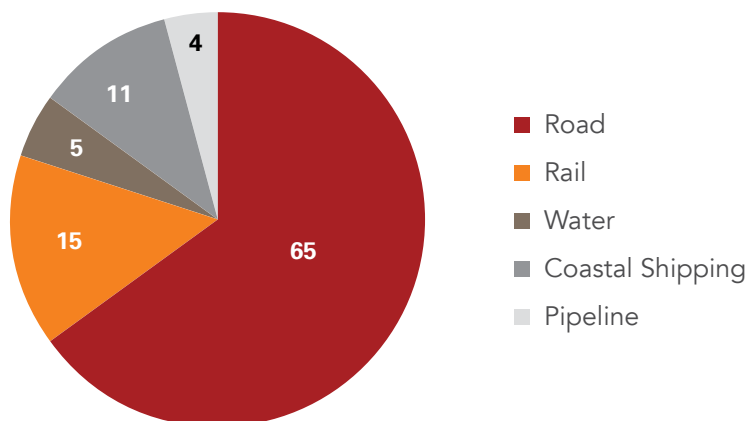
Presented in 2015 by the Brazilian government, the National Logistics Plan (PNL) is divided up by mode for the reference year, handling a total of 2.4 Freight Tonnes Kilometre (FTK), in addition to simulations for the 2025 scenario. The PNL presents strategic planning for fine-tuning cargo transport, taking into consideration the potential of each mode of transport.

It is worth stressing that the as-is scenario is based on demand through the Origin / Destination

Matrix (O/D Matrix) for 2025, with the as-is multimode network supply for 2015, plus work on the BR-163/230 Pará State, BR-135, Pará State, BR-135, Bahia State/MG and BR-242, Bahia State, highways, in addition to doubling the Estrada de Ferro Carajás – EFC railway. For demand, the 2025 scenario used this same 2025 O/D Matrix, but with the supply increased by new segments that will be operational by 2025. These modes of transport divisions for the 2015 and 2025 scenarios are presented in Graphs 2 and 3.

## GRAPH 2 - TRANSPORT MATRIX

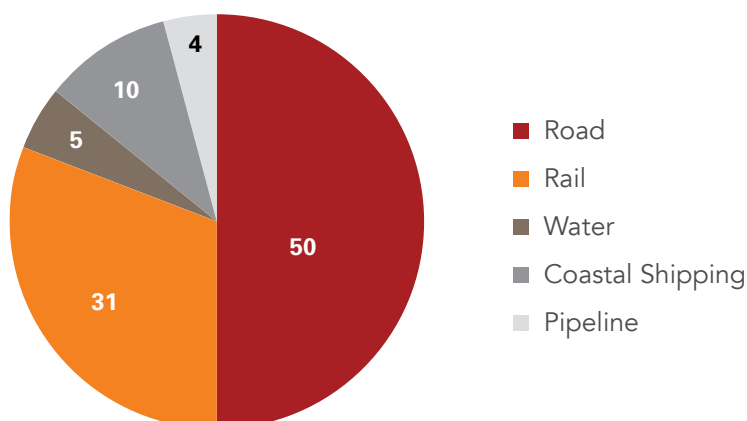
(% by mode) 2015



Source: EPL/PNL (2015)

## GRAPH 3 - TRANSPORT MATRIX

(% by mode) Simulation 2025



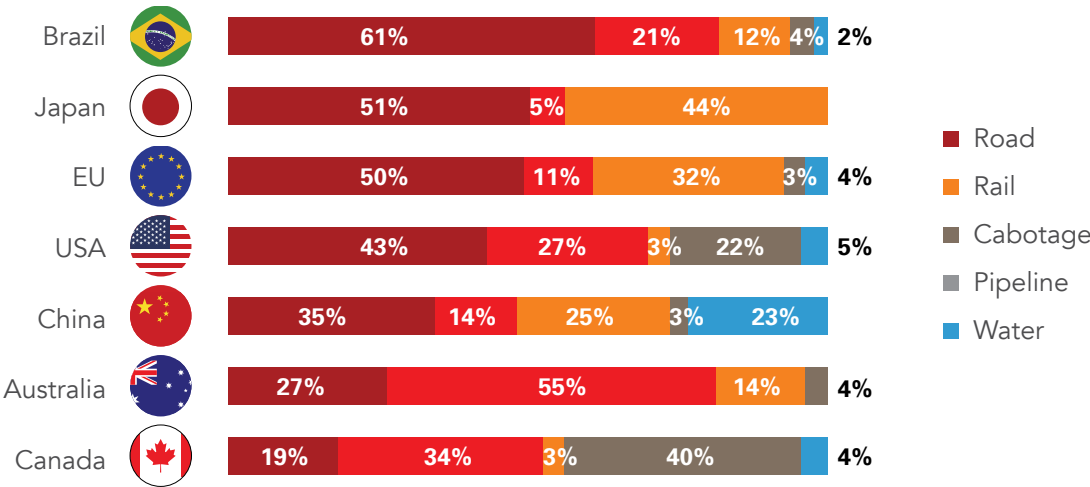
Source: EPL/PNL (2015)



According to data released in 2020 by the Logistics and Supply Chain Institute – ILOS for volumes transported in Brazil, 61% of cargoes are hauled along highways, 21% are carried by rail, 12% by

cabotage, 4% by pipelines, 2% by waterways and less than 1% by air. Brazil's Cargo Transport Matrix is presented in Figure 2, in a comparison with this distribution in six other countries.

**FIGURE 2 – NATIONAL TRANSPORT MATRIX COMPARISON (% FTK)**



Source: ILOS (2020)



# 3

CHAPTER

# TRANSPORT INFRASTRUCTURE





Moving on from the situation presented in the previous chapters, which does not indicate a systemic and integrative view of Brazilian logistics, reflecting a drop in investments in transport during at least the last five years, the current cargo transport infrastructure conditions are presented below, by mode of transport.

### ROAD TRANSPORT

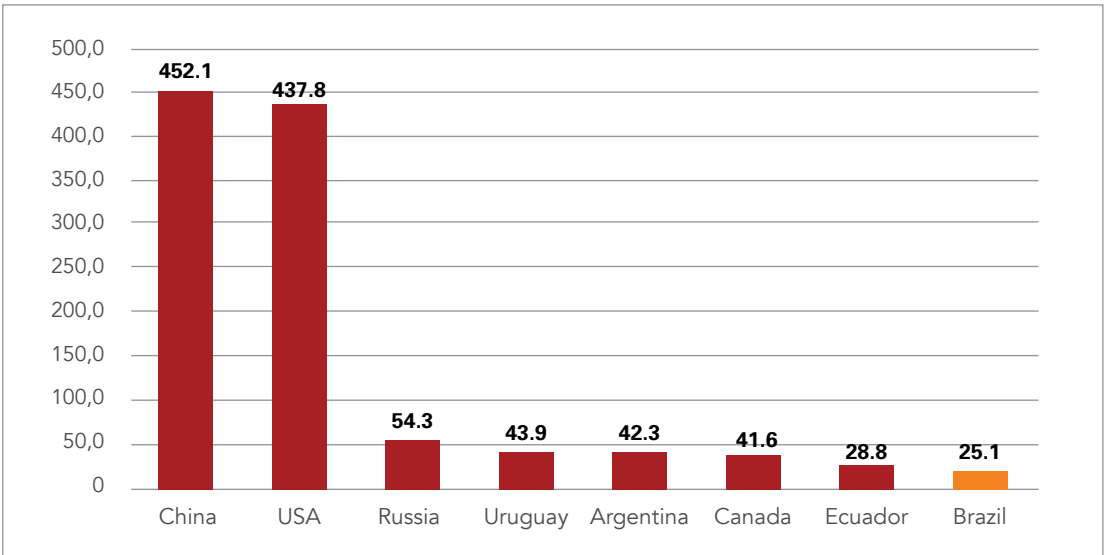
According to the Federal Highways Portal, run by the EPL, Brazil has a total of 129.824,60 kilometres

of federal highways, of which 6.4% are double-lane, and 48.6% asphalted. Most hard-topped highways are in the Federal District (62.2%); Sergipe State (41.8%) and Amazonas State (34.7%). Compared to other countries, Brazil's highway density falls well below that of other continent-sized nations like China and the USA, and also lags behind other countries in South America, including Argentina, Uruguay and Ecuador, as shown in Graph 4.

Further details are presented in Figure 3.

**GRAPH 4 – ASPHALTED ROAD NETWORK DENSITY BY COUNTRY**

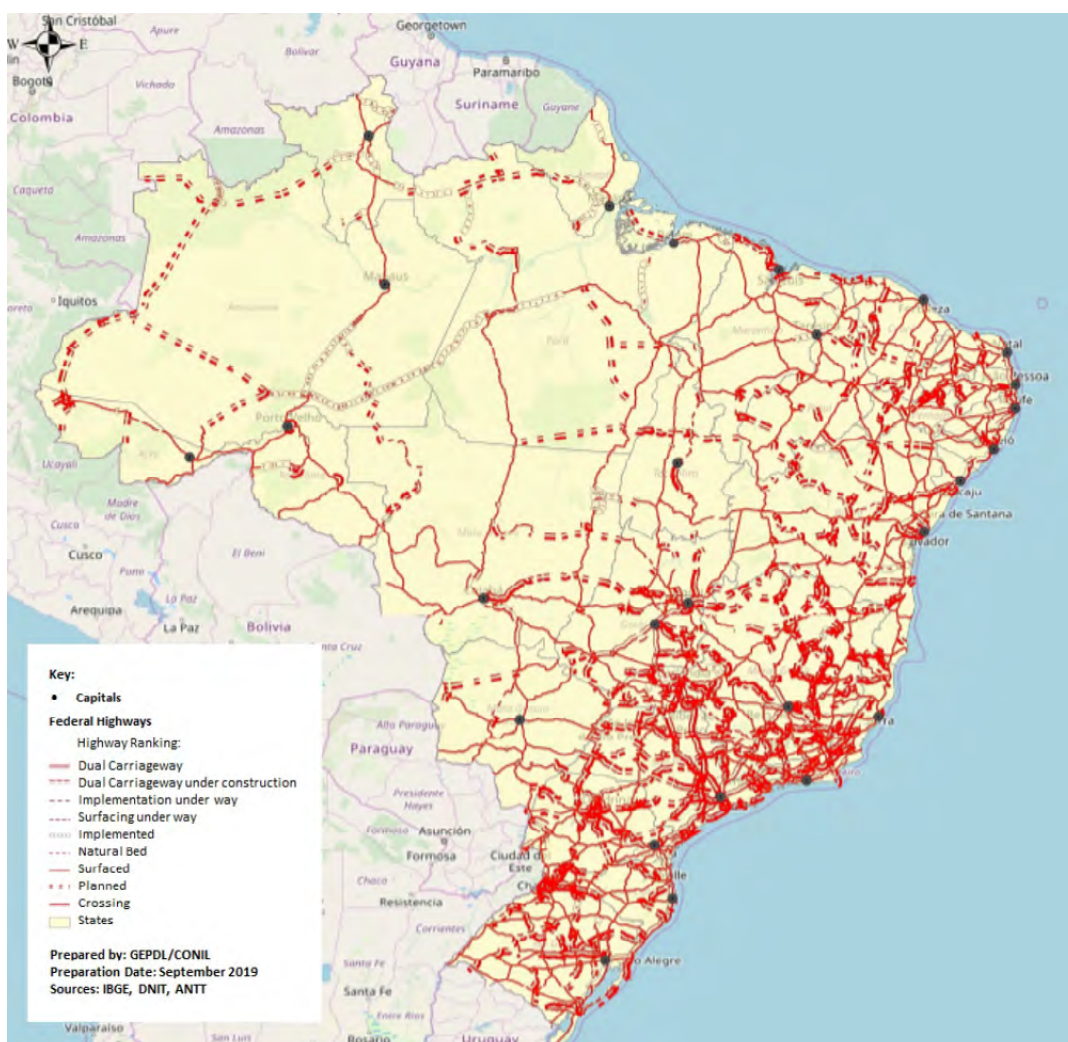
(kilometres / 10<sup>3</sup>.km<sup>2</sup>)



Source: CNT Highways Survey (2019)



**FIGURE 3 – MAP: FEDERAL HIGHWAYS**



Source: ONTL / EPL

## RAIL TRANSPORT

Rail transport in Brazil is influenced by some logistics hurdles that undermine its performance and haulage capacity. They include, for example: trespassing on rights of way; critical level crossings; diversified gauges; segments running through towns; low speed; tangled legal aspects related to rights of access; and inadequate

network for operating efficiency, with many curves, slopes and height constraints.

Brazil's rail network runs a total of 29,800 kilometres (EPL, 2019). However, a study by the National Confederation of Industry (CNI), based on ANTT data, shows that 8,600 kilometres (28.9%) of the lines assigned to private



enterprise through concessions are unused or out of operation. On the other hand, the National Transport Users Association (ANUT) states that only 12,000 kilometres of Brazilian railways are in full operation, as the remaining 18,000 kilometres are underused or abandoned.

Figure 4 shows that Brazil's railways are concentrated along its coastline, due to aspects related to European colonization and the need to export primary goods. Today, this region accounts for 80% of Brazil's GDP, with the Southeast accounting for almost 60%.

**FIGURE 4 – MAP: RAILWAYS**



Source: ONTL / EPL

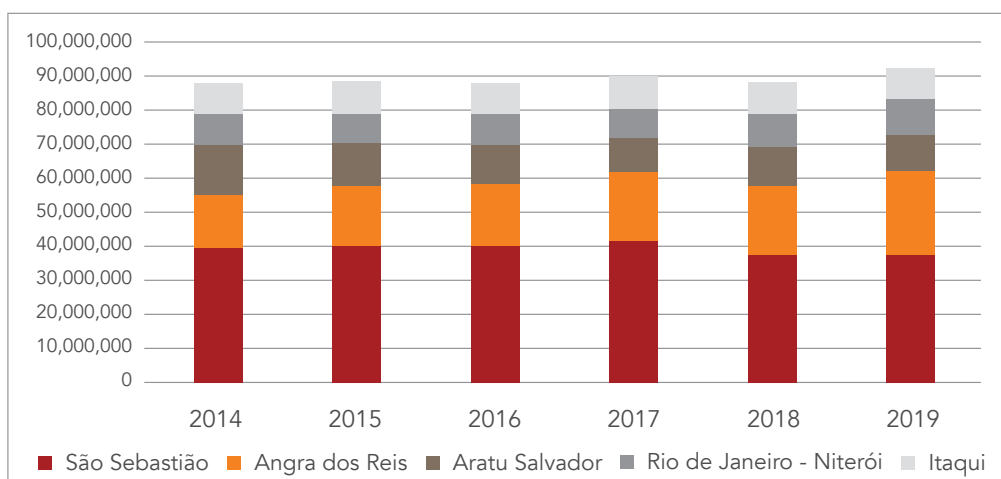
## WATERWAY TRANSPORT

Brazil's Cargo Transport Matrix indicates that waterborne transportation (sea and river) holds a 5% share of waterborne (sea and river) traffic and 11% for cabotage, as noted in the PNL. The cabotage performance for Brazil's five busiest cargo ports between 2014 and 2019 is shown in Graph 5. Particularly noteworthy is the public

Port of São Sebastião in São Paulo, administered by the Company Docas de São Sebastião; the only port with steady growth every year, this could well become one of the most important ports in Brazil. With five mooring berths, four storage yards and five silos with 4,000 tons of static capacity, it is earmarked for concession to private enterprise.

**GRAPH 5 – CABOTAGE PRODUCTIVITY AT MAJOR PORTS**

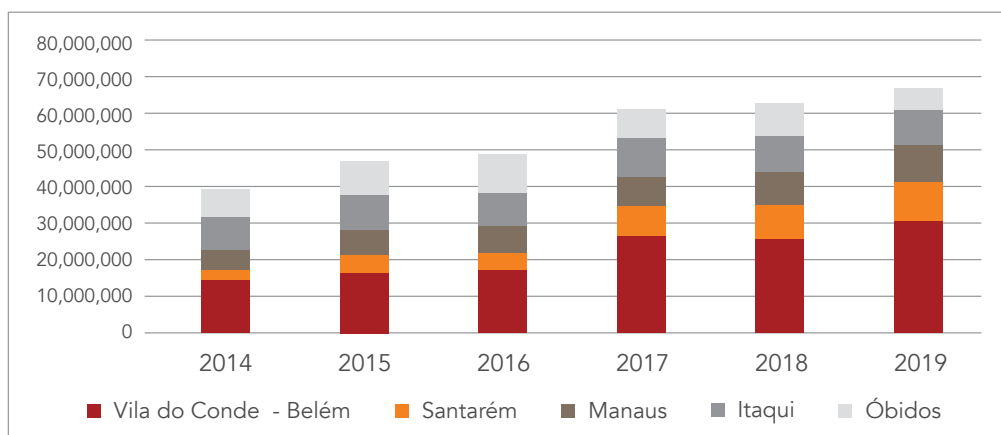
(tons)



Source: ONTL / EPL

**GRAPH 6 - RIVER TRANSPORT PRODUCTIVITY AT MAJOR PORTS**

(tons)



Source: ONPL / EPL



Graph 6 shows Brazil's five busiest river cargo ports. The Porto de Vila do Conde, in Pará State, is particularly noteworthy, with growth of 108% between 2014 and 2019. This port has a multi-use mooring terminal, a bulk liquids terminal for carriers and barges, and a road-river terminal designed only for barges. It is connected to road transportation options by the BR-316 highway.

Figure 5 shows port facilities, locks, waterways and cabotage flows. With a coastline some 7,400 kilometres long, 60,000 kilometres of navigable rivers and lakes, Brazil makes use of only 21% its total capacity, with around 12,600 kilometres of waterways (EPL, 2019). According to ANTAQ, there are 215 port facilities, including 34 established ports, 147 private use terminals, 32 transhipment stations and two tourism facilities.

**FIGURE 5 – MAP: WATERWAYS**



Source: ONTL / EPL



## PIPELINE TRANSPORT

Pipeline transport can be classified by the type of cargo handled, including oil pipelines, (oil, oil-fuel, gasoline, diesel), gas pipelines (natural gas), ore pipelines (rock salt and iron ore), water pipelines and multi-product pipelines (other types of cargoes).

Pipeline distribution throughout Brazil is shown in Figure 6. Brazil has 718 pipelines, with a total length of 21,200 kilometres, and seven ore pipelines, with a length of 1,700 kilometres (EPL, 2019). In comparative terms, the USA, Canada and China have 2,225 kilometres, 100,000 kilometres and 87,000 kilometres of pipelines respectively.

**FIGURE 6 – MAP: PIPELINES**



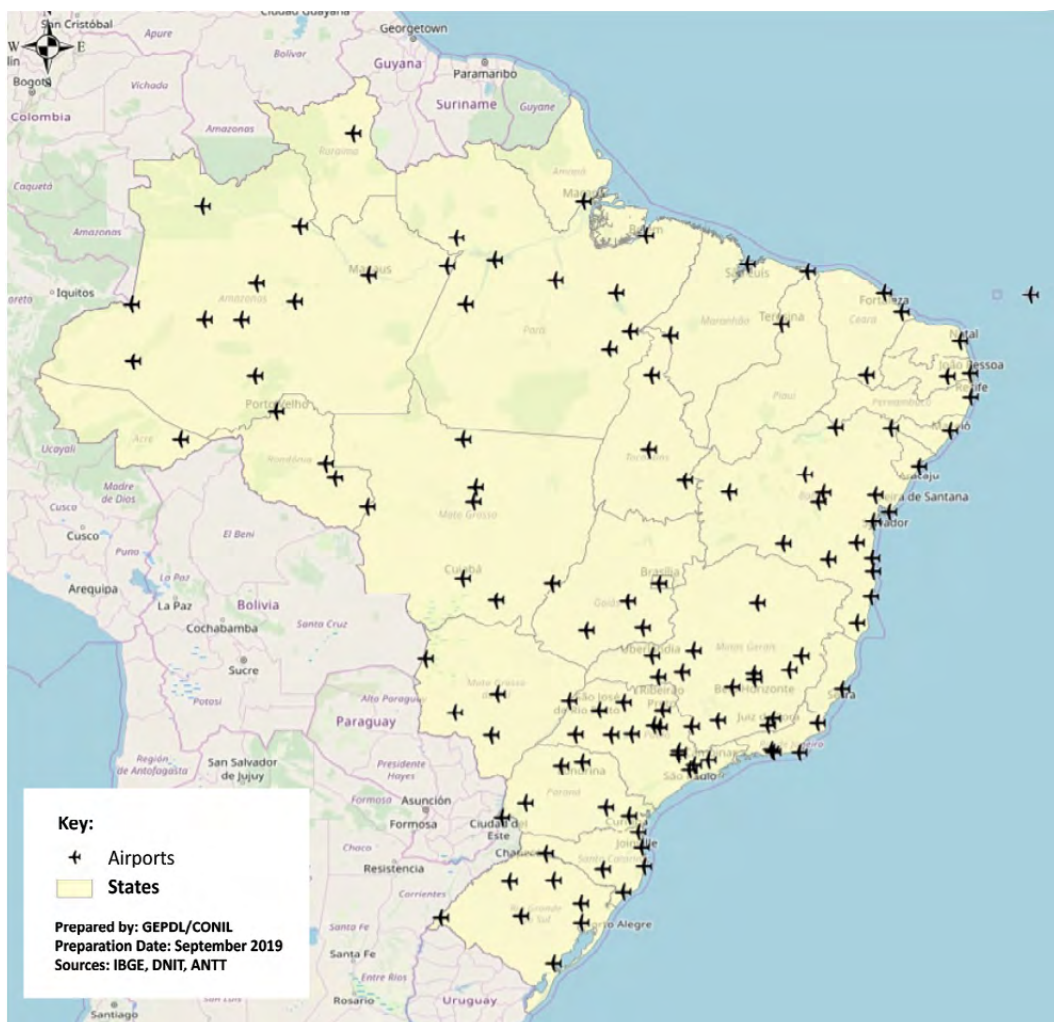
Source: ONTL / EPL

## AIR TRANSPORT

Air transport encompasses air paths, airports (areas set aside for landings, take-offs and taxiing), passenger and cargo terminals and air traffic control systems. Figure 7 shows airport positions throughout Brazil.

Brazil has 2,340 airports and aerodromes, of which 78% are private, with a mean landing strip length of 1.05 kilometres, and 88% following daytime Visual Flight Rules (VFR). Some 37% of Brazil's airports and aerodromes are clustered in Mato Grosso and Mato Grosso do Sul States.

**FIGURE 13 – MAP: AIRPORTS AND AERODROMES**



Source: ONTL / EPL

# 4

CHAPTER

# MAIN LOGISTICS CORRIDOR PROJECTS







Coordinated by the General Staff of the Brazilian Presidency, the Investment Partnerships Program (PPI) was set up in order to extend and buttress interactions between the State and private enterprise. Its portfolio encompasses 119 projects and nine policies under development, as shown below.

For road transport, there are 21 projects under way. Eight projects are in the environmental licensing phase, with thirteen ready for concession to the private sector. Figure 8 shows these projects on a map.

**FIGURE 8 – MAP: ROAD TRANSPORT PROJECTS**

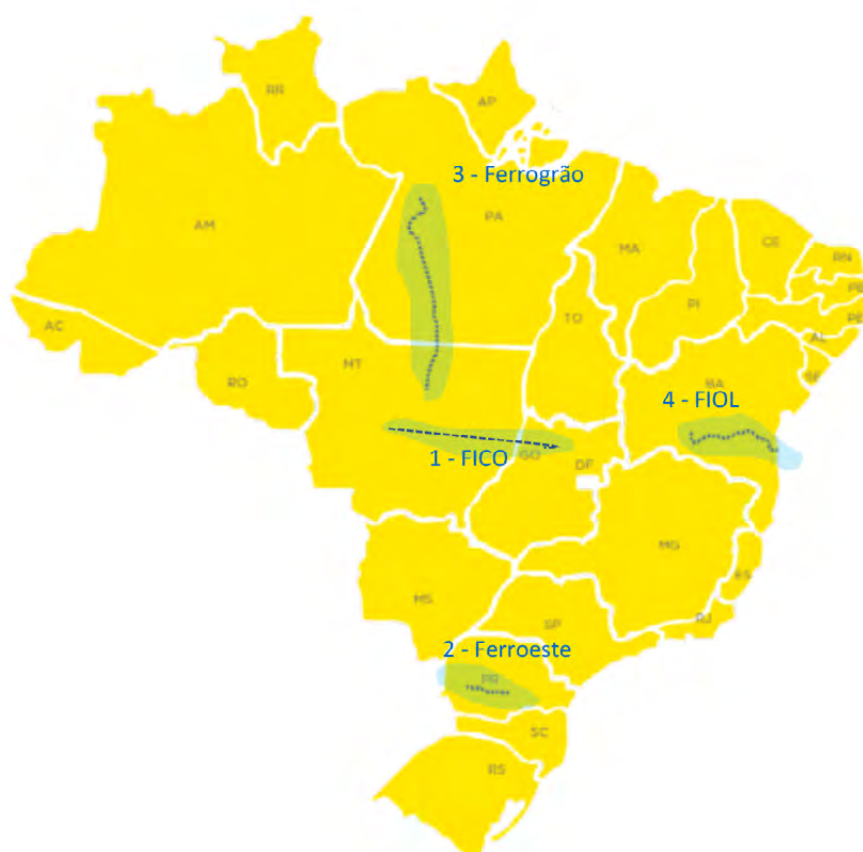


Source: PPI (2020)

For rail transport, there are four projects listed, of which two are concessions, one is privatisation,

and one is a sub-concession. These projects are shown on the map in Figure 9.

**FIGURE 9 – MAP: RAIL TRANSPORT PROJECTS**



Source: PPI (2020)

The only waterway project listed for PPI is related to the environmental licensing for the Pedral do Lourenço navigable waterway dredging and clearing project along the Rio Tocantins river.

However, there are 29 projects presented for cabotage and ports. Figure 10 presents the projects grouped by Region.

**FIGURE 16 – MAP: CABOTAGE PROJECTS AND PORTS**



Source: PPI (2020)







Air transport is included in the PPI with three projects, all earmarked for private concessions. As these projects are scattered all over Brazil,

Figure 11 presents the North I, Central and South Blocks in greater detail.

**FIGURE 17 – MAP: AIR TRANSPORT PROJECTS**



Source: PPI (2020)



# 5

CHAPTER

# MAIN PRODUCTION CHAINS





In order to define the main production chains in Brazil, an approach was adopted based on the contributions to its GDP by different sectors of its economy. According to data released by the IBGE (2018), the sector with the highest contribution to Brazil's GDP is Services (approximately 73%), followed by Industry (21%) and Ranching & Farming (6%). Brazil's main production chains were selected from the Ranching & Farming and Industry segments, chosen for their importance in terms of domestic demands and exports.

Production chains were selected from these segments by volume of cargoes hauled, and contributions to Brazil's balance of trade. According to data released by the Ministry of Transport, Ports and Civil Aviation (2018), the main products for this study are: soybeans; oil and fuels; iron ore; sugarcane; beef; and automobiles. A brief description of each chain is given below, for each major product.

## SOYBEANS

In Brazil, soybeans are the most widely grown crop, and one of the main grains grown in its agricultural sector. The products constituting the soybean complex are beans, meal and oil (EMBRAPA, 2010). According to APROSOJA (2017) the human foodstuffs industry processes soybeans, oil and meal within its product compositions, with soy-based beverages also joining this list. Livestock fodder must also be mentioned, as many types of feed are produced from soybeans and meal. Other

industries also use soybean complex products, including the chemical, healthcare, cosmetics and biodiesel sectors.

According to data released by CONAB (2020), the 2020/21 harvest may reach 37.85 million planted hectares, with an estimated output of 133.5 million tons, up 7.3% over the 2019/20 harvest. This is the harvest segment with the heaviest weight (26%), beating past harvest records, up by 5.1% in 2020.

In terms of commodities, soybeans are among the world's leading crops, with Brazil and the USA the main growers as shown in Table 1. In May 2020, Brazil outstripped the USA as the world's leading soybeans producer. Other countries ranking high for soybean production, such as the USA, state that they are already using their full land capacity for soybean plantations. Brazil is the only nation with potential for expansion (WORLDTLAS, 2020).

In 2021, Brazil will export around 86.79 million tons of soybeans, with China remaining the main destination, absorbing around 80% of all exports in 2021 (CONAB, 2020). According to data released by EMBRAPA (2020), 63% of soybeans grown in Brazil are earmarked for export, with the rest consumed on the domestic market. Volumes processed internally are divided into soy meal for export (38%) and domestic consumption (39%) and soy oil for household use (16%) and for export (4%) (MTPA, 2017).



**TABLE 1 – HIGHEST SOYBEAN OUTPUTS (000 TONS)**

Ranking	Country	Output (2019/2020)
1	Brazil	124
2	USA	96.79
3	Argentina	51
4	China	18.1
5	Paraguay	9.9
6	India	9.3
7	Canada	6

Source: WorldAtlas (2020)

## OIL AND FUELS

Oil is one of the leading energy sources used worldwide. Important products are made by refining oil, including gasoline, diesel oil, jet fuel (ATF), liquefied petroleum gas (LPG), naphtha, lubricants and fuel oil. In 2018, global consumption reached some 98.82 million barrels per day, according to the Organization of the Petroleum Exporting Countries (OPEC). The

nations with the largest global reserves are Venezuela, Saudi Arabia, Canada, Iran and Iraq, according to the US Central Intelligence Agency (CIA), with Brazil ranking 15th (MINFRA, 2020).

Table 2 shows the distribution of the main fuels produced in Brazil: oil, gasoline A, diesel oil, jet fuel, biodiesel and ethanol.

**TABLE 2: FUEL DISTRIBUTION BY VOLUME**

Product	Output	Imports	Exports	Domestic Consumption
OIL	150,102	10,805	65,186	95,721
GASOLINE A	23,707	2,966	1,390	25,283
DIESEL OIL	41,880	11,650	945	52,585
JET FUEL	6,376	858	515	6,719
BIODIESEL	5,350	-	-	5,350
ETHANOL	33,056	1,737	1,682	33,111

Source: MINFRA (2020) – Data: ANP/SECEX (2018)

## IRON ORE

The ores and mining sector accounts for some 4% of Brazil's GDP, according to data released by the IBGE and the Geology, Mining and Ore Processing Bureau under the Ministry of Mines and Energy (SGM/MME). This 4% includes contributions from the ore extraction and processing segments (metals and non-metals), in addition to oil and gas. During the first quarter of 2020, the ores and mining sector posted revenues of BRL 36 billion (excluding oil and gas) (IBRAM, 2020).

The iron ore production chain is the most important mining activity in Brazil, ranging from ore prospecting to define ore beds through to international marketing and sales of products deriving from iron ore (MTPA, 2018a)

With the world's second-largest iron ore reserves, Brazil ranks second only to Australia (US Geological Survey, 2020) and is also the second-largest producer of this metal (in 2015, it accounted for 18.9% of global output), with Australia being its main competitor (Table 3).

**TABLE 3 – HIGHEST IRON ORE OUTPUT (MILLION TONS, ACTUAL WEIGHT)**

Ranking	Country	Output (2017)
1	Australia	883.4
2	Brazil	435.5
3	India	201.8
4	China (1)	115.0
5	South Africa	62.3
6	Canada	49.0

(1) Output adjusted so that Fe content is similar to world average

Source: United Nations (2020)

## SUGARCANE

The sugarcane industry has a long history in Brazil, as the country is endowed with natural conditions making it the perfect place to plant this crop. In the course of its history, sugar exports have brought in five times more foreign exchange earnings than other agricultural produce shipped out to foreign markets (MTPA, 2018c).

Brazil's sugar industry continues to expand. The

2020/21 harvest (with estimates for August 2020) was the outcome of working a harvested area planted with sugar cane covering some 8,409,800 hectares, according to the 2020 historical data set released by the Companhia Nacional de Abastecimento (CONAB). In the Southeast, São Paulo and Minas Gerais States harvested 5,174,000 hectares, which was the area with the highest productivity and output in Brazil (CONAB, 2020).

According to the WorldAtlas (2020), Brazil is the world's leading sugarcane producer, followed by China and India (Table 4). It is also a global leader in ethanol production technology. In addition to the raw material needed to produce sugar

and alcohol, by-products and solid wastes are also used to co-generate electricity, as well as livestock fodder and cropland fertiliser (AGEITEC, 2015; MTPA, 2018c).

**TABLE 4: HIGHEST SUGARCANE OUTPUTS (000 METRIC TONS)**

Ranking	Country	Outputs
1	Brazil	793,300
2	India	341,200
3	China	125,500
4	Thailand	100,100
5	Pakistan	63,800
6	Mexico	61,200
7	Colombia	34,900

Source: WorldAtlas (2017)

## BEEF

In 2018, Brazil's beef cattle chain handled volumes worth BRL 597,22 billion, reaching 8.7% of its GDP (MALAFAIA et al., 2020). Nevertheless, according to a study conducted by CONAB (2020), the cattle-ranching contribution to GDP growth was negative in the farming and ranching sector, particularly for cattle. During the second quarter of 2020, 7.3 million head of cattle were slaughtered, down 8% over the same quarter in 2019, but 0.3% higher than the figures for the first quarter of the year. The Brazilian Meat Exporter Industries Association (ABIEC) believes that there was a drop of up to 40% in the food service sector, due to lockdowns and meals eaten at home during the months when

the toughest isolation measures were in place in Brazil.

Worldwide, Brazil ranks second for beef output, behind only the USA (USDA, 2020) and followed by The European Union and China, as shown in Table 5. According to the Livestock Output Statistics Survey for January – June 2020 (IBGE, 2020), the number of cattle slaughtered over the period dropped, despite an upsurge in beef exports driven by rising demands in China.

The countries with the highest beef demands in 2019 were the USA and China, followed by Brazil as the third-largest consumer market (USDA, 2020).

**TABLE 5: MAIN BEEF PRODUCERS (000 METRIC TONS)**

Ranking	Country	Output
1	USA	12,514
2	Brazil	10,200
3	European Union	7,900
4	China	6,670
5	India	4,305
6	Argentina	3,120
7	Australia	2,432

Source: USDA (2020)

## AUTOMOBILES

A major player in the global economy, the automotive sector put down firm roots in Brazil during the 1950s, its importance confirmed through specific policies for this sector.

Today, there are 26 auto-assemblers in Brazil, operating out of 65 plants in ten States and 43 municipalities, according to data released by ANFAVEA (2020). As stated in this Yearbook, Brazil has an annual installed production capacity of 5.05 million vehicles, with revenues reaching USD 61.9 billion in 2018. Its accumulated output of automotive vehicles from 1957 through to 2019 topped 84.4 billion. This industry employs 1.3 million people in direct and indirect jobs, with a total share of 3% in Brazil's GDP (2017).

In the 2019 global ranking, Brazil is the eighth largest producer, and sixth for domestic market size. The domestic market absorbs 88% of all vehicles produced in Brazil, with exports accounting for only 12% (MTPA, 2018b). In 2019, the main destination countries for its automotive exports world were Argentina (25.3%), the USA (16.4%), Mexico (10.7%) and the European Union (10.1%). For imports, the

main countries of origin were Argentina (26.1%), the European Union (21.1%), China (10.5%) and Mexico (10.2%). In 2019, Brazil's trade balance was negative by USD 2.9 billion, including auto-parts, with exports of around USD 15.9 billion and imports reaching some USD 18.8 billion.

Most (90%) industrial plants are clustered in the Southeast and South Regions, with 46% (27 plants) located in São Paulo State (MTPA, 2018b). In 2019, the total output of automotive vehicles reached 2,951,446 units, including production, domestic sales and exports. Of this total, São Paulo State accounted for 40.1%, followed by Paraná State with 15%; Minas Gerais and Rio Grande do Sul States with 10.7% each; and Pernambuco and Bahia States with 7.5% each. (ANFAVEA, 2020)

Furthermore, this sector encompasses some 592 business units in the auto-parts sector that feed into the supply chain, as shown in data released by SINDIPEÇAS (2020), together with 3,980 dealerships that distribute automotive vehicles nationwide, mainly in the Southeast (44%), followed by the South (24%) and Northeast (16%), according to FENABRAVE (2020).

# 6

CHAPTER

# MAIN LOGISTICS PLAYERS



There are currently 275 logistics operators in Brazil, bringing in gross revenues of BRL 100.8 billion a year, generating more than 1.5 million direct and indirect jobs, and paying around BRL 26.2 billion

in taxes, social security and other levies. ABOL study, in partnership with Fundação Dom Cabral (2020), points out that logistics operators in Brazil operate in different segments (Table 6),

**TABLE 6 – OPERATORS WITH THE LARGEST SELF-OWNED FLEETS ACTIVE IN BRAZIL**

Company	Services	Segments	Trucks	Imple- ments	Total (units)
JSL S/A	Transport, logistics and supply chain, fleet rental and management, vehicle sales, passenger transport, machine rental and rubbish collection	General cargoes, poultry, and farm produce	2,122	4,368	6,490
Ouro Verde Locação e Serviço	Leasing vehicles and equipment		1,251	2,346	3,597
Martelli Transportes	Transport	Grains	1,023	2,473	3,496
Centro Oeste Logística	Industry	Beers, alcoholic and non-alcoholic beverages.	2,335	280	2,615
JBS S/A	Industry	Beef, pork, lamb, and chicken; leather processing	1,149	1,420	2,569
HU Transporte Rodoviário Ltda	Transport and fleet management	Agribusiness, petrochemicals, consumer goods	691	1,502	2,193
Comando Diesel Transporte e Logística	Transport	Assorted	756	1,408	2,164
Transportes Bertolini Ltda	Transport		470	1,687	2,157
Transpanorama Transportes Ltda	Transport	Poultry and farm produce, timber, grains, bulk liquids, general cargoes	946	1,041	1,987
Expresso Nepomuceno S/A	Spot cargo transport through to complete logistics operations projects	Sugar and alcohol, forest products, chemicals, beverages, and automotive items in several regions of Brazil	743	1,198	1,941

Source: World Transport (2018)



# 7

CHAPTER

# MAIN LOGISTICS CORRIDORS







## RAIL CORRIDORS

As illustrated in Table 7, there are thirteen rail corridors in Brazil, showing that the main production chains described in Chapter 5 (Main Production Chains), rail corridors do not service the beef and automotive chains. However,

they are essential for other chains, particularly soybeans and maize, iron ore, sugar and fuels. It is also stressed that the Imbituba corridor, which carries mainly charcoal, is unrelated to the production chains examined in this Report.

**TABLE 7 – RAIL CORRIDORS AND PRODUCTION CHAINS**

Corridor	Soybeans and Maize	Iron ore	Sugar	Fuels	Vehicles	Beef
São Luís	X	X		X		
Intra-regional Northeast		X		X		
Vitória	X	X		X		
Centre-West – São Paulo	X		X			
São Paulo – Northeast	X	X	X			
Rio de Janeiro – Belo Horizonte		X				
Rio de Janeiro – São but Paulo		X	X			
Santos (broad gauge)	X	X	X			
Corumbá – Santos (narrow gauge)		X	X			
Paranaguá	X		X	X		
São Francisco do Sul	X		X	X		
Rio Grande	X			X		

Source: CNT Railways (2015)

## PORTS

According to the Brazilian infrastructure sector (CBIE), there are 175 cargo port facilities in Brazil, including marine terminals, ports and waterway facilities. Among them, 99 are ports and terminals along the coast, while 76 are inland facilities.

During 2019, 64,600 mooring operations took place in 34 established ports, 147 private use terminals, 32 cargo transshipment stations and two ports with tourism facilities, handling volumes that totalled 1,104 billion tons (ANTAQ 2019).

In terms of cargoes handled by ton, the main ports are listed in Table 8. The ten largest established ports handle 85% of all cargoes shipped through this type of facility, while the ten largest private ports handle 65% of these cargoes (ANTAQ, 2019).

It is worth stressing that the ports most commonly used for long-haul shipping of containerised cargoes (imports and exports) are Santos, Itajaí, Paranaguá, São Francisco do Sul and Rio Grande. Cabotage takes place mainly in private ports, with only 22% handled by established ports (ANTAQ Statistics Yearbook, 2019).

**TABLE 8 – MAIN PORTS BY ACTIVITIES**

Port	Cargoes handled (million tons)	Private or Organised	Main goods
Ponta da Madeira Marine Terminal (MA)	190.1	Private Use Terminals (Vale)	Iron ore, manganese, copper
Santos (SP)	106.2	Organised	Containers, soybeans, bulk liquid
Tubarão (ES)	76.4	Private Use Terminals (Vale)	Iron ore, coal, grains, fertilisers, bulk liquids
Terminal Angra dos Reis – Tebig (RJ)	51.9	Private Use Terminals (Petrobras)	Oil
Paranaguá in Paraná State	48.5	Organised	Agricultural produce (soybeans), containers, automobiles, sugar
Itaguaí (RJ)	43.2	Organised	Iron ore and containers
Terminal de São Sebastião – Tebar (SP)	43.2	Private Use Terminals (Petrobras)	Oil, oil products, alcohol, biodiesel
Rio Grande (RS)	25.8	Organised	Woodpulp and timber, bulk solids, containers, automobiles
Itaqui (MA)	25.2	Organised	Bulk solids (soybeans and maize) and bulk liquids (diesel, gasoline)
Suape (PE)	23.9	Organised	Bulk liquids(oil), automobiles, iron ore, soybeans and sugar, containers

Source: ANTAQ Statistics Yearbook (2019) • Note: TUP – Private Use Terminals

## WATERWAY CORRIDORS

Despite the length of Brazil's rivers, inland shipping uses only 30% of this network for commercial purposes, with only 5% of its cargoes carried by waterways. This is well below the figures for other continent-sized countries such as China and the USA (CNT Navegação Interior, 2019).

River shipping in Brazil is relatively important, particularly in the North Region, due to the availability of navigable waterways, low transport costs and the absence of road networks.

There are six major river basins in Brazil: the Amazon, with a length of 15,014 kilometres (80.6% of all Brazil's navigable waterways, the Tocantins-Araguaia (1,338 kilometres and 7.2%); Paraná (1,267 kilometres and 6.8%); Paraguay (591 kilometres and 3.2%); and the South Atlantic (406 kilometres and 2.2%), in addition to the Vale do São Francisco river valley, which is not yet in use (VEN, 2018).

The main cargoes shipped along waterways in Brazil are bulk solids (soybeans, maize, and iron ore), followed by bulk liquids and gases (oil and oil products), as well as general cargoes, mainly in the river-laced North Region. This mode of transport has potential for the expansion of containerised cargoes, due to its limited representativity.

## CABOTAGE CORRIDORS

During 2018, cabotage was mainly for carrying bulk liquids and gases (with crude and oil products accounting for 60.6% of coastal cargoes that

year), followed by containerised cargoes and bulk solids (bauxite, iron ore, iron and steel) (ANTAQ, 2018; ANTAQ, 2019).

Among the major production chains described in this Report, cabotage is used largely by the fuels and iron ore chains, and to a lesser extent for soybeans and maize (carrying grains as well as fertilisers), in addition to vehicles, sugar and beef.

## PIPELINES

In Brazil, pipeline shipping systems are used mainly to carry fuels and natural gas, as well as assorted oils and oil products, fuels, natural gas and iron ore, providing efficient and sustainable means of transport.

The infrastructure needed to transport fuels includes bulk liquids terminals and oil pipelines. Built to receive, store and ship out goods (fuels and liquid oil products) terminals may be located onshore, as well as alongside lakes or waterways. In oil-producing areas, products may be shipped from oil fields to terminals, or pumped directly to refineries. For biofuels such as ethanol and biodiesel, output is delivered to distributors or at terminals (ANP). Oil pipelines may be onshore or subsea, with the main oil pipeline in Brazil running more than 990 km between Paulínia and Brasília. The main players shipping liquids through pipelines are Transpetro and Logum.

With lighter environmental impacts, ore pipelines carry minerals over long distances, shipped out as thick slurries consisting of water and solids.

# 8

CHAPTER

# TECHNOLOGIES INVOLVED







Discussed below are the current and future technologies that might be notable for logistics management in Brazil.

In 2011, the term Industry 4.0 arose during an industrial technology trade fair in Hanover, Germany, which highlighted the possibility of linking machines with smart systems. The Brazilian Government opened the <http://www.industria40.gov.br/> portal, which presents the impacts and challenges for all industrial links. This new paradigm has impacts

on industry (focal point) and all its connections along the supply chain (SC). Viewing logistics as an operating support, this transformation of the focal point created ongoing impacts on its services, particularly transport, warehousing and customer order cycle management.

Leite (2020) and Trevisan (2020) highlights some market solutions (Table 9) that are already available in Brazil, trending towards an even larger share.

“

*In 2011, the term Industry 4.0 arose during an industrial technology trade fair in Hanover, Germany, which highlighted the possibility of linking machines with smart systems.*

”

**TABLE 9 – SOLUTIONS AVAILABLE ON THE MARKET**

Provider	Solutions
Traveling Salesman Problem – Ailog	Defines and assembles cargoes, fine-tuning times, costs and distribution sequences
Sascar / Trimble	Analyses driver behaviour, allowing accidents to be predicted prevented, together with traffic offences
Benner	Deliveries and Collection Management, Route Planning and Freight Rates Listing
Reply	Machine Learning provides support for transport planning
Sialog and Mitra	AI and Predictive Modelling for simulating scenarios and simplifying decision processes
Compuetra	Dock scheduling and control with no human intervention
Senior	Logistics optimisation
Opentech/GKO	Contracting and parametrising transport
Fretebras	Price analysis
GoogleMaps, Alexa associated with MyTracking (Point Sistemas)	Route Planning
Vuxx	Forecasting infrequent routes
Lincros	Control towers and cargo tracking

Source: Trevisan (2020), Milk (2020).

Leveraged during the pandemic and buttressed by last-mile logistics, e-commerce upgraded its control systems and movement activities, running from distribution centres through to end-destinations, with growth in this area, in addition to boosting customer loyalty through unboxing experiences

Some analysts suggest that the last mile accounts for up to 30% of transport costs in an order cycle. For last-mile distribution, companies have also appeared as alternatives for retailers that do not intend to have their own fleets. For customers, AI-driven tracking visibility with direct B2B and B2C connections through Enterprise Resource

Planning (ERP) offers greater confidence in shipping movements.

There is also the possibility of flying over areas with high vehicle density and traffic jams, through using drones.


Another technology that can increase the visibility of operations and allow rapid action when needed are control towers, transmitting information in real time, with gains through lower fuel consumption, greater fleet efficiency, shorter times and better service levels (OLIVEIRA NEVES, 2019; TARALLO et al., 2019).



# 9

CHAPTER

# AFTER COVID-19: POST-PANDEMIC EXPECTATIONS



WHAT WILL  
BE AFTER  
**COVID-19?**





The post-pandemic period could well be beneficial for Brazil, despite beginning only after the advent of a safe and efficacious vaccine available worldwide, probably in mid-2021. The reason for this statement is that there are positive expectations that the Brazilian economy might move to the fore as a major global supplier of agricultural commodities, contributing above all through supplying food to many peoples all over the world. For this possibility, the development of Brazilian logistics and upgrading the nation's transport infrastructure will be fundamental in order to ensure that Brazil is endowed with a keen competitive edge on global markets. This public health crisis is a major opportunity for Brazil, although there are many challenges to be surmounted.

The Ministry of Infrastructure has been announcing major projects, many of them begun during the pandemic, with the government targets of BRL 30 billion in public investments and BRL 250 billion in federal concessions, during the next two years, as well as BRL 40 billion for railways and BRL 1.9 billion for upgrading road access to the Port of Santos.

With the large amounts of money announced and based on the track record of allocating public funds to Brazil's transport infrastructure, these expectations will certainly not firm up over the short term. However, in a best-case scenario, a ten-year

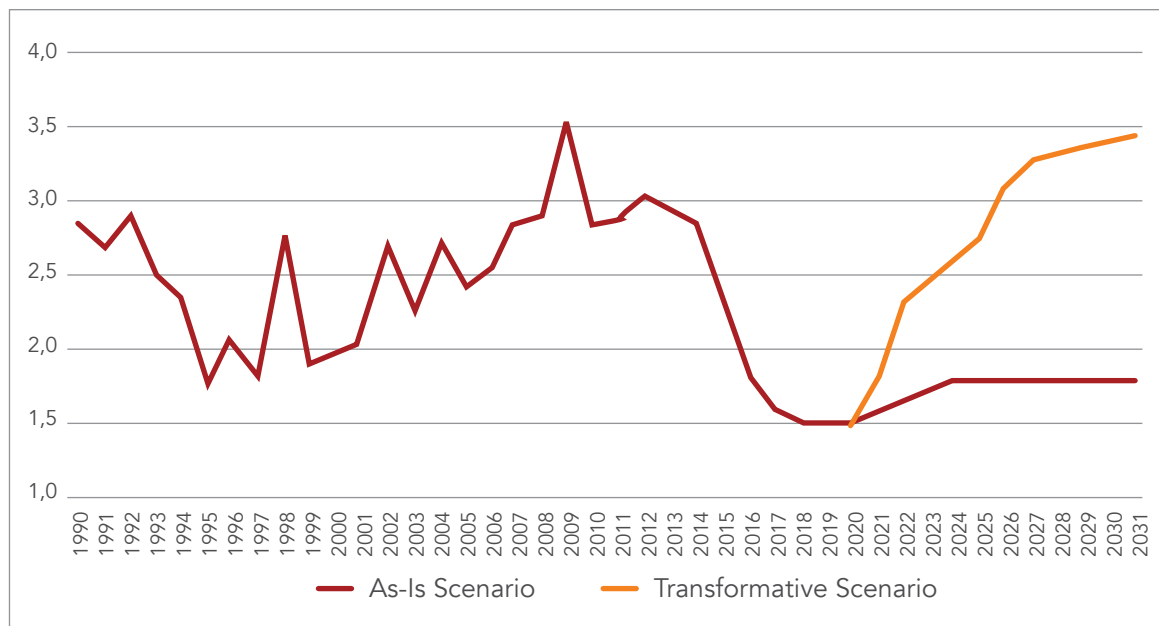
horizon may be considered for the implementation and completion of the announced projects.

The main expectation of the Brazilian Government is to forge ahead with port privatisation, in order to streamline the shipment of goods and commodities, while doubling the rail share in the Transport Matrix and thus reducing free charges for the logistics market. During the next two years, the Brazilian Government intends to conduct 24 port lease auctions, signing 54 private terminal adherents agreements, increasing Brazil's cargo fleet by 40%, while preparing the country for a massive upsurge in rail transport.

However, according to the IPEA (2020), investments in infrastructure have been very low for years, as shown in Graph 7, and are not even enough to offset the depreciation of the patchy transport structure and energy supply system in place in Brazil today. Expectations for the next ten years are not encouraging, with the as-is scenario projections keeping public investments in infrastructure at the extremely low level of 1.7% of the GDP each year. Any transformative scenarios that might include upscaled investments in infrastructure, moving towards a desirable 3.5% of the GDP over ten years, will require the approval of new laws by the Brazilian Congress.

## GRAPH 7 – INFRASTRUCTURE INVESTMENT RATE (1990 – 2031)

(at constant 2010 prices, in % GDP)



Source: FGV (prepared by Dimac / Ipea)

In terms of agricultural output, according to the Ministry of Agriculture, Livestock and Supply (MAPA), the Gross Production Value (GPV) for every business will increase by 8.5% in 2020 over 2019, reaching BRL 703.8 billion. The Brazilian Agriculture and Ranching Confederation (CNA) is more optimistic, forecasting that the GPV will reach BRL 740.3 billion, up 12.4% over the 2019 figures.

On the other hand, according to projections drawn up by IPEA during the COVID-19 pandemic, Brazil has shifted from a reasonably promising outlook to the current context, with forecasts for 2020 indicating the possibility that the Brazilian economy will shrink by up to 6%.

The worldwide public health crisis caused by COVID-19 has prompted expectations of tight economic constraints on both the supply and demand sides. Social distancing in order to curtail the dissemination of the virus is undermining the confidence of consumers, business executives and governments, resulting in the sharpest drop in Brazil's GDP since this historic dataset began in 1901.

In its study of the impacts of the COVID-19 pandemic on the Brazilian economy, the IPEA noted that production activities were strongly impacted, with the service sector – accounting for 70% of Brazil's GDP – most severely affected.

Another post-pandemic expectation is related to the behavioural, economic, social and cultural changes imposed on individuals, companies and governments, including the digital transformation, for example, which has progressed very quickly over a brief period, together with the appearance of new business models and innovative solutions.

Market surveys show that Internet purchases are up by around 50% over 2019, with this situation indicating massive progress for the retail logistics sector during the next few months. Consequently, retail logistics will play a key role and may gain ample headroom, despite shortfalls in Brazil's transport infrastructure, as Brazilian consumers sheltering at home have understood and opted strongly for delivery services, creating a context that is far more favourable for on-line commerce.

The first six months of 2021 will be decisive for adapting and migrating off-line markets to on-line options, with a major restructuring process for the retail logistics sector. To an increasing extent, consumers will continue to buy their medications, food, cleaning and grooming products, among others, without leaving the house, while demanding fast deliveries and low freight fees.

There will probably be many mergers, acquisitions, partnerships, court-supervised restructuring processes and bankruptcies, including the logistics sector, in addition to expanded operations, extended Polarity, lower operating costs, higher process automation and extended remote management for haulage companies and logistics operators.

New technologies will start to reach a commercial scale. For instance, drones will be important for fine-tuning logistics for deliveries (B2C) as well as carrying input materials, feedstock and products between industries, hospitals, companies, stores and service providers (B2B).

Post-pandemic shifts in people's consumption habits will drive e-commerce to an increasing extent, prompting the adaptation of marketplace platforms run by major retail chains, in order to increase their product mixes, including products and services offered by macro-enterprises and small businesses, resulting in the modernisation and optimisation of logistics processes.

There is also the possibility that the logistics sector will adhere to the shared economy. This would consist of haulage companies joining forces in order to offer better and more personalised services to their customers, with low costs and impractical and smart ways, through using automation and technology.

Finally, the main expectation is the implementation of multi-mode logistics in Brazil. The first major step in this direction will be the completion of the design project for the Electronic Transport Document (DT-e) by the Ministry of infrastructure, which proposes a new electronic fiscal transport document, using smart technology to connect up hauliers and shippers. This would reduce paperwork and streamline transport operations, while lowering logistics costs, improving inspections and contributing to trip planning in all modes.

# 10

CHAPTER

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