Article

Perspective of a new national port geography: advances, retreats and permanence of the national port sector after 2000's

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Perspective of a new national port geography: advances, retreats and permanence of the national port sector after 2000's

Abstract

Ports are geographical phenomena that materialize the interrelationships of producer and consumer spaces. In the current stage of capitalism, they become central elements, accounting for over 90% of international trade. In Brazil, the sector is characterized by a cyclical process of higher/lower investment. However, the period marked by radical changes in the sector at a world level occurs together with changes in the international financing policy and in the State's indebtedness. New leaders start to command the country, imposing cost-cutting policies. Ports become strangulation nodes that only began to be faced after the 2000s, with state funding, public-private partnerships and new legislation. Although they need to mature, the initial results cast perspective for a new port map. Thus, we aim to investigate this new spatial dynamic, its genesis, process and perspective. We considered bibliographical references on the subject in international and national context, as well as data from official bodies.

Keyword: Ports. Navigation. Economic development. Brazil.

Perspectiva de uma nova geografia portuária brasileira: avanços, recuos e permanências do setor portuário nacional depois dos anos 2000

Resumo

Os portos são fenômenos geográficos que materializam as inter-relações de espaços produtores e consumidores. No atual estágio do capitalismo, tornam-se elementos centrais, respondendo por mais de 90% do comércio internacional. No Brasil, o setor se caracteriza por um processo cíclico de maior/menor investimento. Entretanto, o período marcado pelas modificações radicais do setor em nível mundial é concomitante

a mudanças na política de financiamento internacional e no endividamento do Estado. Novas lideranças passam a comandar o país, impondo políticas de contenção de gastos. Os portos se transformam em nós de estrangulamento que só passaram a ser enfrentados depois dos anos 2000, com financiamento estatal, parcerias público-privadas e nova legislação. Embora precisem amadurecer, os resultados iniciais lançam a perspectiva de um novo mapa portuário nacional. Objetivamos investigar essa nova dinâmica espacial, sua gênese, processo e perspectiva. Levamos em conta referências bibliográficas sobre o tema nas conjunturas internacional e nacional, além de dados de órgãos oficiais.

Palavras-chave: Portos. Navegação. Desenvolvimento econômico. Brasil.

Perspectiva de una nueva geografía portuaria nacional: avances, retrocesos y permanencias del sector portuario nacional desde la década del 2000

Resumen

Los puertos son fenómenos eminentemente geográficos que materializan las interrelaciones de los espacios productores. En la etapa actual del capitalismo, se convierten en elementos centrales, representando más del 90% del comercio internacional. En Brasil, el sector se caracteriza por un proceso cíclico de mayor/menor inversión. Sin embargo, el período marcado por cambios radicales en el sector a nivel mundial se suma a cambios en la política financiera internacional y en el endeudamiento del Estado. Nuevos líderes comienzan a dominar el país, imponiendo políticas de reducción de costos. Los puertos se convierten en nodos de estrangulamiento que solo comenzaron a enfrentarse después de la década de 2000, con financiamiento estatal, asociaciones público-privadas y nueva legislación. Aunque necesitan madurar, los resultados iniciales arrojan perspectiva para un nuevo mapa de puertos. Así, pretendemos investigar esta nueva dinámica espacial, su génesis, proceso y perspectiva. Se tienen en cuenta referencias bibliográficas sobre el tema en el contexto internacional y nacional, así como datos de organismos oficiales.

Palabras clave: Puertos. Navegación. Desarrollo económico. Brasil.

Introduction

Ports are "eminently geographic phenomena, with the particularity of being complex" (Mamigonian, 2017, p. 21). Being "a phenomenon rich in spatial, structural qualities, in terms of the network of varied relationships, it is a factor possessing all the geographical qualities" (Araújo Filho, 1974, p. 16). They manifest themselves from the exchange relations subordinated to the characteristics of the spaces of influence (hinterlands) at stake. They are, therefore, fruits of the convergence of forces emanating from a vast space, subordinated to national and international structures, as interpreted by Araújo Filho (1974, p. 15):

> A *sui generis* phenomenon, which only for this quality draws our attention, ports are places that materialize, in a close connection and exact portions of the continents, the interrelationships of producing spaces, at the same time that they constitute expressions of the convergence of broad and specific interests linked to a whole complex framework of needs.

Despite their importance, ports are at the mercy of navigation, which implies the need to adapt to ships to receive them better. Thus, ports change along the evolution of maritime navigation, and not the other way around (Mamigonian, 2017). Containerization and the size of ships are examples of changes imposed on ports by navigation, implying the need for constant investments (expansion of the wharf, changes to deeper access channels, increase in the backyard, and new equipment, among others) (Machado, 2020).

In other words, according to George (1961, p. 316), ports are "the place of transit between maritime navigation and continental transport. Based on this, according to the interpretation of Araújo Filho (1974, p. 15), "a whole requirement accompanies it and which is responsible for lending it a physiognomy that will be the richer and more heterogeneous the greater and more complex the intensities of transits are." George (1961, p. 316) adds: "[the development of ports] or the conservation of their activity is, therefore, subordinated to their ability to respond to the requirements of this transit function."

The current globalized economy, characterized by the intensification of the international division of labor and, consequently, the enormous flow of goods between nations, means that transport systems remain continuous targets for innovation, resulting in more intensive, technological, and highly specialized operations. Today, port activity is responsible for handling more than 90% of international trade (in volume), constituting the primary means of transporting goods (95%) of Brazilian foreign trade (Antaq, 2014).

In Brazil, the period marked by the radical evolutions of the port sector worldwide (such as gigantism of ships and containerization) is concomitant with State indebtedness, the depletion of internal financing, and changes in international financing policy. Added to this reality were changes in domestic policy, which came to be dictated by neoliberal dogmas, i.e., a

radical opening of the economy and a reduction in public investment. At the same time, there is an incentive and expansion of exports of mineral and agricultural commodities, increasing the demand for port services. All this turned the country's ports into bottlenecks already in the 1980s, but which only started to be seriously faced from the 2000s onward, with the return of more voluminous investments through growth acceleration programs (PAC I and II and PIL), together with the new port legislation (Law No. 12,815/2013) and public-private partnerships (PPP) (Machado, 2020). By allowing greater participation by the private sector and expanding the volume of invested resources, although they still need time to mature, these programs and the new legislation are creating what can be characterized as a new national port map.

This new port map has been materializing mainly due to the vertiginous expansion in the movement of grains and ores through the ports of the North and Northeast, starting to attract and move cargo previously directed to the ports of the Southeast and South, which were, until then, hegemonic. In the case of grains, the movement growth was 482% between 2010 and the first half of 2020, increasing the participation in the total volume movement of the merchandise from 24% to 49% (Antaq, 2020a). Regarding iron ore, handling the volumes extracted in the North, the Northeast increased its share in the total movement from 30.2% in 2010 to 52.8% in 2020 (Antaq, 2020a). In containers, it went from 9% in 2002 to 13.0% in 2020, and in the North, from 5% to 7.4% (Brasil, 2021a).

Given the above, we investigated this process by analyzing the evolution of the Brazilian port issue and correlating it with national and global events to understand how Brazil reacted to waves of innovations and adaptations in the port sector, clarifying the current situation and recent changes.

Therefore, we used a bibliographic review, from which we highlight, among others, George (1961), Fischer (1963), Araújo Filho (1969, 1975), Vigarié (1979), Stopford (1997), Silva and Cocco (1999), Monié and Silva (2003), Oliveira (2011), Monié (2012), and Mamigonian (2017), survey and analysis of official data (Antaq, SEP, IBGE, Cia. Docas, and MDIC among others), technical visits (to public and private ports, port authorities, unions, and the Ogmo), and *in loco* observations.

We take as a theoretical reference the teachings of the geographer Armen Mamigonian, who points out in his works that the set of knowledge is explained by the combination of factors related to each of the geographic scales – world, nation, and region –and by the hierarchical levels of natural, socio-economic, political, and ideological determinations. Given the scope of the analysis, we resorted to the theory of socio-spatial formation proposed by Milton Santos, according to which the State is part of a dynamic reality in constant transformation, in which, at each historical moment, factors such as demographic behavior, degree of modernization, and creation and retention of added value are combined (Santos, 1982).

The port issue in Brazil and the world

In mercantilism, when maritime navigation gained a planetary dimension, manufacturing capitalism gave rise to center-periphery trade relations, globalizing the economy. From then on, ports and navigation acquired a new status of a central role in trade relations.[1]

In its colonial period and the early days of the independent monarchy, Brazil was configured as a landowner, enslaver, and eminently exporter. This combination gave rise to sparse coastal cities of medium and large sizes on the shores of bays and reefs, peninsulas, inlets, and river mouths.

In the first four centuries, virtually all major cities were involved in the surroundings of a port-emporium,[2] having their own social division of labor and more linked to agro-export than to trade with other Brazilian regions (Rangel, 1968). With industrialization and national integration, post-1930, regional formations began to be interconnected by the road system to more dynamic centers (Sao Paulo on a national scale and other regional metropolises).

In the world scenario, the technological innovations then developed (such as the combustion engine, assembly line, chemistry, and electricity) resulted in the outbreak of the Second Industrial Revolution, which boosted the resumption of capitalist ascension, expressed by the expansive phase of the third Kondratieff cycle (1896-1921). Later, these same inventions began to be incorporated into the transport sector, already in its recessive phase (1921-1945), until its mass use, leading to the birth of the fourth Kondratieff (post-1945).[3]

In the current and singular depressive phase,[4] post-1973, the focus remains on the relentless pursuit of cost reduction, deepening the international division of labor, and the geographic and sectoral expansion of the market (Machado, 2020). Thus, between 1978 and 2008, the average annual growth of international trade was 6.6%, a rate almost twice as high as that of world GDP; then, between 2011 and 2016, annual growth was 3.1%, against 3.4% of world GDP (IMF, 2016).

1 In *The Wealth of Nation*s, from 1776, Smith (1983) gave great importance to maritime navigation, stating that, as the social division of labor intensified, productivity would increase, generating surpluses that would need to be sold in ever broader markets. Given the limited land transport access, maritime transport would reach such markets. He also highlighted maritime transport's economy of scale over land, at the time, with productivity 15 times greater.

2 Still in 1900, of the Brazilian cities with more than 100,000 inhabitants, only São Paulo, umbilically linked to Santos, was not on the coast, the others being Rio de Janeiro (691,565 inhab.), Salvador (205,813 inhab.), Recife (113,106 inhab. inhab.), and Belém (96,560 inhab.) (Santos, 1993).

3 While already described by Engels and Marx, Nikolai Kondratieff (1892-1938) proved the existence of cycles in the capitalist economy, and Schumpeter (1939) systematized and disseminated his theory. In it, he showed that, for 25 or 30 years, the pace of economic growth was accelerated and that, after that phase, another cycle would begin at a slower pace in the following 25 or 30 years (average annual rates of 2%). Thus, each Industrial Revolution corresponds to two cycles, the first with new technologies incorporated into the production process on a large scale, and the second when these same technologies are launched in the transport sector, expanding the profit rate again and giving rise to a new capitalist expansion phase.

4 Singularly, at this stage, the new inventions (such as informatics and robotics) were not able to promote what Schumpeter (1939) called "creative destruction." In it, trade and financial transactions were artificially leveraged, and the possibility of debenture earnings inhibited "creative destruction." According to Mamigonian (2017), Reagan's economic policy (1980-1988) delayed the financial crisis to 2008 by the brutal financialization of all economic life, causing the GDP of the system's center to grow at 2% p.a. Still, international trade was stimulated at 5% or 6% p.a. The financial turnover started to "be on cloud nine," at 10% or 12% p.a., postponing the financial crisis and the beginning of the expansionary phase of the new long cycle.

As a result, ports and maritime navigation underwent solid modernization processes. Authors such as Silva and Cocco (1999), Lacerda (2004), Levinson (2006), Oliveira (2011), Espíndola (2014), and Mamigonian (2017) allow us to state that some of these modernizations consist of (a) the increasing use of containers, leading to the enlargement of ships, which can carry up to 24,000 TEU,[5] and to the expansion of economies of scale and more operational agility, including transshipment, with a consequent increase in productivity,[6] (b) the use of gigantic vessels (super bulk carriers, supertankers, and ro-ro supercarriers),[7] (c) the intensive use of labor-saving technologies (computerization, cranes, conveyor belts, and forklifts), (d) intermodal operations, with the creation of logistics networks and the emergence of hub ports of containers and transshipment, (e) the intensification of security and in the reduction of cargo losses, (f) the reduction of docking time in ports, and (g) he formation of highly specialized large multinational shipping companies and with extensive use of modern logistics.

This process required a quick response from the globalized nations to modernize their port complexes, which only occurred specifically (selectively), i.e., in specific ports and countries. The reduction in speed of "port modernization occurred all over the world, where traditional ports (such as London and Liverpool) that did not adapt (inadequate depth, lack of a backyard, or far from the sea) ended up becoming ports of second importance" (Machado, 2020, p. 352). On the other hand, the Second World War (1939-1945) gave rise to modernizations in the main European ports and the renewal of the merchant fleet. These reconstructions already occur in the new port logic, with a large backyard, deeper access channels, away from large urban centers, and intermodality, as happened in the ports of Le Havre (France) and Rotterdam (Netherlands) (Machado, 2020). Vigarié (1979) and Hoyle (1989) support this statement by indicating that the displacement of port sites to areas with wider backyards, deep drafts, and the adoption of modern machinery intensified after the 1950s.

Brazil's reaction process was localized, encouraging the implementation of private use terminals (TUP) for large exporting companies for their own and highly specialized uses (Cargill, Aracruz, Vale do Rio Doce, and Petrobras) and the implementation of export corridors. This

5 The acronym TEU (twenty-foot equivalent unit) corresponds to an equivalent transport unit, the standard size of an intermodal container of 20 feet (approximately 39 m^3).

6 According to Stopford (1997), the daily cost of a ship with a capacity of 1,200 TEU was 16.6 USD per unit, but those carrying 6,500 TEU had a cost of 7.5 USD (almost three times lower and cargo volume six times larger). Thus, as the dimensions of the ship increase, the share of fixed costs in the total cost decreases from 42% to 26%. Based on Stopford (1997), Lacerda (2004) states that this results from several factors, such as the cost of capital per container, the ratio between the crew and the cargo capacity of the ships, fuel consumption per unit of cargo transported, and the number of port fees per TEU.

7 The acronym ro-ro designates roll-on-roll-off-type cargo ships built to transport loads that have wheels using ramps. They are closed, like vertical parking lots. Their use intensified after 1970 when international trade in automobiles increased significantly. In 1973, the European Highway was built in Japan (K-line company), transporting 4,200 cars (Fazcomex, 2022). Currently, these ships can transport up to 8,500 cars, as with the Höegh Target from the Norwegian company Höegh Autoliners.

reality was verified in ports with more significant movement and specific cargoes (coffee, rubber, coal, sugar, soybean, cotton, cocoa, and iron ore) (Machado, 2020). Thus, until the beginning of the 1980s, 80% of the total movement in the country was carried out by private terminals, which handled low-value-added cargo. Public ports, handling general cargo, accounted for 20% (Oliveira, 2011).

Subsequently, due to the slow growth of the national economy and the accelerated process of modernization of the sector, Brazilian ports ended up suffering a delay in the reaction and adaptation to the new impositions of navigation and the new port infrastructure. Thus, since the end of the 1980s, they have become bottlenecks (Rangel, 2005).

National port development: advances, setbacks, and permanence

According to Santos and Silveira (2013), the history of the Brazilian territory, its flows, and the implementation of its engineering systems is, at the same time, one and diverse, requiring a periodization effort to understand it in its process and its current reality. From the period called by the authors a "natural" medium to the technical means of mechanized circulation, between the beginning of the 20th century and the 1940s, the dynamics that commanded the Brazilian territory were based on serving exogenous interests.

Like logging, sugar production, with mills close to the coast, did not require large engineering systems. Later, mineral extraction and coffee production required the construction of roads and railways linking the interior to the coast. However, these infrastructures did not unite the territory, contributing to the formation of regional archipelagos that resisted until the 1930s and 1940s (Mamigonian, 2009; Santos, 1993). Since several ports were granted to the private sector, long-term concessions (up to 90 years) harmed and inhibited constant investment. Upon returning to the State after 1930, with the nationalization, they accumulated the need for large sums for their modernization.

In the technical-scientific period, after 1950, in the industrializing logic, attention turned to implementing an effective and immediate command over the national territory. Due to its rapid implementation, the industrial incentive policy focused on national integration through road transport. However, the situation that followed, initiating the post-1973 depressive phase, prevented the continuation of massive investments in infrastructure. The massive investments in energy generation (Itaipu, Tucuruí, and Angra I and II), the construction of highways (the BR from North to South and the state networks), the constitution of the airport network (1949-1970), telecommunications (radio network, Intelsat satellite, and Telebras), oil (Petrobras), and river transport (Tietê River), among others, made the industrial building effective. However, they did not prepare the ground for the country's insertion into the highly competitive international market (competitive integration) (Machado, 2020).

Due to its indebtedness, the exhaustion of domestic investment possibilities (issuance of public debt bonds), and changes in the international financing policy,[8] the State was unable to make the massive necessary investments, with an aggravating factor for the port sector, given its specificities and the context of rapid modernization.

The great attempt to systematize the sector took place through the work of Empresa de Portos do Brasil S/A (Portobras), created in 1975, as a result of the Master Plan for the Ports of Brazil 1975-1984, which constituted the first major national project for the sector, as a holding company aiming at the State's interest in centralizing port activities, making it possible to integrate the national port system. However, it was created at the beginning of the depression, causing contingencies in the port plans of 1975-1984 and 1987-1996, and was closed in 1990.

The adoption of neoliberalism after 1990 and the strong business and media pressure led the government of Itamar Franco to approve the Port Modernization Law (Law No. 8.630/1993), which removed the monopoly of the operations of Companhias Docas, which had then onward an administrative role only, and that of the unions, with the creation of the Labor Management Body (Ogmo), in addition to establishing new legislation for private terminals, allowing the handling of third-party cargo (sporadically and not on a final basis). There, the so-called "dry ports," or the Inland Customs Station (Eadi), emerged due to port obstacles and aimed at reducing seaport bureaucracy. They were important facilitators of the supply chains, particularly the automobile industry, which, being the primary beneficiary of the "fiscal war" that worsened after 1988, began to settle in areas increasingly distant from large port complexes (Machado, 2020).[9]

Despite being an attempt to solve the port problem, the new regulatory framework created a paradox: public ports that move general cargo (sack bags, inputs, vehicles, machinery, and rocks) begin to suffer from the deterioration of their structures and lack of investment, while other terminals (minerals, oil, cellulose, and grains) are overcapitalized and highly specialized in a reduced range of products. The access infrastructure, which remains under the responsibility of the State, did not follow this modernization. Insufficient investments in highways, railroads, dredging, and parking yards resulted in major bottlenecks, becoming, according to analyses of the Port Master Plans (Brasil, 2021b), the main port problems, implying delays in deliveries, increased freight prices, and loss of competitiveness.

These bottlenecks began to be faced at the beginning of the 21st century, with the return of massive investments in the infrastructure sector, provided by PAC I (2007) and II (2010) and by PIL (2012) (Table 1). By Law No. 12,815/2013, TUPs are now allowed to handle third-party

8 Externally, with the beginning of the depressive period, there is an increasing restriction of credit and an increase in interest rates. This policy was initiated in the USA in 1979, during the government of Jimmy Carter, and maintained by Reagan (1981-1989).

9 According to Luedemann (2003), although more than 200 km away from the nearest port, municipalities such as São Carlos (Volkswagen engine factories), Catalão (Mitsubishi/Cameco), Indaiatuba (Toyota), Sumaré (Honda), Juiz de Fora (Mercedez-Benz), and Sete Lagoas (Iveco) had then dry ports available in Juiz de Fora (MG), Campinas (SP), Contagem, and Uberlândia (near Catalão-GO), which favored the logistics system of these new plants.

cargo no longer just on a supplementary or occasional basis. The construction and regulation of private mixed-use terminals were also allowed, which began to compete directly with public ports (ports of Itapoá-SC, Navegantes-SC, Açu-RJ, and terminals of Pecém-CE and Ponta da Madeira-MA).

Table 1 – Investments in infrastructure works in billions of BRL (2017 prices)

segment	2007 - 2014			2015 - 2017		
	total	per year	(%) of GDP	total	per year	(%) of GDP
transport	476.2	59.5	0.9%	147.9	49.3	0.7%
road	311.6	39.0	0.6%	95.8	31.9	0.5%
railway	44.5	5.6	0.1%	11.5	3.8	0.1%
waterway (ports and waterways)	42.7	5.3	0.1%	11.4	3.8	0.1%
air transport	3.2	0.4	0.0%	0.5	0.2	0.0%
stations*	21.0	2.6	0.0%	14.1	4.7	0.1%
works of art**	53.2	6.6	0.1%	14.6	4.9	0.1%
electricity	143.8	18.0	0.3%	49.5	16.5	0.2%
mineral resources (oil and gas)	142.0	17.8	0.3%	23.9	8.0	0.1%
telecommunications	52.0	6.5	0.1%	20.2	6.7	0.1%
overall total	814.0	101.7	1.6%	241.5	80.5	1.2%

* Airports, maritime terminals, train and bus stations, etc.
** Bridges, tunnels, walkways, etc. on highways and railways.

source: IBGE (2018) and Media anual... (2018).
adaptation: The author.

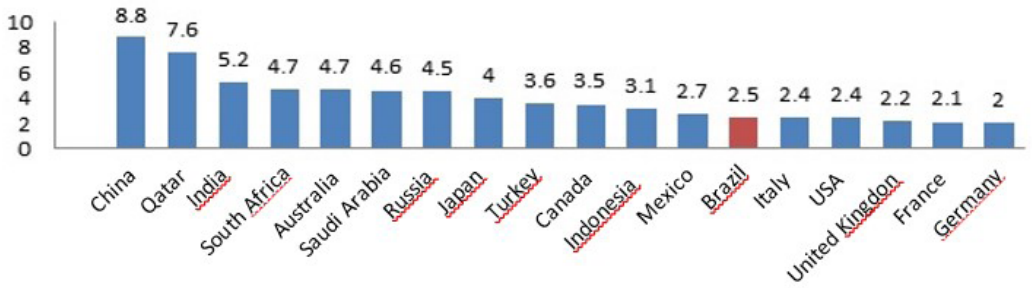
Paradoxically, such actions allowed significant advances, permanence, and even setbacks. On the one hand, internal infrastructures were modernized (dredging, highly specialized, and technically modern private terminals with a high productivity rate). On the other hand, a superstructure remains with no significant changes (inefficient and non-technical management, inspection bodies with a low contingent, little intercommunication, high bureaucracy, costly financial tenders, and low legal security for long-term investments).

Although with reduced participation in transporting the total cargo volume, public ports, with facilities for public use, constitute nodal points of great strategic importance, as they are fundamental for cargo handling feasibility studies, providing greater assurance to investors interested in new leases (Machado, 2020).

In addition to the reactivation of the shipbuilding industry, government programs have led to the resumption of significant investments in the port sector, including access routes to ports (waterways and railways-roads), the establishment of dry ports, implementation of computerization systems (Porto Sem Papel), and dredging (National Dredging Plan). Between 2000 and 2018, public investments in the infrastructure sector were, on average, just over 2% of GDP, reaching a maximum of 2.53% in 2010, compared with 1.20% in 2000, maintaining an

average of 2.5% between 2008-2013 and then declining (BNDES, 2018) (Graph 1). However, other emerging countries invested, on average, in the period 1995-2015, 6.4% of GDP in infrastructure, and Latin American countries, 5.5% (FMI, 2018).

Graph 1 – Investments in infrastructure – 2008-2013 average (% of GDP)



source: McKinsey (2016)[10] apud BNDES (2018).
adaptation: The author.

The National Dredging Program (PND I and II) stands out in the context of more significant investments. Instituted by Law No. 11,610/2007, it allowed for the deepening and maintenance of the maritime access channel and the maneuvering area of several Brazilian ports. There were also, especially in the PIL, initiatives to modernize the transport infrastructure (ports, airports, roads, and railways) in the order of hundreds of billions of BRL, seeking to transfer to the private initiative (with idle resources) in the form of a concession, the exploitation of these public utility services (Transnordestina, Fiol, Leste-Oeste, Ferrogrão railways; airports such as Guarulhos, Campinas, Galeão, and Confins). However, private participation, mainly national, did not respond significantly to the call, taking a localized interest. The lack of interest in major infrastructure works is exacerbated in the transport sector. In 2014, 81% of investments in this sector came from the federal and state government and state companies/authorities, even two years after the launch of the PIL (CNI, 2016).

This reality is a consequence of maintaining a macroeconomic policy based on high-interest rates, fighting inflation, and floating exchange rates, which strengthened specific sectors of the country's social classes with strong political representations linked to the financial market and disconnected from a national development policy. These factors inhibit investments in productive sectors. According to Machado (2020), with the support of these representations and the involvement of imperialist forces, operations such as Lava Jato took place, which prevented the participation of prominent national contractors (Odebrecht, Andrade Gutierrez, OAS, Camargo Corrêa, Queiroz Galvão, and Galvão Engenharia, among others) in the bidding processes for heavy infrastructure works, causing foreign investments to increase from 27%, in 2010, to 70%, in 2018 (Sobeet, 2019), or even paralyzing works already started, such as stretches of the Transnordestina Railroad.

10 McKINSEY. *Bridging global infrastructure gaps*. [S.l.]: McKinsey Global Institute, 2016.

Other factors that have not contributed to the participation of the private sector are the fact that the projects have specific characteristics, making financing complex, the reduced availability of long-term financing sources (they depend almost exclusively on the BNDES), the exchange risk of loans, the restricted offer of guarantees in the Brazilian financial system and the fact that they are long-term return investments (CNI, 2016; Dutra; Sampaio, 2017; BNDES, 2018).

New port geography?

Given the above, investments in infrastructure, especially in the transport sector, started in the 2000s. While still requiring maturation, the New Ports Law (Law No. 12,815/2013) and the new PPPs are beginning to change the national port map, launching prospects for the configuration of new port geography.

This new port map is characterized by the vertiginous expansion in the movement of grains and ores through the ports of the North and Northeast, attracting and moving cargo directed previously to the ports of the Southeast and South. It results from investments in port access infrastructure, such as highways (BR-163, BR-158, and BR-242, among others), railroads (Carajás, Norte-Sul, and Transnordestina, among others), waterways (Tabajós-Amazonas), new terminals (TUP), such as Chibatão-AM and Terfron-PA, and cargo transshipment stations (ETC).[11]

Specifically dealing with grains (corn and soybean), which occupy the second position in tonnage in Brazilian port movement (Graph 2), the ports of these two regions, called Arco Norte,[12] considering the total participation, had an evolution of 482% between 2010 and the first semester of 2020 (Antaq, 2020a).

North and Northeast ports increased their share from 24% in 2010 to 49% in 2019 (Antaq, 2020a). Graph 3 shows this evolution, whose data provided by the MDIC ([2021]) are based on import and export port movement in grain tons by region between 2010 and 2019.

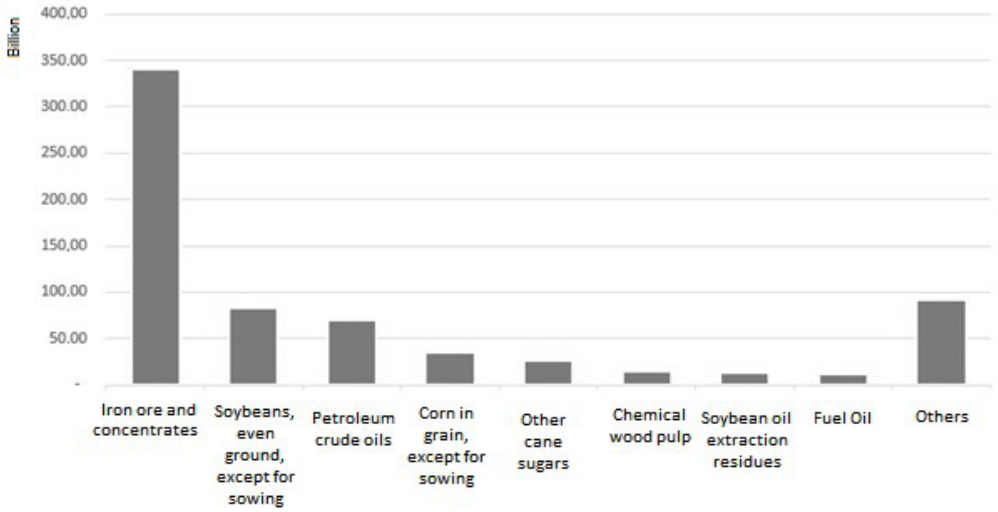
The ports of those regions are also starting to play a leading role in the movement of iron ores since, in 2020, the Northeast was responsible for moving, in tons, 52.8% of the national total, against 44.6% of the Southeast. In 2010, the Northeast accounted for 30.2% and the Southeast for 67.1% (Brasil, 2021b). Although this movement occurs mainly in the Northeast, through the port complex of Itaqui-MA,[13] the cargo originates in the North region (Canaã do Carajás/S11D Eliezer Batista Complex).

11 According to Resolution No. 2,520/2012 of Antaq, ETCs are port facilities located outside the area of the organized port, whose sole purpose is the transshipment of cargo destined for or coming from inland navigation. The Miritituba-PA ETC transfers the "soybean highway" (BR-163) flow to the Tapajós-Amazonas waterway, reaching the ports of Santarém-PA, Barcarena/Belém-PA, and Santana-AP.

12 Denomination by Antaq to designate the ports located above the 16th parallel South and which stand out in the movement of grains. It comprises the ports or ETCs of Rondônia (ETC Porto Velho), Amazonas (Itacoatiara), Pará (Santarém, Vila do Conde, Barcarena, ETC Miritituba e Marabá), Amapá (Santana), Maranhão (Ponta da Madeira, in São Luiz), and Bahia (Salvador and Ilhéus).

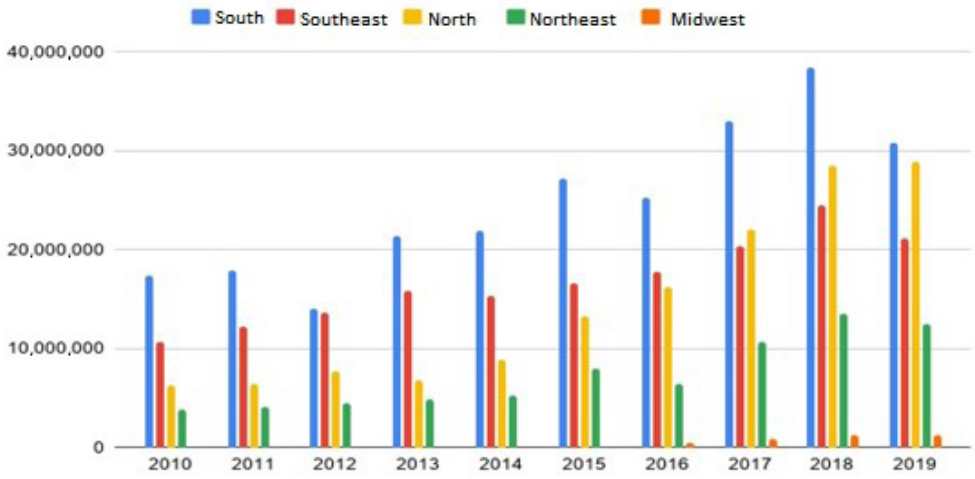
13 Since 2015, the Itaqui-MA complex has been handling more than the Tubarão-ES TUP, traditionally the main terminal in the movement of iron ore since 1960 (in 2019, Tubarão handled 71.10 m.t, while Itaqui handled 189.28 million) (Brasil, 2021a).

Graph 2 – Brazilian export agenda in 2020 (in billions of kg)



source: MDIC ([2021]).
elaboration: The author.

Graph 3 – Movement of grains by region between 2010 and 2019



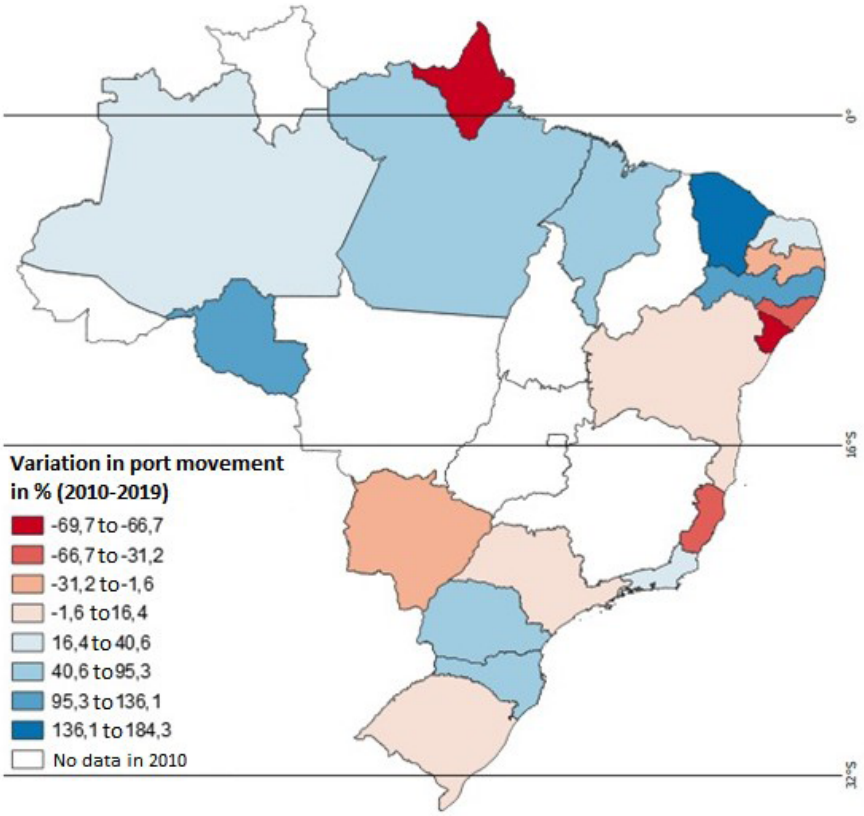
source: MDIC ([2021]).
elaboration: The author.

Furthermore, the maturation of port projects such as Chibatão-AM, Suape-PE, Pecém-CE, and Vila do Conde-PA TUP highlight the movement of containers. In 2019, these ports were, respectively, the 7th, 9th, 11th, and 15th in ranking the 15 terminals that handle the most containers (TEU) (Brasil, 2021b). Thus, the Northeast increased its share in the total movement of containers from 9% in 2002 to 13.0% in 2020 and the North from 5% to 7.4% (Brasil, 2021b).

Considering 2010-2019, this new port geography has been proven by the port movement data available in Antaq's Waterway Statistics (Figure 1). According to these data, the states of Rondônia, Pará, Maranhão, Ceará, and Pernambuco grew more than all ports in the Southeast, and Amazonas and Rio Grande do Norte also grew more than São Paulo and Espírito Santo,

matching the growth from Rio de Janeiro. Compared with the South, only Amazonas and Rio Grande do Norte had lower growth, but ahead of Rio Grande do Sul (Antaq, 2020a).

Figure 1 – Variation in Brazilian port movement in 2010-2019



source: Antaq (2020b).
preparation: Edson Machado and Fernando S. Jesus.

The high growth that occurred in the ports of Santa Catarina and Paraná, making them equal to the growth of Maranhão and Pará but lower than that of Rondônia, Pernambuco, and Ceará, is due, among others, to a great specialization in the handling of containers (mainly refrigerated) and grains (mainly soybean). The first is Santa Catarina's case, where, in the analyzed period, two private terminals came into operation, the Port of Navegantes (2007) and the Port of Itapoá (2011), which occupied the third and fourth position in 2020 in the movement total number of containers (Brasil, 2021a). The second is Paraná (Port of Paranaguá) which, in addition to standing out in container handling, had strong growth due to the increase in soybean exports, having more than doubled its soy grain handling between 2010 (5.12 m.t) and 2019 (11.31 m.t) (Brasil, 2021a).

Given the limits set here, we highlight the BR-163, which connects Cuiabá-MT to Santarém-PA, among the significant works that helped redirect part of the cargo movement to the ports in the North and Northeast. Conceived in the National Integration Program (PIN) in the 1970s, the highway had low trafficability. Still, from 2007, recovered and paved by the PAC, it began to include access to Miritituba-PA (BR-230), where an ETC was implanted. The recovery of the BR-364 enabled the flow from MT to the road and river terminals in Porto

Velho-RO, connected to the Madeira River waterway. BR-319, which connects Manaus-AM to Porto Velho since 1988, was considered impassable. Included in the PAC in 2010, its recovery in 2018 made it usable throughout the year. BR-158, paved from the border with MT to BR-242, connected the eastern region of MT with PA. The Norte-Sul railroad (FNS), started in 1987, linking Anápolis-GO to Açailândia-MA, was completed in 2014, also providing access to the port of Itaqui-MA via the Carajás Railroad (EFC), which was duplicated.[14] In addition to these works, there are others, ranging from the expansion of storage capacity to the construction of TUP by the large trading companies (Cargill, Bunge, Amaggi, ADM) to the expansion in the handling capacity and modernization of port complexes already traditional, such as Itaqui-MA, Santarém-PA, and Vila do Conde-PA.

Given the above, we launch a perspective of this new Brazilian port geography according to the four coastal regions, characterized as follows:

(a) the North region, with the Port of Manaus, remains a significant importer of chemical and electronics inputs, sending its products via cabotage to other national ports, mainly Santos, thanks to the Industrial Pole of Manaus (PIM). The PIM is benefiting from the recovery of the BR-319 and BR-230 (Transamazônica), which give access to the BR-163, which also recovered, being able to send part of its production to the Midwest. The ports of Santarém-PA and Vila do Conde-PA begin leading in the movement of grain produced in the North and in part of the Midwest made possible by the BR-163. This highway also gave access to the road-fluvial terminal (ETC) of Miritituba-PA on the Tapajós River. Santarém-PA, with a Cargill base and the traditional handling of bauxite (18.94 m.t in 2019), increased its handling from 1.15 m.t of soybeans and 0.37 m.t of corn in 2010 to 6.38 m.t and 7.08 m.t, respectively, in 2019. The same situation occurred in Vila do Conde, which started moving grains in 2014 (1.38 m.t of soybean and 0.26 m.t of corn), moving, in 2019, 5.34 m.t of soy and 5.37 m.t of corn (Brasil, 2021a);

(b) the northeastern port range stands out due to the Itaqui-MA Complex in the movement of iron ore and, as a result of river-road and FNS investments, the implementation of the Maranhão Grain Terminal (Tegram) was made possible, with the movement of 8.12 and 3.03 m.t of soybean and corn, respectively, in 2019 (Brasil, 2021a). On its eastern range, the export of fruit stands out, especially from the São Francisco River valley, where 110,000 hectares of irrigable agriculture produce one million tons of fruit per year (SNA, 2014), highlighting grapes and mango in Pernambuco and Bahia, melon, banana, watermelon, and mango in Ceará, and citric fruits in Paraíba (orange, tangerine, and pineapple). The Pecém complex is the primary outlet for these fruits, in addition to the port of Salvador (with emphasis on the movement of grains and cargo from the petrochemical complex in Camaçari, with Ford factories, until 2021, Continental, Bridgestone, and AmBev, among others) and the Natal-RN port complex, where fruit accounts for 60% of the movement (Codern, [n.d.]). The Pecém and Suape complexes stand out for attracting essential industries. The former attracted steel companies (Companhia Siderúrgica de Pecém, Siderúrgica Latino Americana [Silat]), mining companies (Grupo Globest

14 In 2019, the railway section between Porto Nacional-TO and Açailândia-MA handled 7.9 million tons of corn, soybean, and bran (Tramo norte..., 2020).

and Vale), and cement companies (Votorantim, Apodi, and Mizu), among others. The latter, since the beginning of the operation of the Abreu Lima Refinery, in 2014, stands out in the movement of oil and its derivatives, attracting fuel redistribution companies: Bunge, which implemented a grain mill, Termopernambuco, M&G Polímeros, Fiat Chrysler Automobiles (FCA and Jeep factory), and Estaleiro Atlântico Sul, among others. Such complexes can be included in what Fischer (1963) called ports of industrial function, which attract industries that receive or ship heavy products and operate with large tons, generally supplying a semi-product or, on the contrary, value a product from the interior before its export. Thus, we have the case of the mining, steel, and cement industries (Pecém) and those of the petrochemical branch involved in a refinery (Suape).

(c) the South and Southeast regions tend to lose representation in the movement of solid vegetable bulk, going from relative participation of 83% in 2016 to 63% in 2060 (Brasil, 2017). Along with the Midwest, they are home to the main soybean processing industries, with the outstanding movement of general cargo, containerized, and liquid bulk. They have consolidated export corridors, such as the Port of Paranaguá, a national reference in soy exports; the Vitória Complex, with the presence of the Vitória-Minas Railroad and Tubarão TUP; the Port of Itajaí, with exports of chicken meat, and the Port of Santos, the country's principal port in grain exports and container handling. It houses seven of the ten complexes that move the most cargo in containers, in thousands of units (TEU): Santos with 1,719.61; Paranaguá with 523.23; Embraport Terminal with 456.56; Portonave S.A. with 434.09; Itapoá with 405.04; Rio Grande with 380.21, and Itajaí with 299.05 (Brasil, 2021a).

This reality results from the fact that, traditionally, goods packaged in containers are those with the highest added value, such as non-commodity industrialized products (shoes, machinery and equipment, and electronics) and those that need refrigeration (meat and fruit). However, the considerable increase in the movement of containers and the implementation of new exclusive terminals for their movement does not mean an increase in the export of industrialized products since there is a significant increase in the movement of grains in containers (soybean, soy bran, corn, rice, coffee, and sugar),[15] which, added to the cargo already traditionally handled in refrigerated products, indicates a reprimarization of exported goods in the ports of these two regions.

This is at least a partial reprimarization since, according to Espíndola (2014, p. 25), "for agricultural and agro-industrial products, it is necessary to move a complex network of related industries and service providers," involving some processing. This reality is verified even though the most industrialized areas of the country are in the South and Southeast regions, such as: (a) the ABC region of São Paulo, with factories of Embraer, Philips, Monsanto, Panasonic, Volkswagen, General Motors, and Ford (until 2021), (b) the Middle Paraíba, with Companhia Siderúrgica Nacional de Volta Redonda, Volkswagen, and Citroen-Peugeot, (c) Minas Gerais with the factories of Fiat, Mercedes-Benz, and Iveco, (d) the coast of Santa Catarina, with the

15 This trend aims to serve smaller markets where super bulk carriers do not meet the demand. Thus, loading via containers is the most viable option (as is the case in several African countries).

factory of WEG engines, Tupy foundry, Portobello and Eliana ceramics, plastics for construction by Tigre, textiles by Cia. Hering and Karsten, Embraco with compressors for refrigeration, and (e) Rio Grande do Sul, with factories of tractors, harvesters, among others, of Massey Ferguson and John Deere; bus bodies by Marcopolo, Comil, and Neobus; cars by Chevrolet and the Polo Petroquímico do Sul, where there are units of Brasken and Lanxess.

Among the causes of this relative loss in the pace of exports of industrial products, the economic policies maintained since the 1990s stand out, which combine an overvalued exchange rate and stimulus for predatory imports and harm the export of manufactured goods, combined with high-interest rates, which attract national and international financial speculation. The situation worsened after 2016, when the rentier-liberal power pact regained its political strength. As a consequence, the manufacturing industry sector, which in 2010 accounted for 15% of the national GDP, with a maximum of 17.8% in 2004, decreased to 11% in 2019 (IBGE, 2020), against 21.8% in 1985, approaching the same level as in 1952, i.e., 11.4% (Fiesp, 2017).

Complementing this scenario, the substantial price reduction of sea freight for fragmented cargo transported in containers enabled intense, highly competitive industrial concentration in Asian countries, expanding port movement via imports of industrialized products and their inputs in containers. Thus, the post-1990 unilateral trade opening resulted in many importing companies and distribution centers in and around the port's backyard.

The various changes highlighted here confirm adopting an economic model that has guided Brazil's participation in the international division of labor (DIT) as an exporter of agricultural and mineral commodities. Thus, the boom of these goods in the international market after the 2000s, on the one hand, allowed the financing of significant infrastructure works with relevant multiplicative effects on the national economy. However, on the other hand, a significant part of these works respond essentially to international market requirements. In other words, logistical systems of specific possibilities and low flexibility are incorporated into the territory, which may imply redefinitions of the use and occupation of the national territory, with impacts on the country's spatial organization, often unrelated to the national benefit.[16] The State must be aware of this reality, seeking, through the ever-increasing incorporation of constant capital into the territory, to benefit the different sectors of the economy as much as possible, taking advantage of this greater fluidity.

Final considerations

This analysis shows that the significant changes in the international scenario throughout the 20th century had profound consequences in Brazil. Internally, the Revolution of 1930, the military coup of 1964, and the years of accelerated industrial and urban growth led to an actual rearrangement of the economy, form, function, and spatial structure. After 1930, through State

16 For Santos and Silveira (2013, p. 70), in today's society, "the great technical systems, often presented as projects of multiple uses, are called upon to fulfill specific functions, imposing rigidity on the use of the territory." With national and global intentions, this rigidity cannot "create a confluence between these rationalities and authentic regional needs," not allowing other uses "at the risk of compromising the efficiency of the main functions."

intervention, substantial changes characterized the port sector. Ports cease to exist thanks to territorial road integration, and, at the same time, a robust process of localized overcapitalization ("export corridors") takes place. In 1980, a long phase of low and selective investments began, with an aggravating factor in the transport infrastructure. At the same time, an intense and radical evolution was taking place in the sector worldwide. It was a necessary response to the enormous expansion of DIT that began after 1950 and intensified after 1970.

In the context of internal and external indebtedness and changes in the international financing policy, Brazil ends up not having the capacity to react dynamically to the onerous changes imposed on the port sector, being unable to continue its massive investments necessary for the new stage of the world economy (competitive integration). Changes in the country's internal politics are part of this reality, as new leaders came to power (rentier-liberal power pact). The export of mineral and agricultural commodities was encouraged to expand the trade surplus, which increased the demand for port services without adequate compensation, a radical economy opening, and an even more significant reduction of public investments within the scope of a strict containment policy of expenses.

This reality was only seriously faced after the 2000s. More significant investments in the whole infrastructure (PAC I and II and PIL) resumed, along with new port legislation (Law No. 12,815/2013) and PPP. There is an incentive for the naval and equipment industry (offshore), dredging, financing of new terminals, and implementation or modernization of roads, railways, and waterways, among others.

Although still incipient and with the necessary maturation, the results of such investments launch the perspective of the configuration of a new national port map. They have been generating significant changes in the situation that prevailed until then. The absolute leadership of ports in the South and Southeast in the national port movement began to be threatened.

This new port map is mainly characterized by the displacement of the distribution center for grains (482% growth between 2010-2020) and ores (52.8% of the national total in 2020) from the South and Southeast to the ports in the North and Northeast (Arco Norte). The increase in container handling (from 14% in 2002 to 20.4% in 2020 of the national total for the category) also characterizes it. This reality can have multiplier effects in these two regions because, as the transport infrastructure is modernized, with the growing incorporation of constant capital and allowing an effective fluidity between the port regions and the hinterlands, there will be a demand for companies providing services and logistics, intellectual inputs and materials, equipment industries, implements, components, and food processors, among other related ventures.

At the same time, maintaining the macroeconomic policies adopted after 1990 means that ports in highly industrialized areas have been presenting an increasing percentage of the movement of basic products, reprimarizing their exported goods, with increasing use of containers.

Given the above, in conclusion, paradoxically, the return on investments implied advances, setbacks, and permanence in the port sector, with the modernization of the internal infrastructure of ports (highly specialized terminals) and, specifically, of their access infrastructure, leading to

the possibility of what we call the prospect of new port geography. However, it maintained its superstructure without significant changes. Thus, related to the access infrastructure, which did not materialize fully, this reality is the major bottleneck that the sector has to face.

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