

LOGISTICS AND INTENSIVE AGRICULTURE IN THE CERRADO: THE NEW BRAZILIAN RAILROAD SYSTEM

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Abstract *As from the middle of the 1990s, in the wake of neo-liberal policies and of the programs of the partial denationalization of the means of transport and communications in Brazil, a new railroad system has made its appearance, a result of the combination of, on one hand, the reorganization of the old network, functioning as a concession to private companies and, on the other, the implantation of a new network. The expansion of the lines and the topology of the new rail yards are due directly to the influence of modern agricultural production in areas of the Cerrado biome. As a consequence of this new regulatory mechanism, the relationships between railroad and territory and between railroad and the cities have changed radically and the Brazilian railroad system has become a lucrative business at the service of a few agents and a few economic activities and has ceased to be a public service favoring a socially broader spatial mobility.*

Keywords *Logistics, railroad, logistic node, cerrado, competitive agricultural region*

Introduction

The considerable increase in agricultural and agri-industrial production in areas of the Cerrado biome (Brazilian ecoregion similar to savanna) and the greater insertion of Brazil in the international agricultural commodities markets has, in recent decades, overloaded not only the transport system and the physical distribution of goods but also the forms of their regulation and operation. It has come to be realized that the high levels of competitiveness attained in the production of grains in the areas of modern agricultural frontier have, in large part, been cancelled out by the unreliability of the system of circulation, especially as regards soybean.

The solution to this problem (and others related to it) has been sought by the partial or total privatization (de-nationalization) of the transport and communications systems, in the wake of the neo-liberalism that affected Brazil in the 1990s, in compliance with some of the precepts of the Washington Consensus.

As from 1996, the old state railroad companies were privatized and reorganized in accordance with the logic of the economic feasibility of their exploitation. This regulatory change brought with it a series of social implications and deep changes in the relationships between railroads and territory and

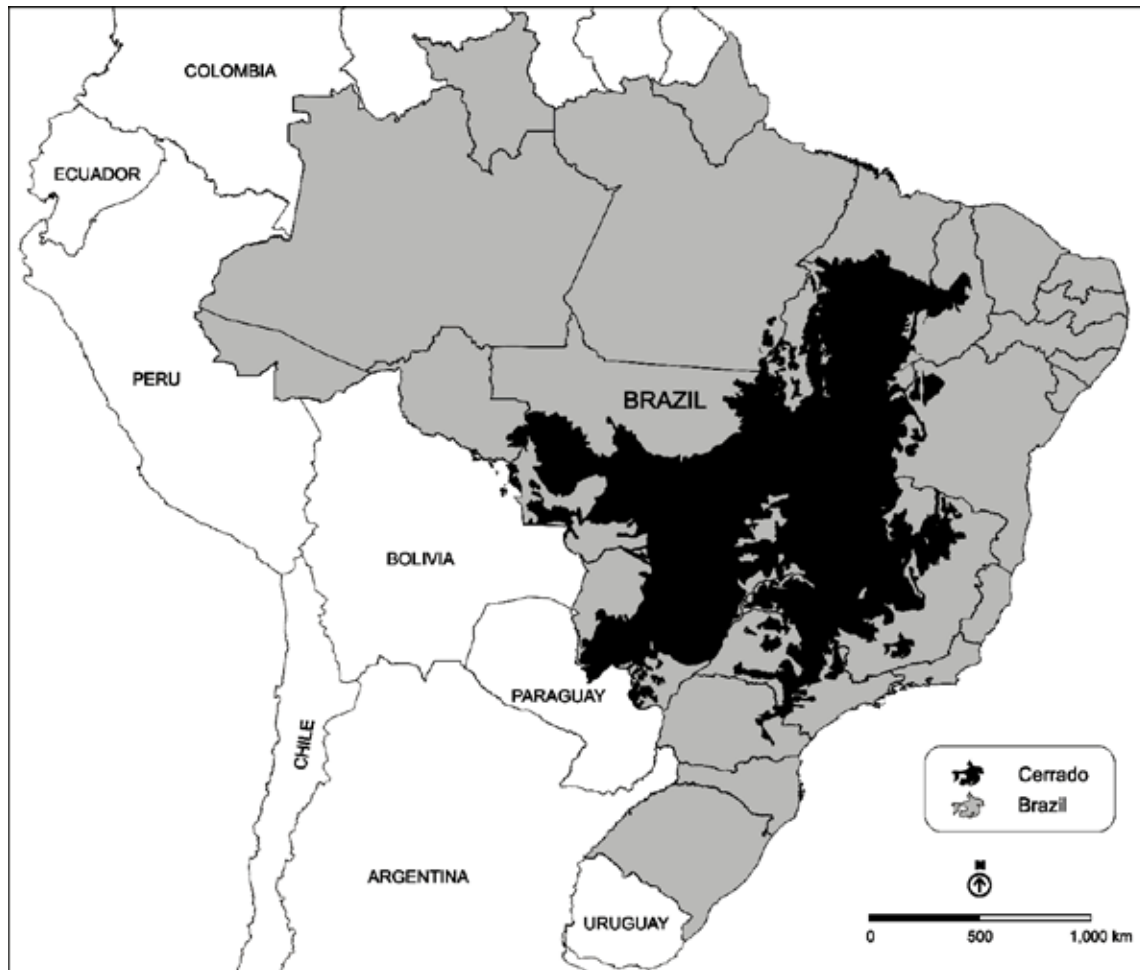


Figure 1 – Brazil. Cerrado Biome

Elaborated by: Vitor P. Vencovsky

Sources: IBGE; Ministério do Meio Ambiente (Brazilian Ministry of the Environment)

railroads and cities. But recently, in the second half of the first decade of the century, the implantation of a new rail network had begun. It was conceived, in large part, to meet the demand for the transport of agricultural commodities produced in the areas of recent occupation by intensive agriculture and, for this reason, this new rail network has been called “agribusiness railroads” (Vencovsky 2011).

In the light of this situation, this article has two main objectives: i) to analyze the new post-privatization Brazilian railroad system resulting from the combination of the reorganization of the old network and the implantation of the new one, and ii) to assess the role of the emergence of the competitive agricultural regions (Castillo 2008, Castillo and Frederico 2010a) in areas of the Cerrado and the expansion of their productive spatial circuits in

the geographical lay-out of the new railroads as well as in the topology of their logistic nodes.

Characterizing the situation: the expansion of modern agriculture in areas of the Cerrado

The expansion of the modern agricultural frontier towards the Mid-West region of the Brazilian territory began in the middle of the 20th century, but it has only been since the 1980s that intensive agriculture has occupied the Cerrado biome more systematically with highly productive monocultures of soybean, corn, cotton, coffee and sugar-cane, on large properties. Among the consequences of this expansion, the increase in the

concentration of landownership, the expulsion of the population of peasants and small farmers, household producers, and large scale environmental devastation may be mentioned.

The so-called globalized corporate agribusiness was installed definitively in vast areas of the Cerrado (parts of the States of Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Maranhão, Piauí, Bahia and Tocantins) during the 1990s (fig. 1).

In these areas of the Cerrado occupied by the globalized corporate agribusiness, one may observe: i) the deepening of the territorial division of labor in the guise of regional specialization; ii) the creation of competitive agricultural regions; iii) the expansion and internationalization of the spatial circuits of the agricultural commodities (Castillo & Frederico 2010b); iv) the emergence of the specialized cities of the modern countryside, called "agribusiness cities" (Elias 2007), where recently settled populations, arising from the combined effect of upward and downward migration, are concentrated (Santos 1993) and also where the per capita income normally attains values greatly above the national average (IBGE), thus concealing great social and spatial inequality.

In brief, in recent decades the Cerrado has become a specialized geo-economic macro-region and highly competitive in the production of agricultural commodities, producing, at each successive harvest, tens of millions of tons of grains. In 2004, the production of grains in the Cerrado topped 50 million tons, for the first time exceeding that of the Southern Region, the traditional producer, and is today responsible for 46% of the entire national production, attaining 62 million tons (CONAB).

In view of the fact that: i) agricultural commodities are high volume and low value-added products; ii) the main productive regions of the Cerrado are far from the main regions of the domestic trade and the export ports, and iii) this part of Brazilian national territory is bereft of adequate infrastructure (especially in terms of transport), it is evident that, beyond the grave social and environmental consequences due to the expansion of the modern agricultural frontier, there has also arisen the problem of *circulation*, seeing that a large part of what is produced in this macro-region is consumed in distant places.

What is to be perceived from the analysis undertaken thus far is that any increase in the

competitiveness of Brazilian agricultural and agri-industrial products in international trade calls for: i) large public investments in infrastructure; ii) a mode of regulation functionally adequate to create the most favorable conditions of circulation (territorial fluidity); iii) a structure of specialized services. This set of infrastructural, normative and operational competencies is what may be called *logistics*. Logistics thus becomes strategic for State policies and arises as a sub-sector of the economy.

Logistics and rail transportation: technique, politics and territory

In accordance with the best known analytical models of the transportation modes, inland waterways and railroads are theoretically the most adequate means for the long-distance transport of large bulk and low value-added produce. Both the modalities are characterized, on one hand, by their great transport capacity and their relatively low freight costs and, on the other hand, by their low speed and little flexibility, that is to say, the loading and unloading of goods can only take place at the respective terminals.

However, the transport matrix of soybean in bulk in Brazil, measured in NTK (Net-ton kilometer), demonstrates the predominance of the highways, which alone accounted for 60% of the soybean transported, as against 33% by the railroads and 7% by the inland waterways in 2007 (ANEC), contradicting all the models of the rational use of transportation modes to the point of being even more off-balance than the transport matrix of general cargo in Brazil (Caixeta-Filho 2003).

Thus it was that the unbalance of the transport matrix in favor of the highways (inadequate for the transport of grains), the low density of transport, especially in the Mid-West and North regions, and the rapid occupation of the territorial funds (Morales 2002) in Brazil, strengthened the central role of *logistics*, both in territorial planning as also in the policies of the great companies involved in the transport, storage, commercialization, industrialization and exportation of agricultural produce. In other words, the irrationality of the haulage system in general creates a strong demand for planning, investment and logistic operations.

Logistics and the logistic nodes

The term *logistics*, understood as a set of specific strategies and operations for the mobilization of goods and information throughout the territory, arose in the military sphere but has been incorporated by companies mainly since the 1970s. Its conceptual formulation has been proposed by various authors in the fields of Administration, Transport Engineering, Economics and Geography, such as Andersson (1986), Lasserre (2004), Hesse and Rodrigue (2004). According to Hesse & Rodrigue (2004, p. 12),

Since logistics emerged as a key organizational system for materials flow and goods delivery, and due to the outstanding growth of freight traffic in the 1990s, contemporary analysis of logistics has to acknowledge the character of distribution as a complex, interdependent system. In this respect, a deeper geographical investigation is favored, since geographical approaches seem to be useful for covering the broader interactions of firms and flows with their spatial environments. Traditional transportation science tends to be devoted primarily to transport capacities, to economic issues or trade aspects. Compared to that, 'looking through spatial lenses' promises a more comprehensive insight into the nature of distribution and its geographical dimensions, particularly in those areas that are intensively shaped by freight traffic and logistics facilities.

As has already been mentioned, logistics can be understood as a set of infrastructural, normative and operational competencies that confer fluidity and competitiveness to the supply chains or to the spatial productive circuits (Castillo 2008, Castillo & Frederico 2010a). Logistics deals with the relationship between, on one hand, the rational modes of transportation and distribution and, on the other, the material and normative characteristics of each territory, with a view to rationalizing the flow of goods.

Beyond the lay-out of the transport networks themselves, the topology of the logistic nodes arises from a combination of geopolitical and geo-economic factors, thus constituting an important strategic question. According to a report of the European Union (2010, p. 8), a logistic node

(...) is a hub of a specific area where all the activities relating to transport, logistics and goods distribution – both for national and international transit

– are carried out, on a commercial basis, by various operators. The operators may be either owners or tenants of the buildings or facilities (warehouses, distribution centres, storage areas, offices, truck services, etc.) built there.

For White & Senior (1983, p. 104),

where two or more modes of transport meet, that is at all seaports, airports and at every railway passenger and goods station, exchange takes place. All these are therefore *transport nodes*, however simple. In addition nodes also exist where two or more lines of the same transport mode meet, railway junctions, bus stations and also seaports and airports. Many nodes belong to both these classes. (...) On the national scale the city itself is a nodal point on the country's road, rail and air networks. But the node of the city itself will have a very large number of sub-nodes.

Logistic nodes may be considered hybrids of technical objects and norms. These nodes make the connection between one or various transportation modes (highway, railroad, air transportation, inland waterway or pipeline) possible for the transfer of products, controlling and redirecting the flows, in such a way that their localization, conception, control and use become strategic for some agents, places and productive spatial circuits. The logistic nodes may contain several kinds of specialized equipment for each type of produce (Braga & Castillo 2006), as is the case, for example, with the railroad, waterway or port grain terminals.

In the case of the Brazilian railroad system – which will be analyzed immediately below – the yards and stations are important logistic nodes. Their typology and topology and the relationships which they establish with their surrounding areas, both in the old as in the new network, reveal important strategies of organization and the use of territory.

Agribusiness Railroads in Brazil

The Brazilian railroad system is at present constituted of the already existing railroads which amount to the 29 thousand kilometers of track constructed over the last 150 years plus the new railroads planned and under construction which, when finished, will add a further 15 thousand kilometers to the present system. Because it does not meet present demands in terms of transport capacity,

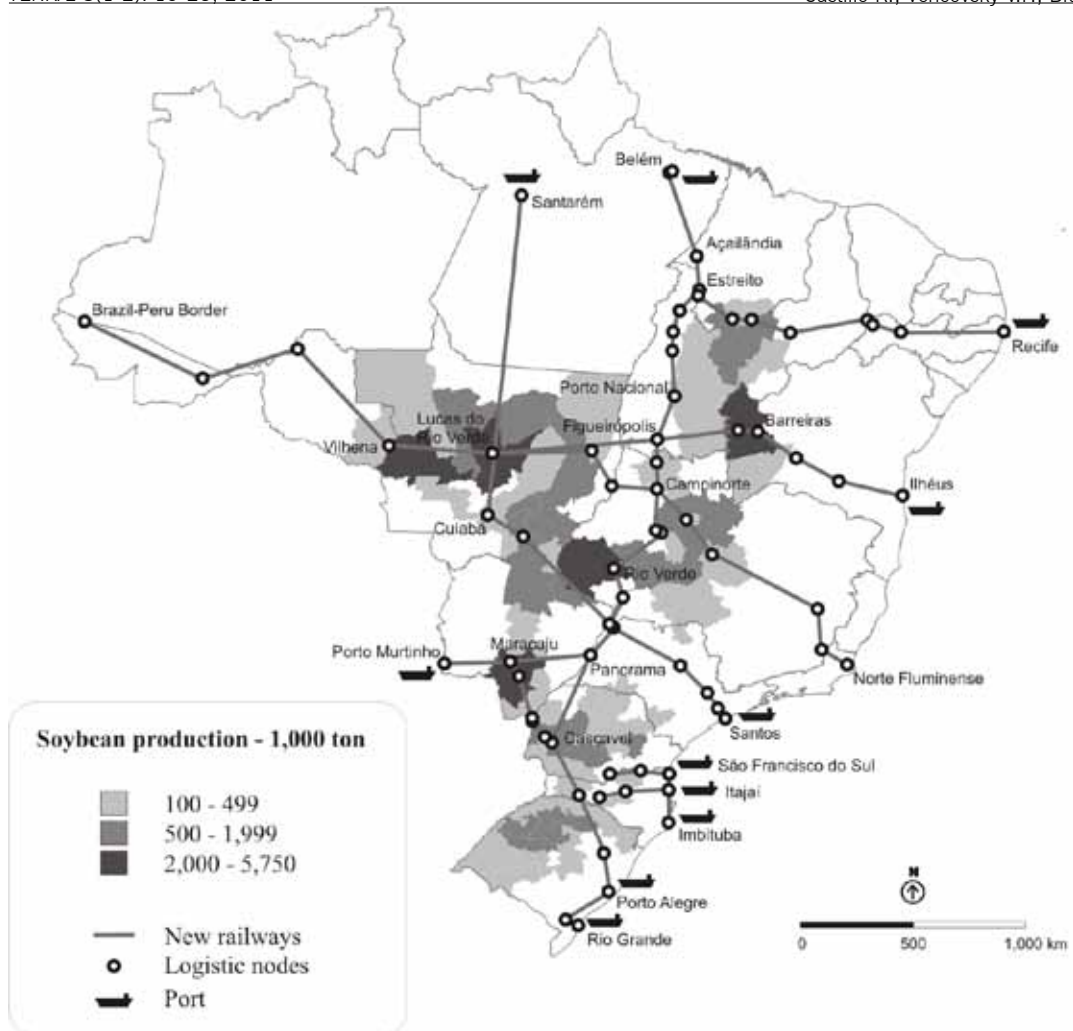


Figure 2 – Brazil. Soybean production and new railroads, 2009.
Source: IBGE, Brazilian Federal Government.
Elaborated by: Vitor P. Vencovsky. Adapted by: Vanderlei Braga.

speed or quality of services offered, the old network is being revitalized by means of a variety of investments, both public and private. The new railroads, on the other hand, are already being conceived and built to meet the present needs of agents, regions and economic activities mainly related to the spatial circuits dedicated to the production of soybean (Vencovsky 2011).

The construction of these new railroads was largely institutionalized by the Federal Government, through PAC – the Program for the Acceleration of Growth, in 2007, and the up-dated National Transport Plan (*Plano Nacional de Viação* - PNV), in 2008. These plans foresee the various new railroads which will constitute the transport corridors dedicated to the exportation of agricultural commodities, to the neglect of other socio-territorial demands.

Among the various railroads presently under construction, the North-South Railroad (FNS) is one of the most important because when concluded it will link the municipalities of Belém (PA) and Rio Grande (RS). The Mid-West Integration Railroad (Ferrovia de Integração Centro-Oeste - FICO) and that for West-East Integration (Ferrovia de Integração Oeste-Leste - FIOL) are planned to link Vilhena (RO) to Ilhéus (BA), intersecting the North-South Railroad in the States of Goiás and Tocantins. These railroads, as also the Nova Transnordestina, have as their main purpose the flow of the grain production of the Mid-West region to some of the main Brazilian ports.

Figure 2 presents the correspondence between, on one hand, the network of the railroads planned and under construction and, on the other, the main soybean producing regions.

The North-South Railroad (FNS) is still under construction; however, the products foreseen for transport between Açailândia (MA) and Porto Nacional (TO), which is the first stretch to be completed, have already been defined, as follows: soybean, grains and soybean meal (75% of the total), soybean oil (1%), fertilizers (6%), ethanol (1.5%), petroleum by-products (4.5%), sugar (5%) and others (7%) (VALEC).

The West-East Integration Railroad (FIOL), with an extension of 1,500 kilometres of 1.6m gauge, was projected to link the North-South Railroad, in Figueirópolis (TO), with the port of Ilhéus, in Bahia. Its lay out also accords with the characteristic of great part of the railroads constructed in this country - perpendicular to the coast, export oriented, and integrating productive commodity regions with the export ports.

The Mid-West Integration Railroad (FICO) forms part of the Transcontinental Railroad, planned to link the Norte Fluminense coast, of Rio de Janeiro State, to Boqueirão da Esperança, on the Brazil-Peru border. With an extension of 1,630 km and a gauge of 1.6 m, its main objective is to transport agricultural commodities such as soybean, corn, sugar, ethanol and cotton, taking on freight at the rail terminals located in the municipalities of Água Boa (MT), Lucas do Rio Verde (MT), Brasnorte (MT) and Vilhena (RO) (VALEC). The connection with the North-South Railroad will occur in Campinorte city (GO).

The characteristics and location of the logistic nodes of the new railroad network are also strategic. Various rail yards are being constructed to meet the need for the storage and transport of agricultural commodities. The most important aspect of these rail yards is that, differently from what used to occur in the old network, they are being constructed at points far from urban centers so as to avoid, as far as possible, level crossings and encroachments on railway lands in order to attain greater transport velocity and efficiency in loading and unloading (Vencovsky 2011).

In Tocantins, the six rail yards of the North-South Railroad, already constructed, were mainly projected to receive soybean, grains and ethanol, thus bringing out the functionality of the new railroad logistic nodes. Some companies such as Bunge and Cosan have already rented areas in some of these rail yards for the exploitation of their services for a 15-year period.

Conclusion

As from the second half of the 1990s, with the privatization and reorganization of the old network and, more recently, with the implantation of the new network, the Brazilian railroad system leaves behind its earlier social functions (transport of passengers and general freight and attendance to the needs of small and medium-sized companies) and becomes primarily dedicated to the logistics of agricultural and mineral commodities mainly at the service of large companies.

This new situation has led to a novel relationship between railroads and territory and between railroads and cities. In this latter case, there used to be a close relationship between one and the other; it used to be said that the railroads were founders of cities and contributed to urbanization and the creation of regional capitals (Monbeig 1962). For some decades now, however, with the stagnation of the old state rail companies, it has become possible to observe that the railroads have become an obstacle to urban growth, hindering intra-city traffic and disturbing the urban order; since the privatization process began, this relationship has been inverted: now the cities have become obstacles (level crossings and encroachment on railway lands) to the railroads which, under the new regulatory conditions determined by the economic viability of their exploitation, need to demonstrate efficient performance and high productivity indices (Vencovsky 2011). As a result, one detects a somewhat selective use of the old rail network - demonstrated by the fact that, of its 29,000 km extent, only one-third is now in operation; apart from which, the majority of the old passenger stations have been deactivated and some converted to alternative uses (as cultural centers, for example) or simply abandoned, in ruins; the old rail yards also are now scarcely functional in view of the economic demands of the present historical moment.

The greatest changes, however, are to be found in the new railroads, whether planned or under construction. In this case, the rail network and the design and topology of the immense rail yards have been conceived within the dominion of logistics, that is, to attend almost exclusively to the demands of the movement of agricultural commodities and the interests of the companies of the upper circuit of the economy (Santos 1979, p. 70). The contradiction inherent in this is that the increase of

the railroad density and its greater availability (presence) in national territory correspond to an increase in social exclusion, leading to a corporative use of the territory. In other words, of the range of possible activities, only some few actually materialize, thus increasing the contradiction between organization and use of the territory (Ramos & Castillo 2010). The competitive insertion of commodities on the international markets has diminished the wider, social use of the railroads in Brazil.

In some other countries, such as the USA and the United Kingdom, the subject as to whether rail transport is a public service or a business enterprise is a subject of serious discussion (Murray 2001, p. 148; Sclar 2003, p. 1). This question is fundamental for the renovation and redirection of the planning of transport systems in Brazil. If rail transport is considered a business enterprise, economic profitability and competitiveness of the rail companies prevail, especially as the railroad is highly sensitive to economies of scale (Vencovsky 2011). On the other hand, if it is considered a public service, the concern focuses once again on society as a whole, in the attempt to maximize the number of users, the variety of freight transported and the regions attended.

It is incumbent upon us, therefore, to examine the Brazilian railroad system in greater detail in order to discern the countless possibilities of its use - whether unfulfilled, latent or hindered under the forms of the regulatory regime presently in force. Only thus will we be able to propose a more comprehensive and less corporative use of this transportation mode within the whole system of movement within Brazilian territory, understanding spatial mobility as an inherent right of the citizen and accessibility as a democratic territorial resource.

References

- Andersson A. 1986. The four logistical revolutions. *Papers in Regional Science. Sci. Lett.*, **59**:1-12.
- Braga V., Castillo R. 2006. Plano Diretor de Desenvolvimento dos Transportes (PDDT Vivo) e planejamento logístico de São Paulo. *Mercator, Sci. Lett.*, **10**:15-30.
- Caixeta-Filho J.V. 2003. Transportation and logistics in Brazilian agriculture. In: Agriculture Outlook Forum. Arlington, 2003. *Proceedings...* USDA.
- Castillo R. 2008. Sustentabilidade, desenvolvimento e globalização. In: Oliveira M.P. et al. (eds.). *O Brasil, a América Latina e o Mundo: espacialidades contemporâneas (I)*. Rio de Janeiro: Lamparina: Anpege: Faperj.
- Castillo R., Frederico S. 2010a. Dinâmica regional e globalização: espaços competitivos agrícolas no território brasileiro. *Mercator, Sci. Lett.*, **18**:17-26.
- Castillo R., Frederico S. 2010b. Espaço geográfico, produção e movimento: uma reflexão sobre o conceito de circuito espacial produtivo. *Sociedade & Natureza, Sci. Lett.*, **22**(3):461-474.
- Elias D. 2007. O meio técnico-científico-informacional e a reorganização do espaço agrário nacional. In: Marafon G.J. et al. (eds.). *Abordagens teórico-metodológicas em geografia agrária*. Rio de Janeiro: Uerj. p. 49-66.
- European Union. 2010. Report WP 2: Analysis of supply and demand – actual capacity and service offers in rail and waterway networks and logistic nodes. *Integration in the intermodal goods transport of non EU states: inland/ coastal waterway modes*. Interim.
- Hesse M., Rodrigue J.P. 2004. The transport geography of logistics and freight distribution. *Journal of Transport Geography, Sci. Lett.*, **12**(3):171-184.
- Lasserre F. 2004. Logistics and the Internet: transportation and location issues are crucial in the logistics chain. *Journal of Transport Geography, Sci. Lett.*, **12**(1):73-84.
- Monbeig P. 1962. *Pionniers et planteurs de Sao Paulo*. Paris: Armand Colin.
- Moraes A. C. R. 2002. *Território e história no Brasil*. São Paulo: Annablume.
- Murray A. 2001. *Off the rails: Britain's great rail crisis - causes, consequences and cure*. London: Verso.
- Ramos S.F., Castillo R. 2010. Sistemas técnicos agrícolas do algodão e uso do território brasileiro. *Geografia, Sci. Lett.*, **35**:101-114.
- Santos M. 1993. *A urbanização brasileira*. São Paulo: Hucitec.
- Santos M. 1979. *The shared space: the two circuits of the urban economy in underdeveloped countries*. London: Methuen.
- Sclar E. 2003. *Amtrak privatization: the route do failure*. Washington: Economic Policy Institute.
- Vencovsky V. 2011. *Logística do agronegócio e uso corporativo do território: avaliação das políticas públicas e privadas do sistema ferroviário brasileiro*. (PhD Thesis). Campinas: University of Campinas.
- White H.P., Senior M.L. 1983. *Transport Geography*. New York: Longman.