

TERRITORY, TRANSPORTATION AND LOGISTIC INTEGRATION: AN APPROACH TO THE ARGENTINEAN CASE

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Abstract *Logistics, as an economic activity, is an element of increasing importance in the organization of production, distribution and consumption. However, its role in the processes of territorial organization has scarcely been addressed. In the present article, we propose, firstly, an approach to the relationship between logistics, transportation and territory from a geographical perspective, identifying the territorial components that are articulated in the logistic practices and the spatial processes they bring about. Secondly, we present the main tendencies and conflicts of the logistic use of the territory in Argentina. The logistic process is mainly guided by foreign trade and regional integration, based on the intensive use of trucking and a scarce development of multimodal transportation. The development of internal logistics is still incipient, although there are projects to build logistic platforms in different parts of the country. Nevertheless, the logic that guides present and prospective investments tends to favor the main nodes and transportation networks, thus reinforcing the pre-existing inequalities in the territory. From a territorial perspective, we believe it is necessary to redirect investments so as to achieve a more balanced and equitable territory.*

Keywords *transportation, territory, logistics, Argentina*

Introduction

The importance of logistics in the functioning of the current capitalism, as well as its territorial implications, is undeniable. This is one of the key elements of the new mode of production and consumption and it has resulted in deep transformations in the organization of the circulation systems in the territory. In spite of its territorial implications, the analysis of logistics from a geographical point of view “remains relatively unexplored” (Hesse and Rodrigue; 2004:172).

The article has two main objectives. First, analyzing the relationship between logistics, transportation and territory, emphasizing the geographical components that constitute places for the development of the logistic process. Our proposal consists of rebuilding this process in

and from the territory, considering the moments, roles and forms articulated in it.

Some of the questions that guide this objective are: What are the conditions of territory configuration and use that facilitate the deployment of logistic processes? Which geographical dimensions are associated with this process? What are their consequences in terms of differentiation and selectivity? What are their implications for the articulation with other processes and practices that take place in the territory?

The second objective, specially focused on the Argentinean case, is to identify the main tendencies and conflicts regarding logistics and transportation at a national scale, characterizing the geographical configuration of places and networks associated with the logistic process.

From territory to logistics: mediations and uses of territory in economic practices

About the territory

The terms logistics, transportation and territory correspond to different conceptual levels and present us with the task of elucidating the instances of inclusion and articulation among the three. In geography, there is plenty of literature that considers territory as an instance of the social totality. This implies considering territory an active dimension of society, with a history, tendencies and developing processes that interweave with actions and practices of social actors (Santos 1996, Soja 1993). This perspective is complemented by a relational approach in which the constitutive character of the interactions and the continuous formation of the territory are highlighted, as a product of the implicit relations in the symbolic and material practices (Massey 2005, Amin 2004).

In Moraes's (2005:43) words "the territory is a terrestrial materiality that encompasses the natural heritage of a country, its production structures and the reproductive spaces of society (*lato sensu*). It is where the sources and reserves of natural resources available to a given society as well as where its environmental resources are located. It is where the spatial forms created by society throughout time are accumulated (produced space). Such forms are incorporated into the land where they were built, becoming territorial structures, production and reproduction conditions at each juncture that is considered." (ours translation).

Thinking in terms of its relationship with logistics, the fact that the territory is differentiated raises particular interest. Locational decisions stem from different logics, within the more general framework of the modes of production and of territorial public policies. Under capitalism, the establishment of successive territorial divisions of labor both at a global scale and at State-nation level is a main issue (Harvey 2003).

Circulation networks in the territory

There are two networks that are especially active in the logistic process: those of transportation and telecommunications. In fact, groups of networks are articulated in the current circulation

conditions, facilitating the intermodal movement, which is planned and monitored by complex communication systems.

Networks are constitutive elements of the territory, characterized by the articulated presence of a formal architecture and a social organization (Santos 1996). That is why they inexorably refer to the social actors: they condense initiatives, projects and policies, and enable new forms of social production and reproduction. These networks are essential for modern logistics, "the major precondition for market coverage, spatial reach and scale of distribution. They are increasingly hierarchical and configured at a large scale, shifting from the local or regional level to a national or even trans-national one." (Hesse and Rodrigue 2007:8)

There is an additional dimension to the networks, the one that derives from the practical construction executed by actors according to their mobility needs (Dupuy 1987). In order to satisfy these needs, the social actors deploy strategies that articulate available technical means, time and economic budgets, and sequences of activity chains.

The transportation network is ever more superimposed by an infostructure (Pumain and Saint Julien 2004), a communication network that allows tracking, monitoring, surveillance and control of the circulation. The increasing informatization of the whole logistic process considerably accelerates the times of circulation, optimizes the use of the infrastructure and equipment and adds value to transport operations.

Logistics: the use of the territory

The term logistics gained particular relevance within the frame of the capitalism restructuring process of the last quarter of the XX century. In fact, it holds a close relationship with the forms of production and circulation that make up a mode of production characterized, among other aspects, by reproduction at a global scale, fragmentation and territorial recomposition of production, a new techno-productive paradigm in which technological innovation plays a central role, new modalities of business organization and intercompany relationships, the search for quicker capital turnover and the informatization of circulation and production processes.

According to Savy and Liu (2009), logistics includes other complementary actions:

physical operations applied to goods, companies' organization and relationships with other companies, and an emerging sector of activity in which logistic service providers operate. Although logistics was initially developed in the field of industrial activity (Bologna 2000), today, its use is also extended to the primary sector of economic activity. Logistics refers to the flows of goods and information, manipulation of products, storage and transformation sites; networks and places of circulation; and movement and non-movement periods. Logistics implies the use of space in time, a space-time convergence, "an organization and synchronization of flows through nodes and network strategies." (Hesse and Rodrigue 2004:176)

As is the case with all uses of territory, it is subjected to the interaction with other social production and reproduction processes. For example, it is possible to mention that a significant part of the transportation infrastructure is not for exclusive logistic use, or there are several instances of interaction with other circulations (passengers, cargo that is not under logistic treatment, networks shared by different types of vehicles, and the coexistence of land devoted to logistics and to other uses), which may generate potential or actual conflicts.

The previous considerations should not lead to the conclusion that there is such a thing as a linear sequence between territory, transportation and logistics. Territory is built and rebuilt through the social actor's practices. Thus, logistics not only adapts to given static conditions of the territory but its own exercise endows it with a differential value, promotes renovations of the forms and norms, selects objects and linking channels, and finally, participates in the social dialectic that gives life to the territory.

Typology of logistic places

The deployment of logistic processes as ways of using the territory articulates a series of places, with perfectly defined functions framed within the networks, which shape the set of relationships established in the territory. The two main characteristics of logistic places are: specialization, since they are integrated in the chains only if they fulfill their functions, and the tension with different uses of the territory. Hence the fact that

such specialization is not an obstacle for some of them to become both specialized and complex places at the same time (Santos 1996).

Our proposal consists of approaching the elements of the territory included in the logistic processes, in light of the identification of three types of configurations: areas, nodes and corridors, articulated through the networks (Raffestin, 1993).

Production areas

The productive processes that feed the logistic practices may be organized in two main ways: as productive areas or as production centers. The areas present variations in their levels of density, intensity and productivity, which generate differential logistic needs. Examples of production areas are agriculture and livestock activities, especially important in the case of Argentina, and the extensive and continuous industrial areas, such as that of Western Europe or of the Northeastern USA. They call for a capillary network that transports the production to the nodes through which it will then access the main network.

The production areas are closely bound to the establishment of the circulation network. In historical terms, there are excellent examples that associate the expansion processes of these networks with the constitution of human settlements and productive systems (Monbeig 1984, Rofman and Romero 1996).

Nodes: command, production, and distribution centers in the logistic process

Nodes are key components of the territory and hold a central role in the management of logistic flows. One may distinguish different functions for such nodes, which in most cases overlap in one functional unit: access to the network, intermediation, distribution and production. Their functions are strongly relational and are defined, to a great extent, by the type of configuration of the network in which they are included.

A first type of node is the one that fulfills the main functions as gateways to the logistic system, such as large ports and airports. These gateways have hinterland areas of dynamic influence and variables that depend on the organization of the articulated complementary networks, and the recent technological changes such as containeriza-

tion and the construction of continental bridges.

According to the characteristics of the networks, these nodes can be inserted in hub and spoke models that concentrate cargos and then distribute them in massive corridors. This type of network has been gaining importance, especially as of the 1980s, compared to the former point to point model (Hesse and Rodrigue, 2004). It is interesting to highlight that the condition of hub derives from the actors who organize all of their logistic schemes through this concentration and distribution process and who deploy different strategies to consolidate this type of center (Sanders 2009, Hesse and Rodrigue 2007).

A second type of node, partially connected to the previous one, is made up of logistic platforms. These are industrial areas mainly dedicated to logistic activities, either because they were specially designed to perform these activities or because they acquired this function with time. The conditions of location, design and access to the multimodal networks are paramount (Savy and Liu 2009). To this relational position, that links the logistic platform to the networks and to other nodes, we should add the importance of the conditions under which the logistic processes towards the interior of the node itself are developed. Indeed, this becomes "a key factor in the global performance of the network" (Sanders 2009:104). The node articulates logistic and production functions due to its attractiveness for industrial and service activities.

Most of the distribution centers' works are based on truck transportation, which implies a preference for suburban locations with road accessibility since they are an important component of the urban expansion process known as urban sprawl (Savy and Liu 2009, Hesse and Rodrigue 2004). It is also important to highlight the metropolitan ubiquity of most of the logistic attraction factors and, consequently, understand it as something inherent to expanded metropolitan regions (O'Connor, 2006)

Corridors within networks

Corridors are the third type of territorial configuration to be considered. Of linear configuration, their main function is to be a passage, a channel through which the traffic flows. The design and structure of the networks is what allows

us to differentiate the corridors and evaluate their significance.

Simply put, corridors can be defined as "bundles of infrastructure that link two or more urban areas" (Priemus and Zonneveld 2003:167). The corridors are subject to the historical dynamics of formation and organization of the territories. The territorial inertia is highly attractive for new infrastructures, which suffer strong influence from the historical background (Priemus and Zonneveld 2003). In fact, it is quite common for the structuring of the networks to rely on the existing nodes and stimulate the appearance of new nodes in points of interrelation between corridors or along a particular corridor. In this sense, corridors can also be considered a developmental axis, an opportunity for territory development and a planning tool, as well as an urbanization axis, guiding urban expansion (Priemus and Zonneveld 2003, Hesse and Rodrigue 2004)

Spatial trends

In the articulation of logistics, transportation and territory it is possible to notice the development of several spatial processes that display the current dynamics. Among them, the following can be mentioned:

The tendency to homogeneity, fragmentation and hierarchization (Lencioni 2010)

The expansion of the global economy, of which logistics is a central part, aims to constitute a homogeneous territory in at least two ways: as productive spaces subject to be incorporated into the global economic space (and submitted to its rules) and as a constituent of a distribution system at a world scale based on rapid transportation (Bologna 2000). However, this homogeneity is, at the same time, a process of territory differentiation, due to the resulting specialization of its incorporation into a territorial division of labor.

Homogeneous and fragmented, the territory also becomes hierarchical. The existence of command nodes, the selectivity of the networks and the uneven distribution of logistic services generate and reinforce inequalities as well as diverse hierarchical levels that result from the same process of territorial division of labor. The differentiation of the infrastructure and of

the various technological characteristics of the networks is a central component of this hierarchization.

The concentration and polarization processes

The development of the logistic systems shows a tendency to concentration and polarization. The economies of scale are a powerful factor of concentration of both equipment and distribution centers (Hesse and Rodrigue 2004). According to Savy (1993), the effects of these forms of transportation and logistic organization tend to emphasize the concentration in space: implantations along the main infrastructure axes of the circulation corridors that offer a reliable quality of service; and polarization of the treatment of goods in the modal and intermodal nodes of infrastructure and service networks, in logistic platforms. The nodes that accumulate the functions of centrality and intermediation are particularly important, both for the number of connections they have with other nodes of the network and for the fact that they are an obligatory route in most of the connections (Knowles 2006). Centrality “reflects the hub city’s own traffic-generating power that comes from its size and function as well as its location”, whereas intermediacy “reflects extra activity levels conveyed to the hub by the carriers’ choice of this location for operational geographical emphasis within their transportation systems” (Fleming and Hayuth, 1994:4). These strategic positions in the network as a whole have a critical role in the global efficiency of the network.

The tendency to concentration and polarization of logistic activities is noticeable at different scales: in certain regions, towards the interior of regions and in specific places (Savy and Liu, 2009). Bologna (2000) and Hesse and Rodrigue (2004) provide several examples of these concentration processes in North America and the European Union, which show circulation corridors, highway intersections and large metropolitan regions, all of them areas of quick access to transportation services, with complex and diversified labor markets. These same authors also point out the existence of tensions in terms of congestion, environmental conflicts and high land value that could be indicating an incipient movement towards deconcentration.

The tension between reticular processes and areal regulations

The logistic practices and transportation services are network processes and, as such, they face the dynamics of proximity, network economies and political and administrative regulations. As a consequence, they find their logics within the frame of the network functioning: they articulate distant points with a centralized control, have their own functioning codes, and imply movement through different political and administrative areas.

On the other hand, the political and administrative areas have well-defined limits in their regulation capacity, which may generate conflicts between the functioning of the logistic networks at a global or national scale and the local or regional milieu. Hence the importance of incorporating the multilevel governance perspectives to address these types of conflicts in the territory (O’Connor 2006, Brugué et al 2005).

Logistic tendencies in Argentina

Some of the features of the logistic practices in Argentina shall now be presented and, subsequently, the organization of these practices in terms of the territorial components involved shall be described.

General features of logistic practices

a) There are two main components that guide the logistic process: global exports and regional integration. Both the logistic use of the transportation infrastructure and the establishment of logistic nodes are closely related, in the case of Argentina, to foreign trade and particularly to the ongoing process of regional integration (Mercosur). Land traffic flows that explain the circulation in the main transportation corridors have the foreign market as origin-destination, going through river or sea port terminals and, at a smaller scale, by land through border crossings.

b) The importance of the primary industry is decisive in the organization of the system. Argentina has historically been a net exporter of agricultural and livestock produce with a fundamental importance for the differential valorization of the territory and its adequacy for circulation. Most of the export cargos are of agricultural produce,

especially grains, and their destinations are port terminals where they are shipped in bulk or industrialized for later shipment.

c) The development of internal logistics is considerably smaller. Most of the products are directly distributed, thus linking production centers to consumption centers without logistics intermediation (ENABLE 2010). The role of the big retail distribution is very important. Supermarket chains define logistic strategies aimed to reduce costs, based on the adoption of new technologies to handle, store, load and unload products, and of computer systems to manage stocks.

d) The main mode of transportation is trucking. The bulk of the transportation of cargo, both to the domestic market and to export, is by road, which account for approximately 95% of the total. The rest is mainly carried by train (approximately 5%), and in near marginal proportions by air and water (UTN, 2011). Road transportation predominates even in long-haul cases, for which the railway could be competitive. The railway is mainly used for grain and mineral transportation and has an idle capacity that could absorb part of the cargos that are currently carried by truck, and those that are eventually generated by an increase in the levels of production and foreign trade. This is particularly relevant in the areas of agricultural expansion in the North of the country. Such use of transportation has environmental consequences as it privileges modes that are less energy-efficient and that generate more emissions.

e) The development of multimodal transportation is still limited. The scarce development of multimodality is connected with the lack of infrastructure and equipment (land terminals, access from the railway to the port, container transshipment infrastructure) with normative restrictions (for example the restriction of free circulation of containers in the territory), and with the lack of a business culture prone to modal integration, particularly that of cargo operators and consignees (World Bank, 2006).

f) There are circulation difficulties in the border crossings. Argentina takes part in several corridors of international traffic in South America. The one with the highest level of activity is Paso de los Libres-Uruguayana, an import-export node that concentrates around 60% of the cargo between Brazil and Argentina and is a compulsory path to Chile, running through the entire country.

The other path is Cristo Redentor, at the border with Chile, which is closed several days per year due to bad weather conditions. These passageways have several problems: long waiting times at the frontiers, operational inefficiencies (lack of integrated computer systems and integrated controls) and infrastructural inefficiencies (insufficient services and facilities), which indicates lack of an integrated logistic center (World Bank 2006). The informatization of the logistic process for exports is limited. The main administrative weaknesses are related to fiscal inspections, documentation management and security controls. Documentation management, both in the container terminals and border crossing points is based on physical documents which generates delays for the trucks in the terminal area and reduces the available room for container storage (World Bank 2006). It was only recently that shared information services between Customs and the organisms that regulate the licenses of carriers and vehicles have started to be implemented.

A scheme of logistic places

One of the main characteristics of Argentina's territorial organization is the deep differentiation in terms of the division of labor and equipment. Homogeneity, as previously described, in light of Bologna's ideas (2000), is far from becoming widespread in spite of the advances of economic activities connected with the global economy over spaces formerly linked to other economic dynamics.

Argentina is characterized by a high concentration of population, as well as a high concentration of its gross product and export activities in some cities and provinces. The five jurisdictions with the highest degrees of population concentration (Autonomous City of Buenos Aires, and the provinces of Buenos Aires, Córdoba, Santa Fe and Mendoza) gather 67% of the total population of the country and account for 71% of the exported goods value (INDEC 2011).

With regards to the territorial division of labor, one may outline some general features that are important for logistics, as shown in Figure 1.

Firstly, the Pampa region may be described as a practically homogeneous area of primary production articulated with agro-industrial complexes, where extensive areas of diversified industrial

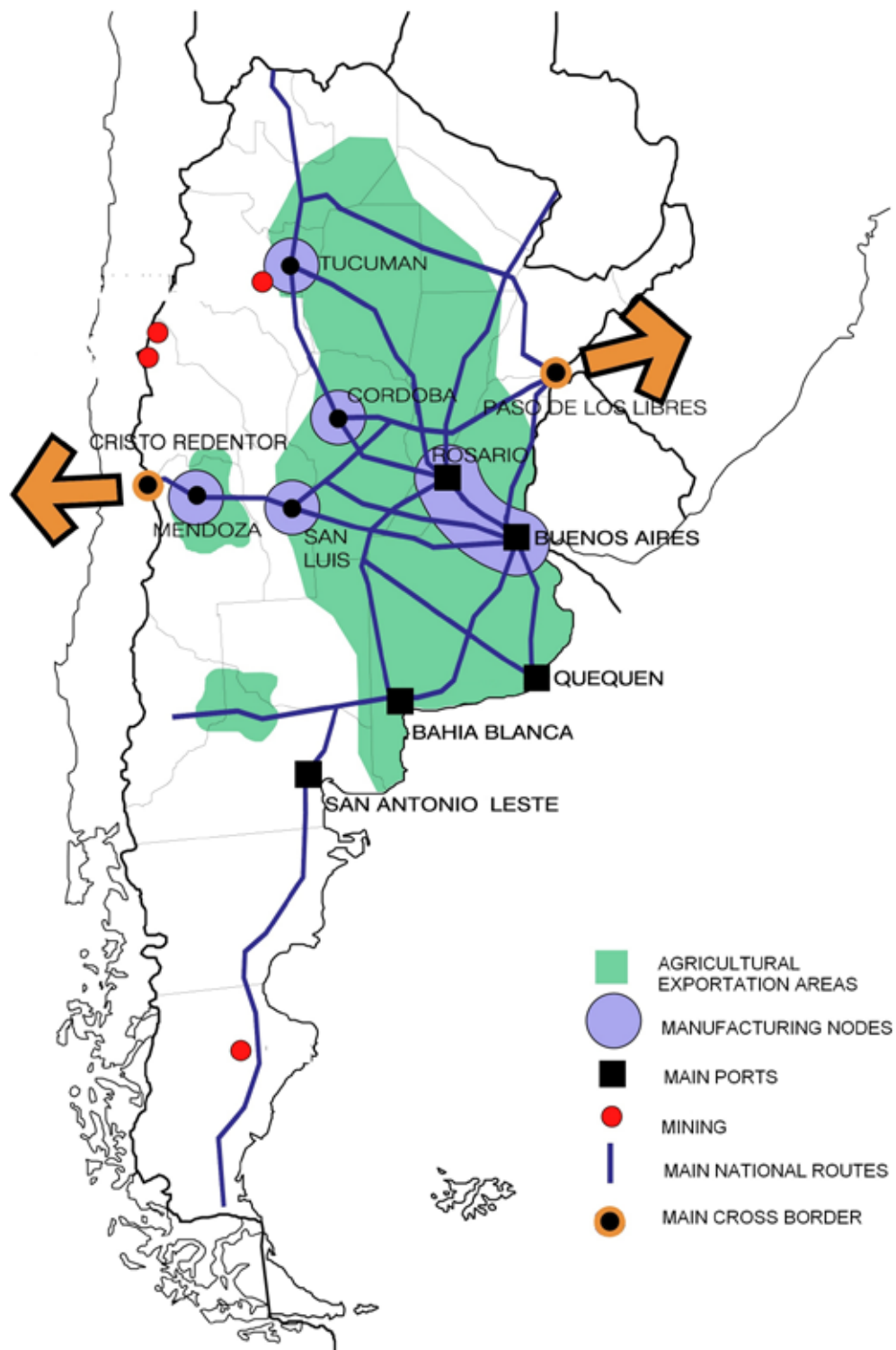


Figure 1. A scheme of logistic places in Argentina

production may also be found, as is the case of the surroundings of Córdoba City and the area that extends from Rosario to La Plata. These industrial zones coincide with the biggest cities, some of which also happen to have the most important ports, and thus a few nodes end up accumulating a great number of functions. That is, there is a conjunction of productive and circulation conditions that result in a high concentration of logistic-related activities.

Secondly, there are different areas of primary production that make up productive and agro-industrial circuits, both in the North and in the West of the country and in the North of Patagonia. In these regions one may also distinguish specialized nodes of primary extractive production (hydrocarbon and mining) and energy generation.

Thirdly, from the logistics standpoint, the areas of expansion of export crops in specialized places are significant. Several environmental and social conflicts derived from the advance in soy farming for export have taken place in these areas of expansion.

The corridors and circulation networks have historically been developed as of the insertion of Argentina in the world economy. The railway networks, the first massive technical system installed in the territory, were a central part of the project for the country to be incorporated in the 19th-century international division of labor. With a radial structure and the main ports as convergence nodes; they are highly dense in the provinces that produce exportable primary goods, and in the corridors leading to the Northeast, Northwest, West and South.

Such concentration has only been partially reversed with the construction of a massive road network in the XX century. Even though in most of the cases the road network reinforced the radial scheme, it also increased the accessibility to ports and big cities and diversified inter-regional connections. As a consequence, the networks have a differential density which provides smooth flow conditions in the Central-eastern region of the Argentinean territory, and, on the other hand, great difficulties in the movement and high transportation costs in the North and South of the country.

The main corridors of connection in South America are currently operating under similar conditions since they articulate the main dynamic nodes. Buenos Aires and Rosario play a central role in the whole circulation scheme. The metropolitan

ports of Buenos Aires, specialized in containers, are gateways for the entrance of imports that are subsequently distributed to the whole national territory. And, at the same time, they represent the main exit for the industrial production. On the other hand, the ports of the node of Rosario concentrate 65% of the grain exports and are one of the main centers of oilseeds industrialization in the world.

Most of the inland logistic centers are located in the metropolitan region of Buenos Aires (BAMR), closely connected to the highway network, taking part in the set of urban expansion processes known as urban sprawl (Savy and Liu 2009). The hubs are scarce outside the BAMR. The central corridor stands out, with a center in the province of San Luis (Logistics Activity Zone of Villa Mercedes) and there are future plans for Mendoza. There are similar projects for the remaining of the country. In the Northwest, there are projects for logistic centers in Tucumán and Salta; in the Northeast there is a project for Misiones (Productive Logistic Platform of Posadas); and in Patagonia there is a project for Neuquén (Logistics Activity Zone of Zapala).

Final considerations: territorial organization and future dilemmas

Most proposals for territorial intervention formulated by the actors of the logistic sector tend to prioritize the works that increase the attractiveness and capacity of the main existing nodes and corridors, which already concentrate logistic and productive functions and represent, at the same time, the main consumption markets. The historical trajectory boosts and increases the geographical inertia. As a result, the Argentinean territory does not reach conditions of homogeneity in its constitution as a global system of rapid circulation but rather, fragmentation and hierarchization together with polarization and concentration predominate. Within this framework and since investments are concentrated in already developed areas, new questions concerning territorial equity and spatial planning arise.

It is, therefore, worth looking back at some of the principles proposed in two recent planning documents: the "Plan Estratégico Territorial" (Territorial Strategic Plan) and the "Plan Nacional de Telecomunicaciones Argentina Conectada" (Natio-

nal Telecommunication Plan Argentina Connected) (Argentina 2008, Argentina 2010). The first one proposes a prospective model of territory and its guiding principles are: circulation integration at a national and international scale, a polycentric urban scheme and an internal connectivity that may generate new articulation axes in the territory. This would result in a more equitable distribution of the set of urban functions in different nodes and the formation of inter-regional connective corridors that diversify the present radial model. The "Argentina Connected" plan, in turn, proposes a federal optical fiber network encompassing the entire national territory as a strategy to homogenize and articulate all of the urban centers in the country.

These initiatives clearly show that the investment criteria could differ according to whether they are presented from the market or from the territory point of view. In the first case, the investments should aim at optimizing logistics through the required interventions in the territory. On the other hand, analyzing the logistic process from the territorial perspective, other investment alternatives focused on more general social objectives and equity could prevail.

Throughout the present article we have proposed a conceptual articulation between territory, transportation and logistics, emphasizing the territorial configurations that are built and on which economic players' practices are based. We have identified territorial tendencies that highlight the processes of concentration, polarization, hierarchization, fragmentation and homogenization of the territory in the international literature.

The analysis of Argentina's configuration shows serious territorial imbalances that could be deepened if a purely market-oriented logic is applied. Hence the need for a broader view, more focused on social objectives, to guide the proposal and prioritization of investments in the territory.

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