

# Spatial structure of the economy – the evolution of nodes and networks in South and Central America

## Abstract

The form assumed contemporarily by spatial organization in South and Central America as a network of nodes and spatial linkages represents the outcome for the space of this region of long-acting external influences plus internal conditions that have – at different times in different ways – shaped spatial relationships and the manner in which space in this part of the world is planned. Naturally, the spatial structure of today's economy is influenced further by globalization, with growing competition for access to resources, be these either mineral deposits or agricultural in nature. These impacts ensure that, notwithstanding the widely-voiced opinion on the need to protect nature in areas of the continent supporting moist tropical forests, and in the high Andes, the governments of the different countries continue to award concessions allowing corporations of global reach to exploit resources of value that are in demand worldwide. This aggressive "resources race" has its serious consequences with regard to the forms and scope the region's spatial management and organization assume.

These processes ought to be regulated by spatial planning, which is thus failing to play its proper role at regional levels. Those researching South America refer without hesitation to the lack of planning and over-exploitation of raw materials, with all the serious consequences this has for society, not least with regard to internal migration, expulsions, the impoverishment of groups in society deprived of their land, and so on.

## Keywords

Space structure of economy • regional nodes and networks • South America • Central America • spatial organization

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## Introduction

Regional development and its forms, directions, scope, characteristic features, and change processes are dependent on many interlinked phenomena and processes specific to the given region. From among the factors shaping behaviors and spatial relations between the economy and society in Latin America, what have undoubtedly been of key importance ever since European colonial times are those of a political nature, as well as those relating to conditions in the natural environment. All remaining elements shaping the form that spatial management and physical development take can be considered subordinated to these two main variables.<sup>1</sup>

In geography, space and the means by which it is managed are treated as elements determining economic growth and processes of development in general. Those analyzing the spatial structure of the economy and social phenomena relate them to regions, and in the case of the territory under analysis, we refer to particular states and geographical regions. The spatial forms management assumes are influenced by location and distance; therefore, the way in which a given space is managed is determined by:

- the management of distance (costs, quality and modes of transport),

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- land management (with high-level characterizing areas (regions and urban areas) located centrally, and with the manifestation of this being the land prices achieved in different places),
- the management of natural resources (above all water, land, the landscape, and raw materials),
- regional economics,
- the organization and steering of development processes in the social, cultural, and political spheres, within the framework of different administrative units,
- the model adopted for a country's spatial management, as a configuration of nodes and a depiction of networks and the linkages between them.

The configuration of nodes and the linkages pertaining between them represent the main subject of analysis in this article. However, an analysis of models of the economy's spatial development also needs to take account of such factors influencing the process as persistence of form and slowness of change, as well as the inertia characterizing spatial development processes, and so on. It is the configuration of nodes (points and mini-regions) in space in an analyzed area that represents a fixed aspect not experiencing more major change even after more than five centuries, other than in cases where there has been a steady incorporation of new entities beyond the economy's traditional

colonial space. Nevertheless, with the passing of the years, an ever-denser network of linkages between (old and new) nodes takes shape, with this being the factor that influences how more and more consolidated economic space of the whole region comes into existence, at the same time ensuring that expansion fronts from the coast into the interior become broader and broader, and more and more permanent.

The generation of the key elements relating to spatial organization and management, i.e., nodes, corridors, networks, intermediate nodes, central areas, and so on, is the subject of both spontaneous processes and those relating to planning, be that sectoral, regional, or integrated. In both cases, it should again be recalled how both political and natural conditions are of relevance here. The policies pursued in South and Central America – whose consequences included new investment in industry, agriculture and infrastructure in hitherto-underutilized regions nevertheless enjoying greater development potential – were the result of overlap between several different implemented policies and programs of development, dating in particular from the 1950s onwards. While it is true to say that planning bodies took their lead from developed countries (in Europe, in particular) and were motivated by policy run at that time by CEPAL, original regional policies and a means of encouraging investment were adapted to local natural, social, and economic conditions (eds Czerny, Arturo & James 2009).

The founding of zones attractive to investors and the concentration of new productive industries and services within them also depends – in very general terms – on the assets and liabilities the given country or region has available to it. Among key assets influencing the socioeconomic organization of space are economic and demographic potential, natural resources, manmade artefacts, and human, and social capital. Needing to be mentioned among the key liabilities influencing the intensity and level of investment in a given area are the status of lagging behind other regions in terms of the level of development, a lack of natural resources, and a low level of social capital. Account should also be taken of the significance of ongoing processes by which territorial structures are shaped. For this reason, the history of spatial organization (in the sense of the development of settlement and agriculture, the use of natural resources and manufacturing processes) represents an exceptionally important element underpinning the interpretation of contemporary spatial-development models.

A whole gamut of internal determinants of development go into forming the matrix of needs and features of a region of relevance to the formulation of plans and programs of development involving both the state and private investors, which are here pursuing their own operational strategies. Regional policy is the key, but by no means only, instrument shaping processes of development in regions. The state has a crucial role to play, for example, as a promoter of the development of peripheral and marginal regions, and those lagging most in terms of wealth; as well as in regard to regions at the other end of the scale which can serve as poles of growth or form central areas of strengthening economic potential. The instrumentation states may draw on is varied, ranging from regional policy through to direct economic investment, via investment in technical infrastructure and human capital.

Beyond the internal factors, it is those of an external nature that are exerting an ever-greater influence (and in some regions even the decisive influence). The most important actor in the shaping of regions' socioeconomic space is globalization – the global interests of enterprises representing different sectors of the economy (agriculture, industry, and mining) that seek to exploit resources essential if global demand for defined goods is to go on being satisfied and often decide the locations of

new infrastructural development, and therefore also the places in which new job opportunities arise. Other external elements (like socioeconomic phenomena playing out in border areas, the political situation in the region as a whole and economic integration processes) all have a major influence in shaping the forms spatial management assumes. External actors interested in operating in the peripheral regions of Latin American countries often have the effect of widening disparities between traditional regions and those being shaped anew by global interests.

In the space generated and transformed by human activity it is possible to distinguish certain repeated regularities and schemes as present in most spatial systems. The most important of these, capable of determining the nature of space, are nodes and networks (in linear systems). Nodes are towns and cities (as single centers or agglomerations), and they are capable of forming whole settlement systems. The cores of the systems of nodes are formed by cities of various sizes. A node system may assume various spatial forms, in that it may be dispersed or concentrated, in equilibrium or polarizing. Linear systems are linked together, with connections of a spatial or relational nature; while between nodes linked by roads, rail lines, canals, and rivers there develop elongate strands of the more-intensive use of space of residential, service-related, or manufacturing function.

The elements present in a given area that are most characteristic for its spatial organization are its zonal systems, which are defined as “multi-spatials” in the organization of the regional or national economy exerting an influence on economic activity and the growth of urbanized areas, regions of agriculture for export, areas specializing in tourism and mining, and so on. Urban and rural settlements together form nodal and linear systems creating the main skeleton of spatial organization and determining both its shape and scope. And the greater the number of cities, the more these systems are persistent and better-developed functionally.

In general, systems of spatial structure reflect persistent or protracted historical processes governing the actors operating in given space for centuries. Obviously – as in the case of mining investment to give one example – appearance in a given area may be abrupt, giving rise to dramatic change in a region's economic and social relations. The exhaustion of deposits may also lead to a change of configuration of the linkages in a region. Characteristic features of such spatial systems are nevertheless permanence, slowness of change, resistance to external factors, and capacity to persist over longer periods, even through times of crisis. This does not mean that these systems are unchanging. On the contrary, the internal change characterizing central regions with dynamic processes of development may take place rapidly. However, this does not do much to change the perception of a region (city or urban complex) as a permanent element in space.

This article seeks to account for differences in the dynamics and intensity of spatial management processes in Central and South America. The assumption adopted has been that processes of the development and spatial expansion of the economy proceed stepwise in line with a “points-lines-areas” logic. In the case of the New World, development was indeed of a markedly pointwise character in its first phase, before spreading out radially into the continental interior from defined places on the coast first reached by the Conquistadors. Geographically speaking, these points were by no means the ones located closest to Europe, and indeed the locations arrived at by the first Spanish and Portuguese explorers can, in reality, be regarded as rather random (in the first stage, they were on the shores of the Caribbean and Gulf of Mexico). Only as more years passed was there a move towards the developing of lands closer to Europe in geographical terms.

The authors' intention here has been to present graphic models based on the nodes and axes of development present in different periods that begin with the first decades of the Conquest and end in the present day. The concept presented here by which processes of spatial development are deemed to have taken place represents an original proposal from the authors based on an analysis of the rich subject literature, as well as their own thinking and theorizing. Among the key works that offered a basis for the further development of the new auctorial concept of spatial development were *The Conquest of Peru* by William H. Prescott (as read in its 1969 version translated into Polish as *Podbój Peru*), Marian Małowist's *Konkwistadorzy Portugalscy* (1976), *Latin America - The Development of Its Civilization* by Helen Miller Bailey and Abraham Nasatir (again in the Polish translated version dating from 1969 and entitled *Dzieje Ameryki Łacińskiej*), *Amerika und die Zivilisation* by Darcy Ribeiro (i.e., the 1985 German-language translation of the 1977 original published in Portuguese), *Die Städte Südamerikas* (of 1984) – by Herbert Wilhelm and Axel Borsdorf, *Amérique Latine* (1991) by Claude Bataillon, Jean-Paul Deler, and Hervé Théry; and many others.

The present-day subject literature on processes of regional development and spatial organization or management in Latin America focuses in on work dealing with the territory of single countries. There are thus few more-modern analyses dealing with South America as a whole continent, or the Central American region. However, Latin American subject matter does appear in the monographs and reports prepared more recently by CEPAL (2016), albeit with the main focus being on sustainable development and the consequences of climate change for economic processes. Thus, the appearance of the need (as perceived by the authors) for a return to the discussion of the main regional directions to development, as taken in the face of new economic challenges (not least increase demands for raw materials on world markets), as well as growing threats linking up with natural phenomena (such as *El Niño*, hurricanes, floods, and so on).

### Latin America's space

In the Modern Era, a feature characteristic of the territorial processes and changes in land use ongoing in Latin America has been the expansion of economic activity, and associated expansion of settlement, into new areas. The last few years in the 21<sup>st</sup> century have seen (as indeed most of the 20<sup>th</sup> century saw) this process of expansion and change in regional economic structure assume ever-more aggressive, and indeed ever more-unforgiveable, dimensions. All this activity has had radical impacts on the natural environment and society alike, necessitating renewed discussion of the model underpinning spatial organization, as well as a new effort to conceptualize the matter of land use in the era of globalization as all-embracingly as possible. Through the centuries from colonial times to the era of post-colonial forms of spatial management, the forms assumed by land use reflected both strategies for the exploitation of new lands and spontaneous activity seeking to open up and settle new regions. Both settlement processes and forms of exploitation reflected the goals of colonial conquest. More specifically, they represented a strategy by which raw materials and agricultural products prized in Europe and necessary for its development were shipped out. Over that time, there was no process whatever of adopting spatial management or physical development plans, even though the effect of most point activity (e.g., the development of mining) was to change spatial organization in the economy quite markedly. At most, certain features of regional planning did emerge, as the colonial authorities sought to safeguard state borders. This was primarily true of unmanaged land located between Spanish and Portuguese colonies, as well as enclaves

taken by the Dutch or French within the area guaranteed to the Portuguese Crown by virtue of the Treaty of Tordesillas.

Likewise, in the first half of the 19th century, economic decisions were more a reflection of political than regional conditioning. Only from the end of the 19th century was it possible to speak of the planned development of settlement, and thereby of the management or organization of new land designated for cultivation. It was at that point that Latin America received waves of immigrants from Europe, with many countries (like Argentina and Brazil) promoted in Europe via programs encouraging Europeans' settlement in these lands. Extensive areas of basically empty wilderness began to fill with large numbers of new settlers, as at Misiones in Argentina and in Brazil's southern states. The demographic policy being pursued represented an impulse for new spatial management structures to establish. The early 20<sup>th</sup> century was also important for spatial change, given the appearance of new mining settlements, in particular those engaged in the exploitation of crude oil.

Today's economic situation in Latin America combines with pressure on resources and the intensified utilization thereof (not only in areas long exploited, but also in peripheral regions now losing natural vegetation that ought to be protected) to ensure the appearance of planning initiatives and national strategies relating to managing and planning in those areas where the exploitation of resources has become intensive. These strategies ought to be integrated into national systems, but also into a continent-wide one. Remaining as part of the process of preparing a strategy at national or regional level – as before – is an unresolved question as to whether activities engaged in are to steadily reduce the disparities between these regions and central areas or are to increase the effectiveness of state scrutiny over development processes and thus generate further economic growth. If it is the concept of achieving more favorable growth indicators that dominates, then this will give rise to a further strengthening of economically-strong and developed central regions. The downside of such a strategy is of course further polarization of development processes. In turn, if development strategies focus in on evening out levels of development from one region to another, then investment in areas that have thus far been only weakly developed and peripheral will need to be supported, and this policy may limit the strength of regions that have been strong hitherto, if these can no longer rely on ongoing support for their development. According to R. Domański (2002), this "dramatic contradiction" may be eased by means of activity that seeks to increase regions' accessibility. Domański claims that measurement in matters of the evening-out of opportunities to develop between one region and another should take place in line with their level of accessibility (ibid.).

### Colonial nodes and axes of development

Means and directions of the geographical expansion of economic activity from the moment the *Conquistadores* arrived in South America have been linked closely with the expectations of the Spaniards and Portuguese when it came to accessing the resources they craved. The Spaniards, who came first to the Caribbean, pressed on with their exploration in two directions, i.e., to the west and today's Mexico; and to the southwest in the direction of today's Panama, and further south in today's Peru). The western direction allowed them to reach central Mexico and to occupy the fertile land in the *El Bajío* region. The Spaniards settled in populated, fertile lands that had sustained agriculture even prior to their arrival. *El Bajío* supplied food to successive waves of settlers from Europe. In the colonial era, the region's economy blossomed, thanks to the activity of numerous *ranchos* engaging in both crop-growing and the raising of livestock. From central Mexico, the new Spanish settlers headed north in the

direction of regions rich in silver. They thus founded mining towns which constituted the first nodes in the colonial settlement network (albeit with many collapsing once the reserves of minerals were exhausted). A second direction of colonization headed south – to Guatemala, and then much later to what are today Nicaragua and Costa Rica.

In South America, Spanish colonization proceeded southwards and westwards. The first Spanish towns came into being on the shores of the Caribbean, and in the Pacific Lowland of what is today northern Peru (Piura). The main nodes to the organization of the colony's economic space appeared, with Lima as the capital of the Viceroyalty of Peru, and with other key centers of the temporal and ecclesiastical administrations like Santiago, Trujillo, Mendoza, Cuzco, Arequipa, Salta, Quito, Popayán, Bogotá, Cartagena, Caracas, and others.

Alongside the nodes in the form of centers of the Spanish administration and mining centers, the network of linkages was formed by hard-surfaced roads and old Indian trails, along which goods were transferred and new settlers moved in. The distribution of nodes was an uneven one, with centers of administration and mining plus ports forming small areas in which development was of high intensity, as contrasted with extensive, low-population areas characterized by extensive agriculture as the dominant function. Distances between one *hacienda* and another might be great, and the relationships pertaining between them only weak. There was in fact a lack of spatial continuity between the main economic and political nodes of the colony, and that situation only improved very slowly with the passage of time, as important economic nodes in the interior gradually came on the scene and were a target for further new settlers. These processes were especially important for economic expansion into the interior in the case of the Portuguese colony, since settlement there marked a distinct process of transfer from the coast inland, initially with a view to resources of gold and silver being exploited. The mining was followed by a wave of settlement involving agriculture and the raising of livestock. It was the trade routes between the mining centers (i.e. in Minas Gerais) and the coast that played host to the first permanent settlements.

Spatial differences in the economic system between the coast, the Andean region and the extensive lowlands crossed by major rivers were first and foremost manifested in levels of accessibility. Access to many parts of Amazonia, but also other lowlands, was frequently just impossible, or at least so difficult that only a few desperados managed to actually settle. In contrast, the uplands and sierras had a more efficient system of transport infrastructure, though many technical difficulties still needed to be overcome. The dominant model in the spatial economy thus assumed linear form – along the eastern and western coasts, albeit with branches off into the interior (and these far longer in the case of the Portuguese colonies, far shorter if denser in the case of the Spanish ones). The side-branches led mainly from ports into the interior and were thus very narrow lines. In contrast, the main economic linkages pertaining to the colonies led into the outside world, heading via the ports to the colonial metropolises.

In summing up, it is possible to refer to the following listed points in identifying the most characteristic features of the process whereby new economic and social space took shape:

1. Main nodes of a political and economic nature emerged out of the main centers of colonial administration – i.e., the capitals of the Viceroyalties of Mexico and Lima. These were later joined by two further capitals: Santafé de Bogotá and Buenos Aires. Remaining nodes were formed by centers augmenting the network – capitals of first- and second-order administrative units, as well as ports, and the capitals of Catholic Dioceses.

2. The key economic regions of the colonies took shape, along with transport-related or other linkages between them.
3. Settlement and the economy expanded slowly into the interior, with an attendant increase in the areas of land under cultivation or given over to pasture.
4. The model for spatial development in place was dominated by relationships with the exterior (the colonial metropolis).

### The 19th century and first half of the 20th century

Eschewing analysis of the exact political situation, and focusing solely on the economic consequences of the independence of Latin American states, it is necessary to stress two phenomena exerting particular 19th-century influence on the development of this region's spatial economy. These are foreign investment and the influx of immigrants from Europe, and their results entailed both intensive expansion of agriculture as more land came under cultivation from Italian, German, French, Polish, Ukrainian, and other incomers, and industrial development – again aided by immigration, in this case entailing Germans in southern Brazil and the British in southern Argentina. Abrupt increases in areas growing (and in the harvests of) wheat, coffee, cocoa and bananas took place, as did increases in the numbers of head of cattle and sheep. This favored the development of textile and leather industries, with the meat industry also taking off at the turn of the 19<sup>th</sup> and 20<sup>th</sup> centuries. Progress in food production technologies (particularly discoveries regarding the chilling and preserving of meat) ensured that centers of the meat industry appeared (i.e. in Argentina, Brazil and Mexico), as well as centers of agriculture and the food industry (in Colombia, Chile, Argentina, Brazil, Mexico, etc.). New mining centers also developed – for the colored metals and (from the early 20th century onwards) oil (Wilhelmy & Rohmeder 1963). By the early 20<sup>th</sup> century, many of these centers had transformed into middle and large cities (like Tampico in Mexico, Comodoro Rivadavia in Argentina, Barrancabermeja in Colombia and others).

The mass influx of immigrants from Europe only accelerated industrialization and the growth of cities, as well as the development of export-based agriculture. Before the Great Depression hit, the whole region had come to represent a very major of supplier of food to both the North American and European markets. In contrast, industrial output mainly went to serve domestic markets. The economic crisis of the 1920s not only generated a fall in both agricultural and industrial output, but it also led to the collapse of many regional economies as a whole, given that these lost their sources of income. The ultimate result of the breakdown in foreign trade was the onset of depopulation, as agricultural workers losing their jobs went to the cities in search of work. Meanwhile, industrial workers made their first forays into the informal economy at this point (Czerny 1976; Czerny 1994).

Seeking to emerge from the economic crisis, the countries of Latin America introduced a strategy of import substitution, *inter alia* with a view to foreign investors being drawn into their industry. This emerged as successful, at least in its first decades in operation, with an increase in the role industry played in the economy ensuing, in the large countries with greater economic potential in particular (i.e., in Mexico, Brazil, Chile, Colombia, and Argentina). It was only from the mid-20th century, and in particular from 1980 onwards, that the above strategy began to fail, to the point where innovation was stifled, and economic growth curtailed.

Features characteristic for the model of spatial development in this period were:

1. New economic developments in the interior – colonization of new lands for the development of agriculture, infrastructural development and the exploitation of new deposits of minerals.



Figure 1. A schematic representation of spatial structure of South America from the late 19th through to the mid-20th centuries  
Source: own elaboration

2. The ongoing development of seaports engaged in the export of raw materials.
3. Regional (economic and demographic) development entailing new raw materials for export (e.g., raw rubber).
4. An increased role for the export of agricultural produce, with the consequence being increased areas taken by cultivation serving this goal (the main crops being bananas, coffee, cocoa, wheat, pineapples, tomatoes and flowers).

Following the major economic crisis afflicting this entire part of the world, regional matters began to take on greater significance in government policies than had been the case previously. Emerging for the first time at this point were large regional projects predicated on infrastructural development and seeking to dynamize investment in different sectors of the economy. Land consolidation in the context of crop-growing for

export took place, and a process set in train from the mid-20th century onwards led to far-reaching change in the way Latin American space was organized, with this entailing rapid growth of metropolises and an attendant process of sprawl into adjacent peripheral rural areas.

**A half-century of the implementation of large regional projects (the second half of the 20th century)**

The 1940s were a very favorable period for Latin American countries from the economic point of view. Large trade surpluses were generated by those in a position to export raw materials and machinery to the combatants in World War II, and these would go on to allow for the implementation of bold infrastructural projects that helped stimulated development in peripheral, but resource-rich regions. Many initiatives of a regional nature came into being. Projects put into effect in the years from the 1950s through

to the 1980s, and capable of influencing Latin America's spatial management in a tangible way, were as follows:

- large projects to manage whole river basins, as mainly implemented in Mexico, but also in Colombia and Brazil;
- the construction of dams and reservoirs to increase supplies of energy (primarily in Argentina and Brazil);
- programs of regional development and expansion of the settlement network in Brazil (via the SUDAM and SUDENE Projects), as well as further (Brazilian) projects for agricultural colonization;
- projects to create a network of growth poles and build industrial cities and parks (mainly in Mexico, Venezuela and Colombia).

In the case of Mexico, the first programs designed to develop agriculture appeared in the mid-1930s, and were concerned with the Mexicali and Conchos Valleys, as well as the lower section of the Río Bravo. At that point, plantation agriculture began to develop over extensive areas of irrigated land. Influxes of settlers gave rise to marked population increase, and economic growth, in the border towns like Mexicali, Piedras Negras and Nuevo Laredo. By 1953, some 144 new farm colonies had come into being. Some of these had even gone on to become proper urban centers, as in the case of Delicias in the Conchos Valley (Reyes Osorio 1970). However, the real breakthrough in the approach taken to regional development came with projects seeking to manage river basins modelled on the Tennessee Valley Authority in the USA. For its part, Mexico established the *Comisiones de Cuenclas Hidrológicas*, and the projects whose implementation it was responsible for encompassed dam-building, the construction of power plants, irrigation of cropland, and redevelopment of both road and recreational infrastructure (Barkin & King 1970). Between 1946 and 1970 projects to manage the basins of the Río Balsas and Río Tepalcatepac, the Papaloapan, the Grijalva-Usumancinta, the Río Panuco, and the combined basin including the Lerma, Lake Chapala and the Santiago all appeared, along with projects to manage arid land, under the auspices of the *Comisión Nacional de Zonas Áridas* (Stöhr 1975) and within the framework of the *Plan del Lago de Texcoco*.

While these projects were all put into effect, not all were implemented with full success. In most cases, it was the construction of dams and reservoirs, and hence the irrigation of farmland, that proved possible to achieve, while only much rarely did any follow-up development of an industrial sector take place. Still, a measure of economic revival was to be noted in all of the regions made subject to the programs, with the major impact of their implementation lying in the management of new land and the development of the settlement network.

In the case of Brazil, the President holding power there between 1956 and 1961 – Juscelino Kubitschek – founded *Grupo de Estudio del Desarrollo del Nordeste* (GTDN), which came out with a policy document entitled *Una política de desarrollo para el Nordeste*. It was in turn to implement that policy that the *Superintendencia del Desarrollo de Nordeste de Brasil* (SUDENE) was set up in December 1959, as the first government institution in Brazil charged with preparing and pursuing a regional development plan (<http://procondel.sudene.gov.br>). In fact, the so-called *Nordeste de Brasil* is among the regions subject since the fifties to experimental regional development policies of various different kinds. And the partial implementation of at least some of these had the effect of generating major economic and social change. While the industrialization process it ushered in did not bring the intended effects, an intensification of industrial development did occur, and the achieved aim in this sense was the establishment of several autonomous industrial districts. Where agricultural development was concerned, the steering

was designed mainly to ensure that needs of the region's urban markets were met, and this did prove possible. Steps were also taken to raise the effectiveness of the farming pursued in semi-arid areas, though this in part entailed a transfer to more humid areas in Maranhão state.

In September 1966, a *Superintendencia del Desarrollo Económico de la Amazonia* (SUDAM) came into operation, with its seat downriver in Belem (Santos Pérez & Petit 2006). Its activity took in parts of a vast, 5.2 million km<sup>2</sup> area encompassing the states of Acre, Amapá, Amazonas, Mato Grosso, Pará, Rondônia, Roraima, and Tocantins, as well as part of Maranhão.

Recent decades have seen governmental programs seeking to integrate Amazonia into the economies of the relevant states. This is of huge relevance, given that Amazonia accounts for ¼ of Peru and Bolivia, for 60% of Brazil and for 50% of Ecuador. Different projects pursued with this aim in mind encouraged mass influxes of immigrants, and both Manaus and Belem now have populations of over a million, as does Porto Velho in southern Amazonia. The development may prove unbalanced: Iquitos in Peru, which continues to lack proper road connections, had over 600,000 inhabitants in 2015. Very strong population growth has also affected Pucallpa (with its more than 300,000 inhabitants as of 2015), though in this case the growth has been fueled by the recent presence of a road link with Lima. Santa Cruz in Bolivia has as many as 1.2 million inhabitants. Taking this all together, the impulses encouraging population growth can be seen to have brought over 20 million people into Amazonia in the course of the last 3 decades (Harris & Hutchison 2011) (Gobierno Autónomo 2018).

It is clear that road-building does much to accelerate a given region's colonization, while an improvement in a road surface further hastens the influx of immigrants. The road linking Cuiaba and Porto Velho received its asphalt surface in the mid-1980s. While this sustains damage regularly, buses, coaches and HGVs continue to ferry passengers into the new settlements springing up along the road. That leaves broad belts of land assuming the form of fields, where forest was still present not so long ago. In the 1970s, the Brazilian government commenced with subsidies for anyone establishing a livestock ranch on more than 20,000 ha of land. Ironically, in the first years of the 21<sup>st</sup> century, livestock-rearing itself came to be threatened by interest in soybean cultivation. Hence, a growing demand for soya in developed countries is pushing up prices and posing a threat to forests (Harris & Hutchison 2011; Fernandez-Satto & Vigil-Greco 2007).

In turn, in the whole period from 1940 to 1970, Mexico was pursuing a series of programs whose aim was to stimulate industrial development, but also its deconcentration out of the country's cities. Key measures were the *Leyes de extensión fiscal estatal para la industria, Créditos a la pequeña y mediana industria, Fondo de Garantía y Fomento a la Pequeña y Mediana Industria* and *Ley de Industrias Nuevas y Necesarias*. As these were put into effect, industry indeed deconcentrated, to the point where it spilled out over the whole of central and northern Mexico (Czerny 1976).

Projects including, but also extending beyond the aforementioned ones were pursued in Latin American states for around half a century, and led to a marked expansion of settlement and economic activity in land that had once been underpopulated, underinvested-in and managed to only a limited extent. Admittedly, different decades saw different dynamics of this process, with the 1950s-1970s witnessing rapid implementation of the infrastructural projects capable of causing later expansions of settlement and agricultural colonization in many regions. In contrast, the 1980s brought a departure from regional projects in favor of stimulation of crisis-hit economies, somewhat irrespective of consequences at regional level. This



Figure 2. A schematic representation of spatial structure of Central America from the second half of the 20th century  
Source: own elaboration

gave way in the 1990s to new concepts seeking to further regional development on the back of globalization. This denoted a major reduction in the role of the state *per se* in initiating change; given that regional economies were now opened up to grand-scale investments – mainly in mining and agriculture – on the part of major transnationals and concerns of global reach.

To sum up, in the early 21st century, regional investment and processes creating economic nodes and networks of linkages have been first and foremost subordinated to the following phenomena:

- an informal process by which land becomes occupied, in both rural and urban areas;
- a growing role for forced eviction of core inhabitants from their land (in rural areas), and also from their building plots in cities (especially those located in marginal areas);
- a growing role for global phenomena and economic or political processes when it comes to the organization of space even regionally and locally;
- a growing role for a speculative financial sector when it comes to the taking on and managing of sites likely to play host to future development.

From among the many plans and projects for regional development and spatial organization that were devised and implemented between the 1970s and late 1990s in Latin America, it is possible to identify three main sectors constituting planning priorities, i.e., transport, industry, and agricultural colonization. In each case, the impact of implementation work was to extend the settlement network and economic management into new areas that had only been developed to a limited degree before.

Visions and strategies for the incorporation of peripheral regions into the system of the national economy thus took shape, with new roadbuilding intended to allow for penetration into potentially resource-rich areas going unexploited on account of there being no way to transfer them out to their customers or recipients. Roads were also to pave the way for new investment in industry, and expansion of the settlement network. For example, the first stage in the building of the new Brazilian capital Brasilia was only made possible by an air bridge linking the new location with the coast, from which the building materials came. This was such a high-cost undertaking that it could not be maintained for long. Therefore, it was the completion of the road leading from Rio de Janeiro to Brasilia that made completion of the new development possible, and above all the movement of waves of migrants from the coast into the interior. A still-greater influence on the colonization of this region came with the giving over for use of a road linking Brasilia with Belem (the port at the mouth of the Amazon by the Atlantic Ocean). This was called the *Rodovia Belém-Brasília*. In 1974, that road gained a hard surface, making it the most important east-west transport route in Brazil – called the *Rodovia Belem-Brasilia*, used by thousands of new settlers transferring into the interior every year.

The issue of the locating of industry, especially in the context of the founding of industrial parks, was also a factor modifying spatial management models. Latin American states in general, and Mexico, Colombia, Venezuela and Brazil in particular, brought in the concept of poles of growth as developed by French economist François Perroux in the 1960s (eds Czerny & Kohlhepp 1996; Lira Cossio 2003). This entailed the founding of centers of the manufacturing and mining industries in a country's interior, with



Figure 3. South America - nodes and networks in the 21st century  
Source: own elaboration

a view to the labor market being stimulated, and processes of economic development generated. The best-known examples of such growth poles, made subject to wide-ranging analysis in the literature, relate to an industrial and mining complex in Venezuela at Ciudad Guayana–Cerro Bolívar. While it is true that this kind of strategy did not gain wide application, in such places as these where it was used, the poles of growth established were indeed in a position to supply positive results for their regions (Czerny 1976).

The second half of the 20th century was a period that brought the pursuit of major agricultural colonization projects, in particular – but not exclusively – in Brazil. The term *frente pionero* came to symbolize this new colonization process involving land that had not previously been developed much in terms of its agriculture. It thus denoted migration by farmers or potential farmers from areas already managed agriculturally but in which free land was lacking. Processes of the occupation and colonization of the Tropics were pushed through by the governments of several

Latin American states, and they did bring about increases in the areas of land devoted to growing crops, and raising livestock, for export purposes. The Brazilian policy of this kind saw a settlement network established in both Amazonia and on the edges of the Pantanal wetland. In Mexico, in turn, the process concerned land in river valleys and lowlands occupied by farmers originating in overpopulated upland areas. An in Paraguay, agricultural colonization took place in land initially overgrown with tropical forest (George 1991) (Desarrollo regional ..., Máttar & Riffo Pérez 2015).

A final important factor in the change affecting spatial organization in Latin America involved the development of tourist centers. Each country pursued its own kind of strategy in this regard. In the case of Mexico, large centers were built by both the Caribbean and the Pacific. Cancún, on which the building work began in the mid-1970s, it gave origin of new space in Mexico devoted to tourism, while Costa Rica set about developing eco-

tourism, which also required the installation of a special road and accommodation infrastructure, and so on.

The second half of the 20th century thus brought a huge transformation in the way space in Latin America was organized and managed. It opened up a hitherto-uncrossed frontier within the tropical forests, in the high mountains and in the desert areas. And in fact, in all of these areas the exploitation of natural resources is of an intensive nature and is not always to the benefit of local people, or indeed more traditional forms of management and settlement. On the other hand, this change marked a shift away from the previously dominant model of spatial organization inherited from colonial times, in favor of a spillover of many forms of management across the whole region. In fact, much influence on the overcoming of ecological barriers to spatial expansion was exerted by activity of an informal or even illegal nature (the production of narcotics, illegal gold mining, failure to heed environmental protection standards by global corporations in the extractive industries, and so on).

### Nodes and networks in the 21st century – in place of closing remarks

In the 21st century, Latin America's economic space entered into a period of very dynamic change with projects altering it ever more markedly (eds Czerny & Tapia Quevedo 2011). Recalling the title of this article, we should seek to define today's nodes – and the network linkages between them – capable of shaping political, economic, and environmental relations in the region. The general features of this configuration are as presented in Fig. 4.

- The dominants here are the main nodes, i.e., cities of (at least) several million people each, of which several (like Sao Paulo, Buenos Aires, and Mexico City) now constitute genuine centers of the global economy. The influence exerted on the wider region is mainly mediated via political and economic decision-making relating to the distribution of new investment at state level.
- Developing alongside the large metropolises (dynamically, and sometimes even more rapidly) are regional metropolises capable of attracting investment and immigrants from rural areas and neighboring countries. These movements lead to increases in population density in rural areas in the immediate vicinity of cities, and in those cities themselves. The network of towns and cities becomes steadily more hierarchical, with the pyramidal configurations taking shape being typical for more-developed economies.
- There are extensive areas predicated upon the exploitation of mineral raw materials, given that this activity changes the face and landscape of whole regions. In this case, the main investors are global firms.
- There are extensive areas becoming devoted to tourism and recreation, and attracting increasing numbers of tourists domestically, as well as from beyond Latin America. In the last decade, increased GDP in most Latin American countries has been ensuring the rise of a middle class, with such people served by new centers of rest and recreation on the coast and in the environs of large cities.

- Ever-larger areas of land are being taken by the export-oriented cultivation of crops of global significance (soybeans, flowers and fruit (like pineapples, melons, mangoes and grapes), as well as vegetables (tomatoes, pumpkins, and artichokes). The growing of traditional crops like bananas, coffee, and cocoa is also expanding.
- There is an expansion of new investment into the region's interior and particularly into formerly peripheral areas. This reflects the ever-greater interest in Latin America's resources that global concerns are showing. The demand for new (agricultural and mineral) resources is the cause of many thus far-unresolved political and social conflicts of a state v region, global capital v local capital and national interest v political interest nature. *In extremis*, the vast new mining developments taking place in Peru, Ecuador, Brazil, Chile and so on take on the appearance of moonscapes, in which ecosystems are eradicated, waters polluted and soils contaminated.

The processes by which models for the spatial management of given regions take shape are thus characterized as follows:

1. A linear model is being transformed into a nodal/linear model, with the nodes taking the form of economic mini-regions (not merely urban centers as such) which are strongly linked in with the global economy.
2. A model of islands of development as regards peripheral regions, which was inherited from colonial times, is giving way to a nodal/linear model, also as a result of centrifugal forces and the clear dynamic characterizing economic growth in the Latin American states since the beginning of the 21<sup>st</sup> century.
3. Conflicts are arising in regard to the lands constituting a key resource underpinning economic development and the spread of Latin American products on global markets.
4. There is an expansion of economic activity into areas formally enjoying protection and/or especially prone to pressure from the outside (for example because they are inhabited by native peoples). This is causing areas of this kind to shrink, while also promoting polarization in the economy, with the regions that are already strongest increasing their potential greatly, as the regions lagging behind grow still-weaker.

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