

Intermediate cities and possible functional urban areas in Planning Region 7 of Rio Grande do Sul - Brazil

ABSTRACT

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This text addresses the methodological and analytical potential of the intermediate city and functional urban areas (FUAs) concepts for the analysis and understanding of the urban network development and territorial development dynamics, in regional contexts. The concepts of intermediate cities and functional urban areas and their connections are reviewed in the analysis of territorial dynamics on a regional scale. Based on secondary data from IBGE (2010), e-MEC (2020), INEP (2017), and Municipal Bus Stations (2020), and an exploratory study in Functional Planning Region 7 of Rio Grande do Sul, the existence of possible functional urban areas in the regional territory is identified and analyzed, and an interpretation is provided about the spatial configuration and commuting flows for work and study purposes between cities in the region. The secondary data on the flows show the centrality of urban economy and the leading role of the cities of Ijuí, Santa Rosa, and Santo Ângelo in the regional urban network, evidencing an initial process of constitution of FUAs in the region.

KEYWORDS: Functional Urban Areas. Intermediate City. Commuting Flows. Functional Planning Region 7. Territorial Development.

1 INTRODUCTION

In the field of studies on regional planning and development, the idea of polycentrism has been praised for the potential it can play in territorial analysis and in the planning of regions, aiming at better complementarity and articulation between cities and greater territorial cohesion of regional and national spaces.

The morphological and functional characteristics of the polycentric urban network are related to the dynamics of the territorial division of labor existing in the respective geographical spaces, in their various spatial scales. One of the components of the polycentric territorial structure are the functional urban areas (FUAs), made up of cities that have greater centrality and economic dynamism, accessibility, and a leading role in the dynamics of territorial development, attracting commuting flows from other cities and rural areas located in their immediate surroundings or even in their region of influence.

In regional spaces, remarkably in the scales of subnational or even microregional spaces, such as the functional planning regions of Rio Grande do Sul, the intermediate cities have a potential leading role in regional urban networks and a structuring role in FUAs in regional territories. Medium-sized cities are regional centers that centralize the provision of different public and private services, which attract commuting flows for work and study purposes of the regional population, and, due to their urban economic dynamics, polarize their regions of influence, in addition to mediating in the territory both economic flows from smaller cities and surrounding rural areas as well as those from metropolitan areas. Because of this condition and role, such cities are essential for the organization and functioning of urban networks and the structuring of polycentric territories.

In this article, the existence of functional urban areas (FUAs) in the territory of the Functional Planning Region 7 (RFP7), established by the State Government of Rio Grande Sul by integrating the Coredes (Regional Development Councils) of Missões, Noroeste Colonial, Fronteira Noroeste, and Celeiro for territorial planning purposes, is analyzed. Based on the analysis of microdata on commuting flows and demographic data from IBGE (2010), data on higher education institutions from e-MEC (2020) and INEP (2017), and data on routes and schedules of intercity transportation from municipal bus stations (2020), the centrality and the organizational role through the medium-sized cities of Ijuí, Santa Rosa, and Santo Ângelo of possible FUAs in this regional territory were observed.

This article is structured in three topics. First, the concepts of polycentrism, intermediate cities, and FUAs are briefly presented. In the second part, a brief economic, demographic and socio-spatial characterization of the territory of the RFP7 is carried out. Finally, the spatial configuration and intensity of commuting flows for work and study purposes in the region are analyzed, as well as the centrality of the medium-sized cities of Ijuí, Santa Rosa, and Santo Ângelo and the possible FUAs that lead the regional territory in the context of economic dynamics and the current regional development process.

2 POLYCENTRISM, INTERMEDIATE CITIES, AND FUNCTIONAL URBAN AREAS (FUAS): CONCEPTUAL TOOLS FOR THE ANALYSIS OF URBAN AND REGIONAL DEVELOPMENT

The concepts or ideas of polycentrism, intermediate cities, and functional urban areas are important analytical and operational tools for understanding urban and regional development processes, as well as for the formulation and improvement of public planning and regional development policies aimed at promoting territorial cohesion, especially in national and regional spheres.

It is possible to say that polycentrism has been considered in two perspectives and in two spatial scales. At national or supranational scale, it has been approached and used in the context of hierarchical urban systems and networks as an alternative to the processes of macrocephaly and urban structure imbalances, as seen, for example, in the European Union and in countries such as the United Kingdom or France. At metropolitan or intra-urban scale of large cities, polycentrism, particularly since the post-war period, has been adopted as a way of solving the main housing, circulation, and spatial integration problems (DOMINGUES, 2008).

At regional scale, functional polycentrism has been considered the system of organization of space, through urban networks, whose centrality occur in different cities, which have different functions and specializations promoting urban networks with increasing levels of interdependence, mobility, complementarity, and connectivity between cities and between cities and their regions (DEMATTEIS, 1991).

However, Nunes, Mota and Campos (2012) point out that the polycentrism approach “should not be dissociated from criteria of spatial organization of territories, i.e., from the different dimensions of spaces in terms of area, population and employment density, mobility flows, etc. and the fact that the growth of the regional economy is not comparable, in different spatial structures and organizations.” Hence the importance of considering the conditions, particularities, and the potential of each territory.

According to this conception of polycentrism — of a polycentric urban system or network, more balanced in the territory, notably at regional scale —, intermediate cities play a crucial role due to their condition and function in the context of different regions. The definition of medium-sized city is still “under construction” in the field of Social Sciences, with different understandings on how to define it.

As a general rule, it is possible to identify at least two main meanings that have prevailed in the debate about medium-sized cities. There is an idea (to some extent still hegemonic) that relates this definition to the size of the city, classifying as medium-sized cities those with a population between 100 and 500 thousand inhabitants, according to the definition used by IBGE, and that, in such condition, have a hierarchical position among small cities and large cities and metropolises.

The other idea, in addition to considering the demographic dimension as a relevant variable — but without establishing a minimum quantitative parameter —, also considers the urban functions that the city has and performs regionally and through which it relates and interacts with its region and participates in the urban

network. We consider this second idea the most suitable for understanding urban and regional dynamics in Brazil, in general, and in Rio Grande do Sul, in particular.

Thus, we understand that the medium-sized cities, in addition to having noteworthy demographic contingent, in the regional context, have economic concentration and centralization and a consolidated function of economic intermediation and public services, and of diverse flows between their hinterland consisting of smaller cities and rural areas and the metropolis. Additionally, it is necessary to consider the context and regional dynamics regarding the levels of modernization and integration of economic activities, the structure and scope of the communication, transport and logistics systems, and the spatial reconfiguration resulting from the productive restructuring, which in turn redefine industry, commerce and services, and the functions and urban centrality of medium-sized cities (SPOSITO, 2007; SANTOS, SILVEIRA, 2001; OLIVEIRA, SOARES, 2014).

An intermediate city, in the context of the spatial relations and interactions that it promotes in the regional territory, allows to identify whether functional urban areas (FUAs) exist. FUA is a type of functional region. As such, it is a given territorial area characterized by a high frequency of economic interactions, such as commerce of goods and services and commuting for work and domestic purchase purposes performed within the region. It is characterized by the gathering of activities and its intraregional transport infrastructure, which facilitates broad mobility of people, products, and services within its borders (KARLSSON, OLSSON, 2006).

FUAs are defined as functional economic units, made up of urban centers and their respective municipalities, with high population density, as well as some other adjacent city (and their municipality) that has a high degree of economic integration with other urban centers, as measured by commuting flows for work and study purposes¹, between cities that integrate a given region and regional urban network.

FUA has become an important functional level of the urban and regional system, as the cities that constitute them have formed increasingly integrated functional regions, due to the diverse, growing and multidirectional flows of people who move in the geographical space to the labor market and to access education. This makes FUA an important tool for analyzing urban and regional trends, as it allows a better understanding of the internal dynamics of a given region through its intraregional functional relations, since, in general, statistical data are organized observing the administrative limits of territories (ANTIKAINEN, 2005).

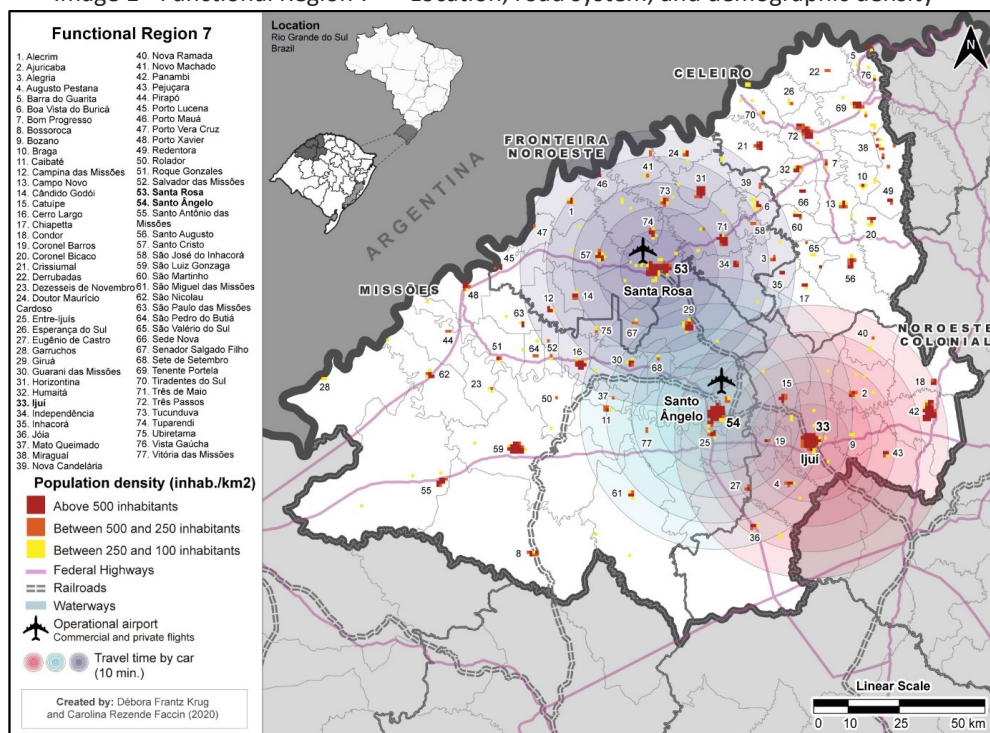
¹ In this text, for the identification of possible FUAs in the region under study, we rely on Silveira et al. (2017) defining as cutoff point the percentage of at least 10% of the labor force of the municipality that commutes for work and study purposes to another municipality. For this purpose, the volumes of commuting flows that occurred between the cities of origin and destination were analyzed and, a priori, those that had a percentage equal to or greater than 10% of the total labor force residing in the municipality of origin were selected. The limit of 10% of commuting for work and study purposes followed the same parameter defined by IBGE (2015).

3 FUNCTIONAL PLANNING REGION 7 OF RIO GRANDE DO SUL

Functional Planning Region 7 (RFP 7) is made up of the COREDEs of the Celeiro, Fronteira Noroeste, Missões, and Noroeste Colonial subregions, as seen in Image 1. In 2010, the region had a total population of 759,591 inhabitants, of which 31% live in rural areas and 69% in urban areas. Despite the prevailing urban population, considering the 77 municipalities belonging to the region, 40 have more than 50% of the population residing in rural areas.

The regional territory has low demographic density (27.63 inhab./km²), given the land structure with prevalence of small rural properties. The highest demographic density is in the main urban centers, such as Panambi, Ijuí, Santo Ângelo, and São Luiz Gonzaga (located along BR 285, in the south of the region), and in Santa Rosa, Três de Maio, Horizontina, and Três Passos, articulated by BR 472 in the center-north of the region.

Image 1 - Functional Region 7 — Location, road system, and demographic density



Created by Débora Krug and Carolina Faccin, based on IBGE (2016) and DNIT (2015).

The intermediate cities of Ijuí, Santo Ângelo, and Santa Rosa stand out in the region and in their regional urban network, with 78,915, 76,275, and 68,587 inhabitants, respectively, in 2010 (IBGE, 2010). Such cities have an important centrality in the regional territory, by means of the varied and specialized urban functions that they carry out through industrial and commercial activities and public and private services, sharing among them the polarization and promotion in the region, of the main flows of people, capitals and products that circulate in it. These three intermediate cities had, in 2019, respectively, an estimated population of 83,475, 77,593, and 73,254 inhabitants, showing moderate growth between 2010 and 2019 (IBGE, 2019).

Regarding the morphology of the regional urban network, it is possible to see, on the one hand, spatial distribution with moderate dispersion of cities in the territory, and, on the other hand, prevalence of a large number of small cities that have interactions and dependence relations with the three medium-sized cities in the region. Image 1 shows this structure of the urban network, as 57 of the 77 existing urban centers are cities with less than 5,000 inhabitants, making up the lower level of the urban network, while in the upper level the three aforementioned intermediate cities stand out, with more than 70 thousand inhabitants each.

Table 1 - Urban network structure of Functional Region 7: number of cities per range of urban population (2010)

Up to 5,000 inhab.	From 5,001 to 10,000 inhab.	From 10,001 to 20,000 inhab.	From 20,001 to 50,000 inhab.	From 50,001 to 100,000 inhab.	More than 100,001 inhab.
57	9	6	2	3	0

Created by Carolina Faccin, based on IBGE (2010).

It is worth mentioning that the municipalities have different characteristics within the RFP7. Most small municipalities and their urban centers have low-complexity economic structures and are specialized in the industrial and trade and services sectors. This means that most of them are supplied by services provided by the medium-sized cities of Ijuí, Santo Ângelo, and Santa Rosa in areas related to health, education, and wholesale and specialized retail trade. In addition, these three medium-sized cities concentrate a substantial part of regional businesses and jobs, generating important daily and weekly flows within the scope of the regional urban network that influence the regional economic and productive dynamics.

In general, the municipalities and cities that make up the region have different rates of population growth between 2000 and 2010 (Table 2). Regarding total population, the region had a negative growth rate of 0.31%, while in the state this rate was positive: 0.48%. The demographic growth was even smaller (-0.50%) in the group of other municipalities in the region, excluding the municipalities of Santa Rosa, Santo Ângelo, and Ijuí. In these cities, the growth rate of the total population was 0.53%, -0.06%, and 0.05%, respectively.

Table 2 - Functional Region 7 and municipalities of Ijuí, Santo Ângelo, and Santa Rosa: urban population, total population, rate of urbanization, and growth rate of total and urban population — 2000 and 2010

	Urban population		Total population		Rate of urbanization		Geometric population growth rate between 2000 and 2010	
	2000	2010	2000	2010	2000	2010	Urban	Total
Ijuí	67,397	71,550	78,461	78,915	85.9%	90.7%	0.60%	0.05%
Santa Rosa	55,950	60,366	65,016	68,587	86.1%	88.0%	0.76%	0.53%
Santo Ângelo	64,900	71,804	76,745	76,275	84.6%	94.1%	1.01%	0.06%
Other municipalities	302,454	322,370	563,706	535,814	53.7%	60.2%	0.63%	0.50%
Functional Region 7	490,701	526,090	783,928	759,591	62.6%	69.3%	0.69%	0.31%
Rio Grande do Sul	8,317,984	9,100,291	10,187,798	10,693,929	81.6%	85.1%	0.90%	0.48%

Created by Carolina Faccin and Tamara Silveira, based on IBGE (2010).

Examining the dynamics of the growth rate of the urban population, it is possible to see that the rates are positive, although, with the exception of the city of Santo Ângelo (with 1.01%), the other intermediate cities and other cities in the region have a growth rate lower than that of the urban population of Rio Grande do Sul. The data show that this negative growth rate in the regional population is possibly happening due to the decrease in the rural population of the municipalities in the region.

The data in Table 2 reveal that, in 2000, Ijuí was the municipality in the region with the largest number of inhabitants and with the largest urban population. In 2010, while the municipality of Ijuí remains the most populous, the city of Santo Ângelo is then the most populous urban center. This is a consequence of the growth rate of the urban population in 10 years and the urbanization rate of Santo Ângelo, which are, respectively, 1.01% and 94.1%, exceeding the rates presented by the RFP7 and the state. It is also possible to see that the city of Santa Rosa holds the second position in relation to the growth rate of urban population between 2000 and 2010, reaching 0.76%, and that it has a small increase in the urbanization rate — from 86.1 to 88%. The city of Ijuí has a higher rate of urbanization in 2010 compared to Santa Rosa, but has a lower rate of growth of urban population compared to the other cities in the region (Table 2).

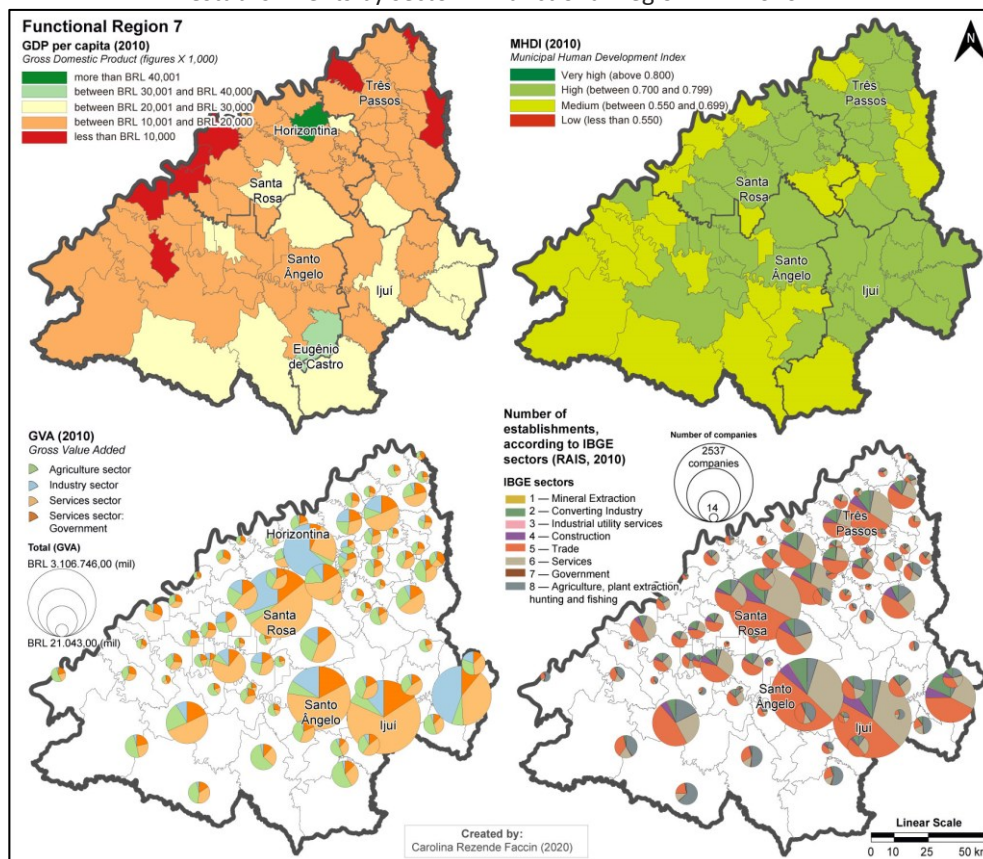
In any case, it is possible to see that the municipalities of these three intermediate cities in the region have higher urbanization rates in 2010 than those seen in the region as a whole and in the state. This intense urbanization process occurs in a territory whose regional economy is characterized by Silva Neto (2015, p. 107) by the prevailing practice of “family farming, but much more dependent on the production of grains (soy) than the other regions of the state. Such a peculiarity makes family farming in that region much less intensive” regarding, for example,

the implementation of labor or productive diversification, which consequently has caused the impoverishment of most farmers in that territory.

The regional economy is based on agricultural grain production, notably soy, corn, and wheat. Additionally, livestock also stands out, through the production of milk and poultry and pig farming. Primary production takes place in a land structure characterized by the prevalence of small family farms with a high level of mechanization and technology. The region accounts for 13.3% of the state's cereal production, 12.7% of the state's soybean production, and 23.3% of pig farming. Regarding secondary activities, two segments of the manufacturing industry stand out: grain processing and the manufacture of food products and agricultural machinery and implements, whose industrial plants are mainly concentrated in the urban axis of Horizontina, Santa Rosa, Ijuí, and Panambi (SEPLAN, 2015).

Image 2 presents the data for four variables relevant to the analysis of the dynamics of regional development. Namely: Gross Domestic Product (GDP) per capita; Municipal Human Development Index (MHDI); Gross Value Added (GVA) by sector, and the number of establishments according to IBGE sectors for the municipalities in the region.

Image 2 - GDP per capita, HDI, GVA by sector of municipalities and number of establishments by sector — Functional Region 7 — 2010



Created by Carolina Faccin, based on IBGE (2010), PNUD (2010), and RAIS (2010).

Regarding the GDP per capita of the municipalities in the region, it is possible to see the intra-regional inequality in relation to production and income generated by the municipalities. Among the municipalities with the highest GDPs per capita in 2010, there are Horizontina (BRL 48,657.00), Eugênio de Castro (BRL 32,861.00),

and Pejuçara (BRL 29,881.00). Among the municipalities with the lowest GDPs per capita, there are Redentora (BRL 6,698.00), Barra do Guarita (BRL 7,366.00), and Dezesseis de Novembro (BRL 8,039.00) (IBGE, 2010). The municipality of Horizontina has productive dynamics strongly related to the industrial sector, with a metalworking agro-industrial complex. In the municipalities of Eugênio de Castro and Pejuçara, a concentrated land structure prevails, with the development of soybean culture, which in turn influences the generation of wealth, since the two municipalities have a population below 5,000 inhabitants. And Redentora, Barra do Guarita, and Dezesseis de Novembro are characterized by some similarities, such as being in a border region with Santa Catarina (Barra do Guarita and Redentora) and Argentina (Dezesseis de Novembro), which make up the coastal region of Rio Uruguay, with weaknesses in relation to the development of its (marginal and stagnant) economic activities, infrastructure, and job and income generation.

Examining the sectoral and total GVA structure for each municipality, also shown in Image 2, it is possible to see that the municipalities with the highest total GVA values are those with the greatest economic and urban dynamism, among which Ijuí, Santa Rosa, and Santo Ângelo stand out. In relation to the service sector, it is possible to see the significant importance of this sector in most municipalities. This sector represents more than 50% of the GVA composition in 55 of the 77 municipalities in the region. The municipalities of Ijuí (82% of GVA belonging to the service sector), Cerro Largo (80.5%), Porto Xavier (80%), and Santo Ângelo (77%) stand out. As for the industrial sector, two municipalities stand out with high participation of industrial GVA: Horizontina, whose percentage of industrial GVA is 64%, and Panambi, with 45%. As for Agricultural GVA, it is seen that in 36 of the 77 municipalities in the region, notably in small municipalities, agricultural activities account for 40%–60% of the municipal GVA (IBGE, 2010).

It is also possible to see an uneven distribution of the number of business establishments by economic sectors classified by IBGE (2010) in the regional territory. Image 2 shows that the intermediate cities of Santo Ângelo, Santa Rosa, and Ijuí have dynamics concentrated in commercial activities and services. It should be noted that such municipalities, as previously mentioned, have greater structure and urban complexity regarding the activities of health and education services, and other services provided by public agencies. In these aspects, these municipalities are characterized by being regional centers, centralizing such commercial and service provision activities with their municipalities of influence, attracting population flows in this context and, consequently, reflecting on the attraction and generation of regional income.

As for the social dimension of regional development through the MHDI, the vast majority of the municipalities are classified as high or medium in the human development index. In the high development range, the municipalities of Horizontina (0.783), Ijuí (0.781), Santo Ângelo (0.772), and Santa Rosa (0.769) stand out. The municipality with the lowest MHDI figure (0.631) is Redentora (Image 2) (PNUD, 2010).

In general, it is possible to see that the economy and the regional development dynamics have an intense relationship with agro-industrial, industrial, and service activities related to the soy and wheat production chains, and the pork production. Such productive dynamics structures the territorial division of labor in the region, organizing economic relations and capital flows, products, information, and people

between rural areas and cities, and between small towns and intermediate cities in the region, as well as establishing the pace and spatial scope of trade and regional labor relations.

4 INTERMEDIATE CITIES AND REGION: POSSIBLE FUAS OF IJUÍ, SANTA ROSA, AND SANTO ÂNGELO

The analysis that we made in the territory of the RPF7 used as a methodological basis the studies on polycentrism and regional development carried out by Pillet et al (2010) in Spain, by Ferrão (2012) in Portugal, and the previous study that we carried out in the Vales region in Rio Grande do Sul, aiming at verifying the constitution of FUAs in intermediate cities that have significant centrality and promote intense spatial relations with their regions of influence through the commuting flows for work and study purposes that they attract within the territory where they are located (SILVEIRA et al, 2017).

In order to confirm the existence of possible FUAs in the regional territory, we considered as a cutoff point the commuting flows for work and study purposes between municipalities that reached at least the percentage of 10% of the labor force of the original municipality moving toward cities of at least 15 thousand inhabitants.

The analysis of data on commuting flows for work and study purposes within this cutoff point, shown in Image 3, allows us to see in the RFP7 the possible existence of FUAs made up of the intermediate cities of Santa Rosa, Santo Ângelo, and Ijuí. The commuting flows for work and study purposes in the regional territory that are within the established cutoff point were those originating in the municipalities of Bozano (9.97%) and Augusto Pestana (9.31%) having as destination the city of Ijuí; flows originating in the municipality of Entre-Ijuís (15.87%) move toward Santo Ângelo; and flows from the municipality of Tuparendi (17.54%) move toward Santa Rosa (IBGE, 2010).

Table 3 - Percentage of commuting flows for work and study purposes in relation to the labor force — 2010

Municipalities	Labor Force	Tot. Pop.	Urb. Pop.	Ijuí	Santo Ângelo	Santa Rosa
Bozano	1,695	2,200	629	9.97%		
Augusto Pestana	4,330	7,096	3,657	9.31%		
Entre-Ijuís	4,853	8,938	4,893		15.87%	
Tuparendi	4,583	8,557	5,294			17.54%

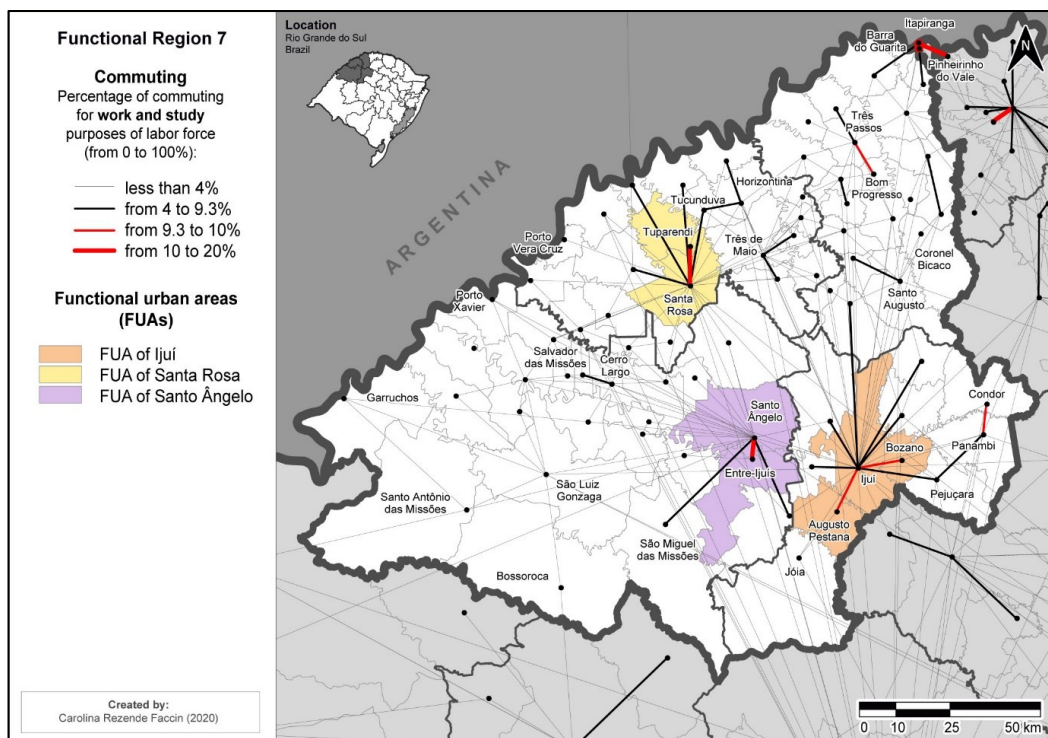
Created by Nicolas Giacometti, based on IBGE (2010).

In order to better represent spatially the commuting flows in the region, Image 3 shows the flows for work and study purposes, between cities in the region, based on the IBGE (2010) microdata, shown in Table 3.

In Image 3, it is possible to see the initial configuration of three possible FUAs in the territory of the RFP7. The FUA of Santa Rosa has as its main urban nucleus the city of Santa Rosa, and the city of Tuparendi as a secondary nucleus. The FUA of Santo Ângelo has Santo Ângelo as its main nucleus, and the city of Entre-Ijuís as its secondary nucleus. In these two FUAs, the commuting flows between the

secondary urban centers and the respective medium-sized cities are significant and above 15% of the labor force; however, in both FUAs, the most relevant commuting flows (over 10%) are concentrated only between a pair of cities, which brings limitations to the actual existence of the respective FUAs. In turn, the FUA of Ijuí has the intermediate city of Ijuí as its main nucleus, and as secondary urban centers the cities of Augusto Pestana and Bozano. In both, the commuting flows, although relevant, do not reach the minimum cutoff parameter (10%).

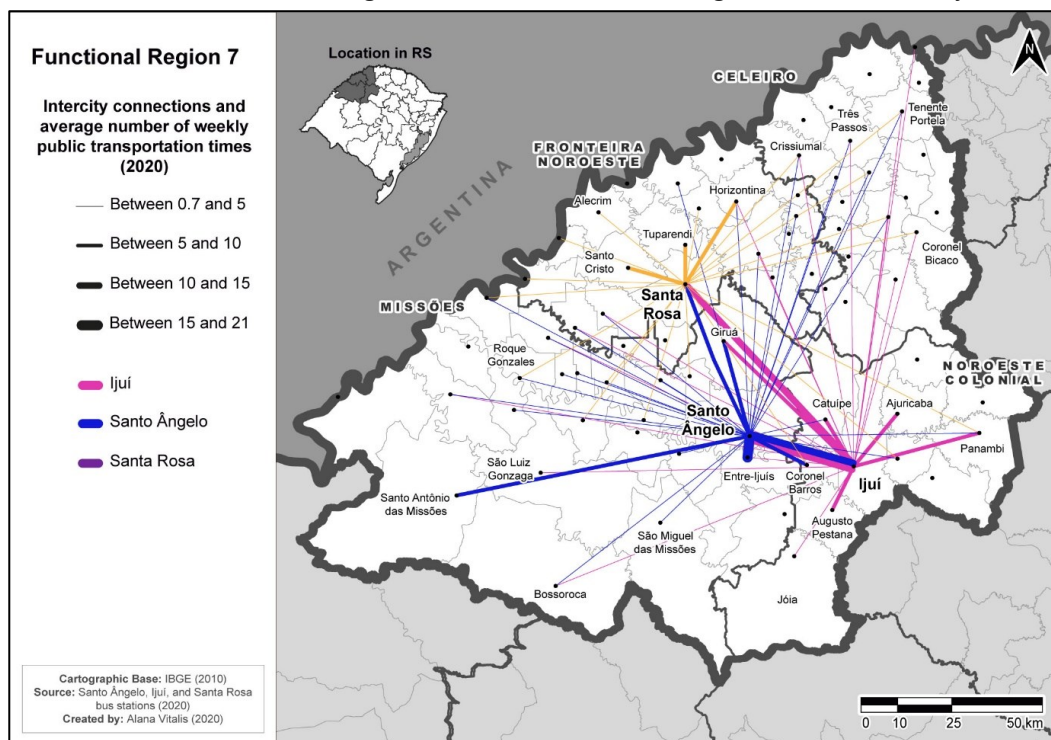
Image 3 - Percentage of commuting flows for work and study purposes in relation to the labor force and Functional Urban Areas (FUAs) – 2010



Created by Carolina Faccin, based on IBGE (2010).

In addition to the data on commuting flows for work and study purposes (collected by the IBGE), data on current passenger flows by intercity public transportation, within the RFP7, were also taken into account. The bus lines existing between the municipalities and the average number of daily routes available weekly, on Mondays, Fridays and Saturdays, can help update the data on commuting flows for work and study purposes, and can help the identification of potential FUAs in the region. In Image 4, it is possible to see that the intermediate city of Santa Rosa has more intense connections with the cities of Giruá (12.66), Três de Maio (8.33), Tuparendi (8.00), Santo Cristo (7.66), and Horizontina (6.00), confirming the expansion of relations between this intermediate city and other cities in the region, thus reconfiguring the area of influence and, respectively, its functional urban area.

Image 4 - Number of routes/times of intercity buses between the municipalities of Functional Region 7 and the cities of Santo Ângelo, Santa Rosa, and Ijuí

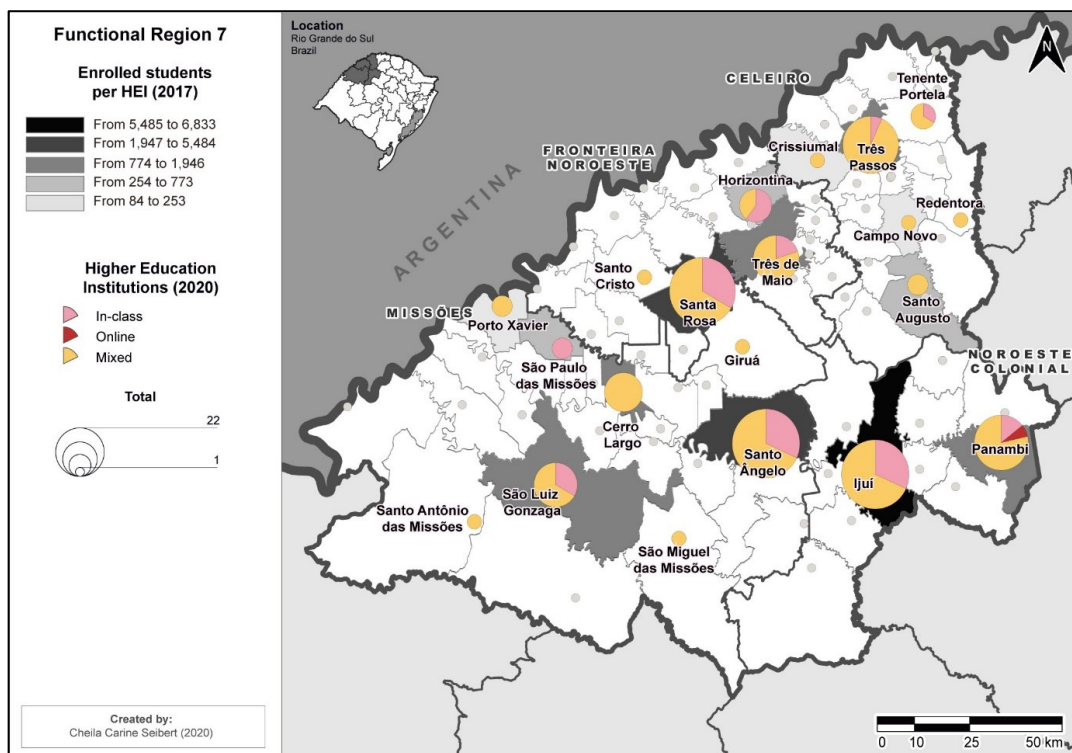


Source: created by Alana Vitalis, based on schedules of the Santo Ângelo, Ijuí, and Santa Rosa bus stations (2020).

It is also possible to see that the intermediate city of Santo Ângelo has more intense connections with Entre-Ijuís (17), with Giruá (9.33), and with Santo Antônio das Missões (5.66), also showing moderate expansion of its functional urban area in the region. Finally, the intermediate city of Ijuí establishes more significant connections with the cities of Catuípe (9), Ajuricaba (8), Giruá (8.33), and Panambi (6), thus showing an expansion of its area of influence and its functional urban area. The data in Image 4 also show the existence of intense — albeit distinct — connection flows between the three intermediate cities in the region. Santa Rosa has 11.66 connections with Santo Ângelo and 11.33 with Ijuí. Santo Ângelo has 12 connections with Ijuí and 9 with Santa Rosa, while Ijuí has 14.33 with Santa Rosa and 13.66 with Santo Ângelo. Such public transportation connections between these main cities in the region prove the existence of important commuting flows for work purposes, brought by the functional articulation between their urban economies, resulting from the territorial division of labor existing in the region and in the regional urban network, both based mainly on agro-industrial, industrial, and services activities related to the soy, wheat, and meat production chains.

Also, in order to complement the analysis, the data shown in Image 5, referring to the territorial distribution of higher education institutions and the number of students in the region, reveal that the cities of Ijuí, Santo Ângelo, and Santa Rosa stand out for having the greatest number of higher education institutions (HEIs), as well as the greatest number of enrolled students, which reinforces the centrality of these cities in the regional provision of higher education.

Image 5 - Number of higher education institutions and students enrolled by municipality — 2017 and 2020



Created by Cheila Carine Seibert, based on e-MEC (2020) and INEP (2017).

Regarding the number of HEIs, it is possible to see that the three intermediate cities have relatively similar values: Ijuí and Santo Ângelo have 22 HEIs each, and Santa Rosa has 21 HEIs (e-MEC, 2020). However, examining data referring to the number of students enrolled in HEIs by municipality, it is possible to see that Ijuí stands out, with 6,833 students (26% of the total students in the region), followed by Santo Ângelo, with 5,484 students (21%) and Santa Rosa, with 4,333 (16%). These three cities concentrate 63% of the total number of students enrolled in HEIs in the region (INEP, 2017). The data also show that an important portion of these students commute to the HEIs located in these intermediate cities, given their spatial proximity to the other cities in the region, as well as the existing road connectivity between them. The previous data on the number of times and routes of intercity passenger transportation also reinforce this evidence and complement the analysis, indicating the existence of possible FUAs that are in the process of being constituted in the region.

5 FINAL CONSIDERATIONS

This article intended to show the importance of polycentrism and medium-sized cities for regional studies. The perspective of a polycentric territorial organization enhances the existence of an urban network balanced with the existence of cities of different sizes, levels of centrality, economic functions, and territorial management skills that are articulated and related to each other.

In the Functional Planning Region 7, located in the northwest of the state of Rio Grande do Sul, there is a regional urban network that has a relatively balanced

urban structure and polycentric organization, with the intermediate cities of Ijuí, Santo Ângelo, and Santa Rosa, which are spatially well distributed in the regional territory. Such cities actively participate in the territorial division of regional labor, with relevant levels of centrality through their urban economies. These cities intermediate flows from their regions of influence and from the larger cities located in other regions and the metropolitan region of Porto Alegre. They present industrial activities and services that meet the demands of the soy, wheat, and meat production chains, in addition to concentrating opportunities for urban employment and higher education provision in the region, attracting commuting flows for work and study purposes from the municipalities located in their respective areas of influence.

The research results show that there is evidence that in the region there are possible FUAs, centralized and controlled by the respective three aforementioned intermediate cities. Although the IBGE microdata (2010) relating to commuting flows for work and study purposes, given the minimum parameters initially established in the methodology employed, do not allow us to affirm the existence of functional urban areas, the use of current and complementary data (as the flows of intercity passenger transportation and those related to the distribution of HEIs and higher education students in the region) show that the FUAs of the intermediate cities of Ijuí, Santo Ângelo, and Santa Rosa, if they are not yet fully affirmed and consolidated, at least they are in the process of being constituted in the region.

In any case, confirmation of such evidence will only be possible with the continuity of our studies on the analysis of spatial relations promoted by intermediate cities in the regional territory context, by means of new and updated data on demographic dynamics, commuting for work and study purposes, the territorial management exercised by these cities, and the recent dynamics of operation of the regional urban network, in its relationship with the dynamics of urban and regional development in the region.

Cidades intermédias e possíveis áreas urbanas funcionais na Região de Planejamento VII do Rio Grande do Sul - Brasil

RESUMO

O trabalho aborda o potencial metodológico e analítico dos conceitos de cidade intermédia e de áreas urbanas funcionais (FUAs) para a análise e interpretação do desenvolvimento da rede urbana e da dinâmica de desenvolvimento territorial, em contextos regionais. Revisa-se os conceitos de cidades intermédias e áreas funcionais urbanas e suas conexões na análise da dinâmica territorial na escala regional. Com base em dados secundários do IBGE (2010), e-MEC (2020), INEP (2017) e Estações Rodoviárias Municipais (2020), e de estudo exploratório na região funcional de planejamento 07 do Rio Grande do Sul, identifica-se e analisa-se a existência de possíveis áreas urbanas funcionais no território regional, interpretando a configuração espacial e os fluxos de deslocamento pendular para trabalho e estudo entre as cidades da região. Os dados secundários dos deslocamentos demonstram a centralidade da economia urbana e o papel de comando das cidades de Ijuí, Santa Rosa e de Santo Ângelo na rede urbana regional, evidenciando um processo inicial de constituição das FUAs na região.

PALAVRAS-CHAVE: Áreas Urbanas Funcionais. Cidade Intermédia. Deslocamentos Pendulares. Região Funcional de Planejamento VII. Desenvolvimento Territorial.

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