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Evaluation of the structure of the services sector in Brazil: a regional approach

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EVALUATION OF THE STRUCTURE OF THE SERVICES SECTOR IN BRAZIL: A REGIONAL APPROACH

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ABSTRACT: This paper studies the service sector considering the spatial and structural characteristics, and the objective is to understand and map the productive structure of the service sectors in Brazil; and analyze the relationship between the industrial and service sector. The study used data from 1995 and 2011 for municipalities, aggregated by AMC 91, referring to 4 service sectors and utilized a methodological strategies, from descriptive analysis and ESDA. You can observe a spatial pattern of distribution of services sectors in the North-South direction. The South has the largest part of the sector activity, with higher diversity and greater degree of competitiveness. Already the North axis of the country has less diversification of services. It was also possible to note that the clustering and population scale contribute to the development of the service sector as well as the correlation between industrial activity and service activity is observed.

Keywords: Service sector, regional analysis, spatial analysis, Brazil.

Theme: G_F - Location of economic activity

JEL: R12.

1. INTRODUCTION

Observing the evolution and growth of the service sector in Brazil, it is possible to point to a move towards a "service economy" following the global standard. From the 1960s to the present day, the service sector has evolves, gaining share on employment and national income, surpassing, in recent decades, the industrial sector. However, Brazil has levels of intensity in different services regionally, ie, the same pattern of development of the sector cannot be seen in all regions of the country. In the same way that regional development is not uniform throughout the country; the development of the service sector also is not.

The role of the service sector is closely associated with their agglomerative features and its location in space. The mainly urban location and its ability to extend and strengthen the impact of the most dynamic sectors of the economy allow the service sector potentiate the impact on growth poles (McKee, 1988; KON, 2004). The complexity and diversity of the service sector can be an encouraging factor clustering, especially for more sophisticated services; even the routine and decentralized services tend to be controlled and managed centrally (KON, 2004). It's necessary to link the analysis of the sector and its locational pattern with the local production and urban structure.

For Brazil, and also in the international literature, there are many papers that study the dynamics, evolution and development of the industrial sector, while the tertiary sector is underexplored, especially in Brazil. The study of this sector is important to understand the dynamics of the current economy. Therefore, a regional and temporal discussion is needed to

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detect different patterns of structure and development of the sector, considering the wide regional disparity in Brazil.

At the same time, a disaggregated study of the service sector is also required, since the sector embraces many different subsectors. The service sector is heterogeneous and needs to be treated in their disparities. The sector comprises since small restaurants with two or three employees to large financial institutions with millions of real collected per year. The disaggregation allows us to understand the process of location, developing and polarization of the various service sectors on their individual characteristics. The analysis of the disaggregated level in services sector aims to treat the sub components of large service sector with the necessary differences that heterogeneity requires.

This paper proposes a study of the service sector in Brazil, based on the years 1995 and 2011. The regional and sectoral specificities are portrayed from Annual Report of Social Information (RAIS) data for municipalities, aggregated in Compared Minimum Areas by 1991 (AMC). Four services sectors were selected, classified by the National Classification of Economic Activities (CNAE) - 2-digit. These sectors were selected because they represent four very different sectors, but with high representation of total income and employment in the total service sector. Additional data were also sought from the Brazilian Institute of Geography and Statistics (IBGE) and the National Plan for Transport and Logistics (PNLT).

The RAIS allows to compose a database at very disaggregated level both sectorally and regionally, making it possible for independent study of services sectors. Furthermore, it allows a fairly wide temporal composition. However, all of the tests and the subsequent conclusions drawn are limited to the formal labor market in Brazil, because the RAIS is restricted to that niche information. The years 1995-2011 cover a period where the process of development of both traditional services as well advanced modern services is advanced, allowing the analysis of the sector in more mature and dynamic environment.

This paper aims to study service sectors considering the spatial and structural characteristics. Therefore, it is possible to divide the central goal of two parts: a) understand and map the productive structure of the service sectors in Brazil, discussing the agglomerative constraints of its location, based on the constructed hierarchy; b) analyzing the intrinsic relationship between the industrial and services sector.

The methodological strategy involves the construction of indicators that describe the productive structure of the four service sectors, as well as the spatial configuration. This set of indicators would have a more accurate view of the structure of the service sector in space and treat explicitly the service sector and its relations with the regional development process. These analyzes will be made from descriptive analysis and exploratory spatial data analysis (ESDA).

The contributions from this work to the literature of the area is: first, the study of service at very disaggregated sector and regional level; second, the methodology employed despite already frequently applied to understand the industry dynamics in several economies, the service sector is still incipient.

To this end, this paper is divided in 4 parts, besides this introduction and closing remarks: section 2 presents the theoretical framework; section 3 describes the database; section 4 describes the proposed evaluation methodology; section 5 presents the results obtained.

2. LOCATION OF SERVICE SECTOR IN SPACE

Just as every kind of enterprise, service companies keep concerns to their location in space. The accessibility and minimal market determine the pattern of occupation. The nature of services suggests that their location is taken in urban centers or places that favor the minimum

volume of demand. The diverse nature of services determine a hierarchy, according to the functions performed by firms, ie greater or lesser range of the population (Ribeiro et al., 2009).

The development process connected to the industry was very related to the whole process of urbanization. Industrial development generates a population concentration, which, in turn, creates economies of agglomeration that attracts other activities, reinforcing the spatial hierarchy. The ancestry of central places, based on the formulations of Christaller (1966), can be seen in the current phase of capitalism as a multiple hierarchy, with very particular characteristics of the weight of services in the regional distribution of world development. The service infrastructure and information technology make significant role in spatial economic relations, so to determine the position of the central places in the urban hierarchy.

The theory of central places of Christaller (1966) permeates the idea of the spatial organization of services sectors, helping to understand the size, distribution and number of centers of an urban hierarchy. The power of centralization of services has a fundamental role in the hierarchy of urban centers, given the central place is one whose urban core is the organizing element of the supply curve and the demand for goods in space. Earning urban density, a center now represents a place of collective consumption. Thus, this intensifies the flow of people and goods to him. The first is the flow of people from places smaller urban scale, looking for non-exportable activities. And the flow of goods increases just for supply the flow of people. The locations of smaller scale that depends on the interaction with the central place, are in its operating range, ie, forming areas of influence around this central place.

Perroux (1997) contributes to developing the theories of polarization with the idea of the region. He defines space for its "economic" nature and strength position, based on the idea of concentrating resources at discrete points in space, analyzing urban centers of independent systems. Perroux (1997) formulates the center of the region, or dominated area, is the pole of growth, starting from the idea of economic space classified into three: a) homogeneous space; b) space defined as a field of forces (heterogeneous); and c) flat space. Thus, the urban hierarchy is replicated in space as a process of economic domination between regions, which results in the existence of poles and dominated areas.

The spatial competition is an issue that is central to this discussion. The principle of agglomeration Hotteling (1929) assumed that firms compete in the first time in location and then by the choice of practical prices, so admits a spatial competition. Considering the cost of transport, the market area, the density of consumers and the profit function of each firm, the author creates a model of location and competition, making a general application of the Principle of Agglomeration. The location of firms occurs at the most affordable place in order to provide lower shipping cost for consumers. Ie, this objective leads to an agglomeration of all in the central place of the market.

The theory of the location of both services and industry, originates the study of the spatial distribution of agglomerative and desagglomerativos factors. These act to concentrate or disperse economic activities. In location theory of Weber 1929 taking the industry as an analytical sector, three key location factors influencing the choice of where the project will be realized: a) cost of transport; b) forces of agglomeration; and c) deagglomerating forces. Diniz (1993) presents a view that the shipping cost is losing relative importance in industrial location, including the Brazilian economy. So theories centered on agglomerative and desagglomerativos factors are of fundamental importance to study the location.

Leme (1982) pointed out that the agglomerative factors can be understood primarily from the Lösch (1954) model, while desagglomerativos factors are best explained by the model originally developed by Von Thünen (1826).

Lösch (1954) shows that the producer has economies of scale when increase production capacity. And the central production site forms because it exists agglomeration of factors that

lead to economies of scale on there. Considering all feasible product production, what happens is an overlap of the various market areas as urban network, that is hierarchically structured from a vertex consists of a production center - the metropolis - which concentrates the advantages inherent a large local demand. So the end result, in short, is: a) hexagonal market areas around the production centers; b) networks of all goods market; c) composed of networks of market areas of various goods urban systems.

About desaglomerativos of factors, the land rent is the most importantly, pointed out by Leme (1982). Von Thünen's model is an explanation of the formation and structure of the agricultural space that takes into account this desaglomerativo factor, ie, the land rent. The model starts from the assumption that there are different rates of profit in the economic activity. Thus, sectors with higher profits pay higher land rents to use "sparse" soil. In other words, since the land is a good with inelastic supply and your property is private, the sectors compete with each other. Those who can get the most value will be allocated in concentric rings closer to downtown.

The central idea from the analysis of agglomerative and desaglomerativos factors is the ability of cities to attract and expel economic activities in accordance with their economies or diseconomies of urbanization. Since each economy has greater or lesser relevance to the city, the sum of results should be weighted according to this relevance.

Connected to this is the idea of externalities Marshall (1985). The author divides the economies derived from increased scale of production into two categories: those that depend on the overall development of the industry - "external economies" -, and those that depend on the resources of the companies, their organizations and efficiency of their government - "internal economies". The internal economies of scale refer to the technical efficiency, business efficiency, financial benefits, the discount amount and the particular synergy of research and development.

This issues is also linked to the issue of scale urban size. In the case of the service sector, often the issue is related to the existence of a minimal scale, as already pointed out by Christaller model and its central places. Henderson (1997) believes that the specialization of cities demarcates they are different sizes. According to him, the equilibrium size of the urban center would be determined by a trade-off between the marginal benefit of agglomeration economies in production and the marginal cost imposed by diseconomies of agglomeration. The size of the city depends on the degree of economies of scale in production in which it specializes, ie products with a higher degree of scale economies imply, on average, larger cities. This is the case of service sectors, as already pointed out has the unique characteristic of not necessarily be located where the service is delivered, ie concentrates its production in cities larger size and distributes for others.

Krugman (1999) summarizes the forces of agglomeration or deagglomeration or, centripetal and centrifugal forces. The centripetal forces are the three classical sources of external economies of Marshall, ie, the effects of market size, the large labor and pure external economies (spillovers). The centrifugal forces, in turn, is the immobility of factors of production such as land, natural resources and, to a lesser extent, people. This implies a deconcentration due to some activities need to be close to these factors, the land rent.

The role of dynamic externalities in the location of economic activity sectors must also be considered. Externalities proposed by Marshall-Arrow-Romer, known as MAR externalities relate to knowledge spillovers between firms in an industry. The concentration of an industry in a region facilitates the spillover of knowledge between firms, hence productivity tends to grow in this sector. Location or specialization economies, represented by such externalities imply that firms benefit from clustering with other companies in the same industry. FUJITA et al. (1999) remind us that the economies of regional specialization generate comparative

advantages in the sense that the export of goods to locations outside the regional market is crucial for inter-regional integration and feedback of the central place of growth factor.

In contrast, externalities proposed by Jacobs (1969) derive from the accumulation of knowledge and ideas associated with the historical diversity. This suggests that firms located in highly diverse areas tend to have rapid growth. These externalities are associated with economies of urbanization and involve inter-sectoral positive agglomeration effects. Jacob's externalities are urban externalities. Externalities of diversification are not simply a sum of specializations, but a product genuinely urban, generated by productive innovations induced by urban growth. Diversification, therefore, varies in direct proportion to urban economic scale.

Finally, externalities Porter (1990), like the MAR, arise from the relationship between industrial concentration and growth, but considering the local competition fosters innovation and the dissemination of information. The positive effects of the size of local markets depend on the degree of competition in these markets. Due to strategic interactions, companies have incentives to locate in the periphery, where competition is reduced. However a more central location allows them to attract more consumers. The work of Porter (1990) revisits Marshall's contribution to analyze the competitive advantages of countries based on external economies of agglomeration.

3. DATABASE

This paper uses RAIS as data source, from administrative records of the Ministry of Labour and Employment (MTE). Even with the many limitations, it shows up as best database to conduct the kind of analysis suggested here, for several reasons. First, and most importantly, the RAIS is a database which contains a large sectoral disaggregation that allows independent study of service subsectors. Second, it allows the longitudinal analysis of the formal labor market, it presents data from the 1980s until recent years. Third, the geographical disaggregation is important for understanding the regional process of the service sector.

The study collected employment, income and number of stores information. The information to the municipalities in 1995 and 2011 were collected. This period was selected by cover an important moment stability of the Brazilian economy and be a time where the process of development of both traditional services as the modern services have already become quite advanced. This allows analysis of the sector in more mature and dynamic environment.

In the first year of analysis, Brazil had 4974 municipalities distributed in 27 states. In 2011, the number of municipalities was 5565 municipalities. For variable employment, it was captured records of employees with link in December of each year, to avoid double counting this population due to possible shutdowns and readmissions of the same employee during the year. The same was done for variable income, captured by the statements of nominal income of the worker in December in the reference year. All variables were disaggregated for both municipalities and for the divisions (2-digit) of the CNAE. The legal establishments in Brazil were recorded from groups of employees. Data on population and area of the municipality were obtained from IBGE.

As already said, all information was captured at the municipal level. However, as the selected period is long, the number of municipalities varies greatly. Especially in the years of the 1990s, which saw a large number of municipalities be created through emancipation and disaggregation. The 2000s saw a slowdown in the process.

In order to aggregate all this information in a single database, it was necessary to reconcile the municipalities in order to be able to analyze the same geographical units in two years. For this, we chose to add the municipalities every year in Minimum Comparable Areas (AMCs), which are municipal aggregations that allow to consider the same territorial currencies

over time. Given the available settings AMCs, which is closest to the municipal setting of 1995, the first year of the analysis, is the AMC 1991, so this was chosen to be the aggregation of data⁴. With this, the 4974 municipalities in 1995 and 5565 in 2011 were aggregated on 4267 minimal comparable areas.

The services examined in this study are presented in Table 1. To facilitate the presentation of data, service sectors were classified according to Singelmann and Browning (1978) and Elfring (1988). This typology classifies the services into four categories: productive services, distributive services, personal services and social services. Industrial, complementary sectors in the analysis, were grouped according to Table 2.

Productive services are demanded mainly by the industrial sector. Also, they are intrinsically linked to urban scale (PEREIRA and LEMOS, 2003). Distributive services also have their most important demand in the productive sector. However, by representing auxiliary activities of the productive process and not directly involved in the production of goods, have much of their demand generated by households. Personal services, in turn, are mostly demanded by consumers. Social services have also represented preferentially demand by households, representing collective consumption and marketable services (KON, 1999; ANDRADE, 1994).

Tabela 1: Service sector, CNAE (2-digit)

Sector	Classification	CNAE	Sector Name
1	Personal services	55	Hotel and restaurant services
2	Distributive services	60	Road transportation
3	Productive services	74	Services to companies
4	Social Services	85	Health and social services

Source: CNAE.

Tabela 2: Industry classification

Sector	Classification	Description	CNAE
1	Industry	Material and electrical equipment; Electronics and other transport equipment; Computers; Machinery and equip.; Instruments; Motor vehicles; Refining and others; Chemicals and pharmaceuticals; Rubber and plastics; Food and beverages; Smoke; Textiles; Tailoring; Shoes; Wood; Pulp and paper; Graphic editing; Non-metallic minerals; Basic metallurgy; Metal products; Furniture and miscellaneous.	15; 16; 17; 18; 19; 20; 21; 22; 23; 24; 25; 26; 27; 28; 29; 30; 31; 32; 33; 34; 35; 36; 37; 40; 41; 45.

Source: CNAE.

4. METHODOLOGY

To examine the pattern of sectoral and regional concentration, the paper introduces some measures that capture the behavior of the service sector in Brazil, from 1995 to 2011. Such indicators are often used to study the development of industrial sectors. In an attempt to adapt, it is proposed to apply them to the study of the service sector.

4.1 Spatial and production structure indicators

The indicators proposed here describe the regional and sectoral configuration of the service sector. All indicators are calculated based on the 4267 AMCs and four service sectors analyzed for the years 1995 and 2011. This setting allows us to analyze the process under three perspectives: sectoral, regional and temporal.

⁴ There are only compatibility tables for the census years. So to make the aggregation from the AMC 91 has replicated the method of reconciling the IPEA, as done by Gomes (2013).

To begin to understand the dynamics of the sectors in question, the location quotient (LQ) is used. This is a simple measure of geographic concentration, introduced to detect patterns of specialization in the sector geographically. This variable measures how the location specializes in one sector relative to what would be expected if the production or employment in this sector were randomly scattered throughout the country. Ie., it is a measure of the externality of type MAR, as described in section 2 (DEKLE, 2002). The variable is defined as suggested by Hoover (1936):

$$esp_{r,s} = \frac{emp_{r,s}/emp_r}{emp_s/emp} \quad (1)$$

where $emp_{r,s}$ is employment level in sector s in region r ; emp_r is total employment in region r ; emp_s is employment level in sector s in Brazil; emp is total employment in Brazil.

LQ is the ratio of the share of employment in the sector by participation of aggregate employment. Above average values mean that the location is relatively specialized in the sector concerned, while values below the mean indicate that the locality has less employment in the sector regarding the share of total employment.

With respect to diversity, it is used, as proposed by Henderson et al. (1995), the inverse of the Herfindahl-Hirschman index of industry concentration, based on the participation of all sectors. A normalization of the variable is made by computed value at national level:

$$div_{r,s} = \frac{1/\sum_{s' \neq s}^S (emp_{r,s'} / (emp_r - emp_{r,s}))^2}{1/\sum_{s' \neq s}^S (emp_{s'} / (emp - emp_s))^2} \quad (2)$$

where S is total number of sectors.

The numerator is maximum when all sectors are the same size in the region, except the question sector. This indicator reflects the sectoral diversity of the sector s in region r . Therefore not necessarily linked negatively with the local expertise of sector s . Moreover, it represents the type of externality Jacob, because the historical diversity of urban industrial base can positively affect employment in an industry (HENDERSON et al., 1995).

The competition indicator uses the index suggested by Glaser et al. (1992), which is externalities Porter (DEKLE, 2002). It is computed as the proportion of establishments in relation to employment belonging to the same region r . It is also divided by the indicator computed at national level,

$$comp_{r,s} = \frac{nestab_{z,s}/emp_{z,s}}{nestab_s/emp_s} \quad (3)$$

where $nestab_{z,s}$ and $nestab_s$ are number of establishments of sector s in region r and in Brazil, respectively. A value greater than 1 means that this sector has more firms in relation to its size in this location than in Brazil. An interpretation of value greater than 1 is that the sector is locally more competitive than in other parts of the country. Alternatively, a value of greater than 1 may mean that companies in the sector in that area are just smaller than they are on average in Brazil. In a liberal interpretation Porter, a higher value of this measure of competition should be associated with faster growth.

In order to control for regional differences, it is important to consider the total density of employment in the region,

$$den_r = \frac{emp_r}{area_r} \quad (4)$$

where $area_z$ is area of region r . Combes (1999) proposes to include this variable in place of the local sector employment variable because it strongly believes that employment changes the interpretation of the specialization variable and leads to an overestimation of location economies. The impact of sectoral percentage of employment in total employment, holding constant the level of sectoral employment, is the inverse of the effect of total employment. Thus, it can not be interpreted as a local intrasectoral externality. The correct interpretation is obtained

if the level of sectoral employment is replaced by the level of total employment in the control variables (Combes 2000).

4.2 ESDA

The spatial configuration from these indicators will be analyzed from Exploratory Spatial Data Analysis (ESDA). It allows us to understand the spatial relationship between the variables, which helps to detect the pattern of specialization and concentration. The spatial correlation coefficients are constructed from three elements: a measure of auto covariance, a measure of variance and a weight matrix (W). The goal is to investigate local relationships of these variables in question, in order to capture grouping patterns that are seen only locally and not in relation to the entire field of analysis. Local Indicator of Spatial Association (LISA) can be calculated as follows for a standardized variable:

$$I_i = z_i \sum_{j=i}^J w_{ij} z_j \quad (5)$$

where z_i and z_j denote the values of standardized variable, w_{ij} is the element of matrix (W) for the regions i and j ; and S_0 is the sum of elements of (W).

Local Moran's I makes a decomposition of the global indicator of autocorrelation in the local contribution of each observation into four categories (High-High, Low-Low, High-Low and Low-High). The calculation considers only neighboring observation I given by the set of spatial weights matrix. The statistical inference made from the Local Moran's I is also based on the null hypothesis of spatial randomness, showing patterns of concentration and dispersion, from the sign and magnitude of the coefficient in each region.

The bivariate versions of the statistical autocorrelation LISA is also used to capture the spatial correlation between two variables, following the form:

$$I_i^{z_1 z_2} = z_{1i} W z_{2i} \quad (6)$$

where $W z_{2i}$ is spatial ligo f z_{2i} . This statistic gives an indication of the degree of positive or negative linear association between the value of a variable in a given lease I and the average of another variable in neighboring locations.

For all indicators constructed, it requires a spatial weight matrix that represents the degree of connection between the regions, following some criterion of proximity. Aiming to avoid distortions in the analysis, the definition of the weights matrix W was performed following Amaral (2008). To study the potential market and wage differentials between Brazilian regions, the author adapted the distance matrix proposed by Fingleton (2006), replacing the 1000 mile distance threshold used by the author in its international analysis of 100 miles, which is equivalent to 160.9 Km is expected that this matrix is better able to capture the spatial effect expected overflow of all the variables, it incorporates a better idea of the potential market. We have then:

$$\begin{aligned} W_{ij} &= \left(1 - \frac{d_{ij}}{160,9}\right)^2 \text{ se } d_{ij} \leq 160,9 \\ W_{ij} &= 0 \text{ se } d_{ij} > 160,9 \text{ ou } i = j \end{aligned} \quad (7)$$

The limitation of the neighborhood to a maximum of 160.9 Km resulted in 21 AMCs without neighbors, who were excluded from the sample. The weight matrix is constructed from the transportation network provided by the National Plan of Logistics and Transport (PNLT), using the minimization of time to build a matrix of distances between locations.

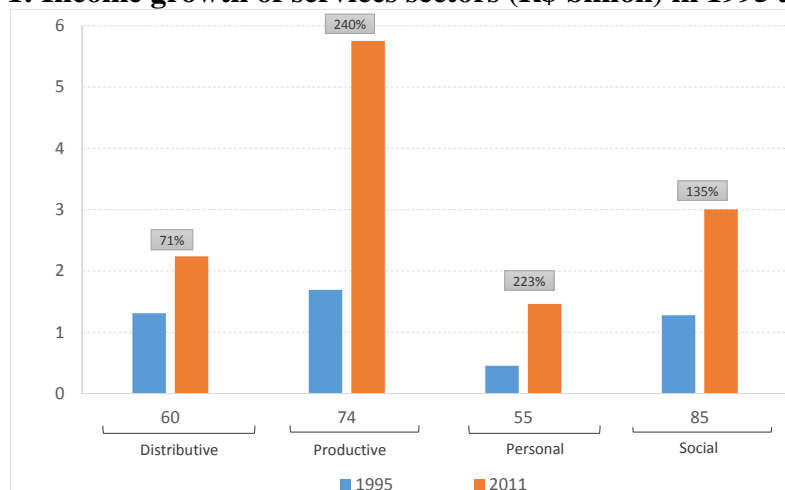
5. RESULTS

This section presents the results obtained in this work. First, an overview of the income of the analyzed services sectors; and second, the pattern of regional concentration of these sectors from the analysis of indicators of agglomeration.

5.1 Income and its inequalities

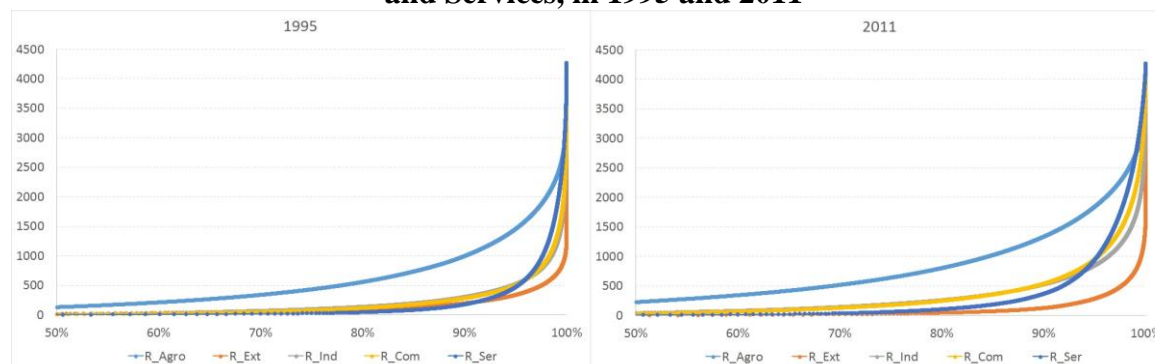
In this subsection we analyze the evolution of income distribution of the various sectors analyzed. Graph 1 shows the evolution of the income of 4 service sectors. All sectors grew above the sector average, which is 131%. The sector of Road Transport was that grew less in the period. the productive sector, Service to companies, grew faster. However, it is not possible to notice how uneven is the distribution of services sectors in Brazil. Graph 2 shows the comparative pattern of spatial concentration of sectors. You may notice a smoothing of the concentration of all sectors from 1995 to 2011, but practically irrelevant by the general pattern of concentration of economic activity in Brazil.

Graph 1: Income growth of services sectors (R\$ billion) in 1995 and 2011



Source: results have been derived based on RAIS.

Graph 2: Spatial concentration of activities Agriculture, Quarrying, Trade, Industry and Services, in 1995 and 2011

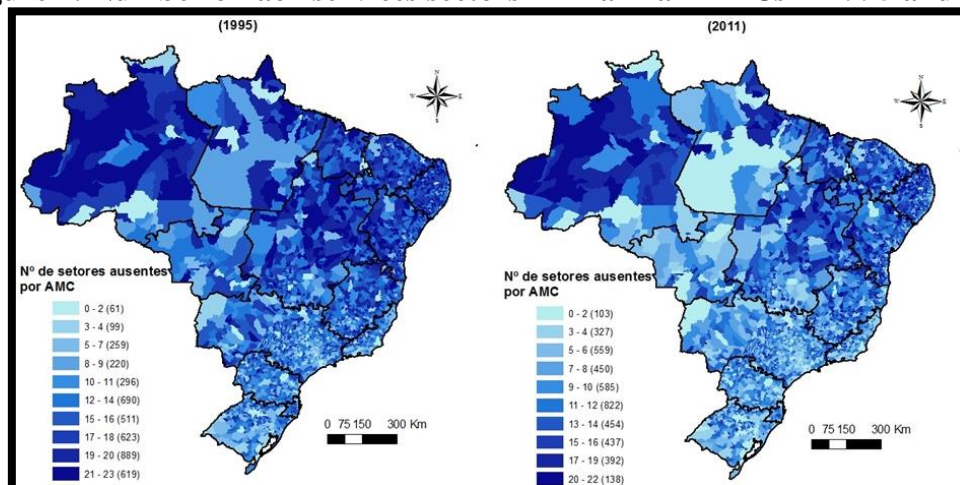


Source: results have been derived based on RAIS.

The analysis of Graphs 1 and 2 suggests besides the huge spatial concentration of services sectors, a possible absence of certain sectors in much of the Brazilian territory, since

many AMCs have no share of income from various sectors. Figure 1 helps to visualize the lack of services sectors in Brazilian urban space. You can observe a trend towards the increased presence of 1995-2011 services. But, even in 2011, more than half the number of AMCs present absence of 11 or more service sectors. It is remarkable also a North-South pattern in the absence of services. The regions of the north, such as Manaus, Belem, Sao Luis, Fortaleza, Recife and Salvador have the highest relative number of AMCs with greater lack of services, showing a possible obstacle in these regions with respect to diversification of activity. Therefore a lower capacity for polarization and generation of spillovers.

Figure 1: Number of lack services sectors in Brazilian AMCs in 1995 and 2011



Note: The number of sectors refers to the total of 23 service sectors, classified by divisions CNAE (2 digits).
Source: results have been derived based on RAIS.

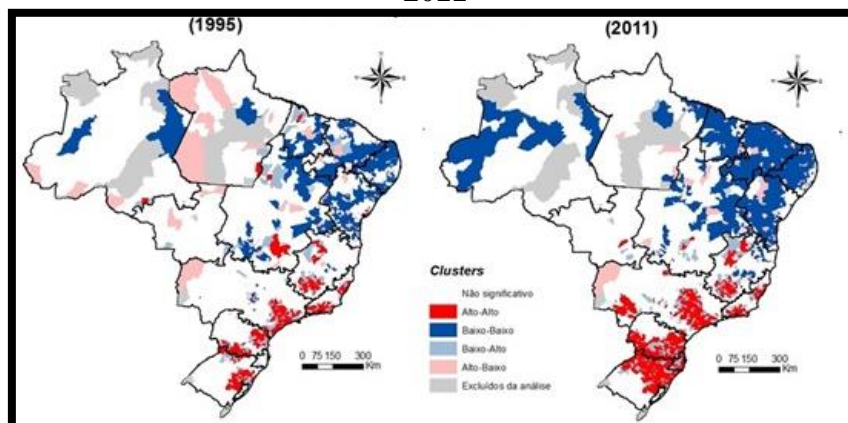
By contrast, the areas of influence of São Paulo, Belo Horizonte, Rio de Janeiro, Curitiba, Florianópolis and Porto Alegre have less than 6 missing sectors, showing that these regions are more dynamic service economy in presenting greater variety of activities.

From here whenever you read North or South axis axis are dealing in the following section of the Brazilian territory. The North axis is represented by the areas of influence of Manaus, Belem, Sao Luis, Fortaleza, Recife, Salvador, Brasilia and Cuiaba. And south axis by Sao Paulo, Belo Horizonte, Rio de Janeiro, Curitiba, Florianópolis and Porto Alegre.

5.2 Concentration of the service sector

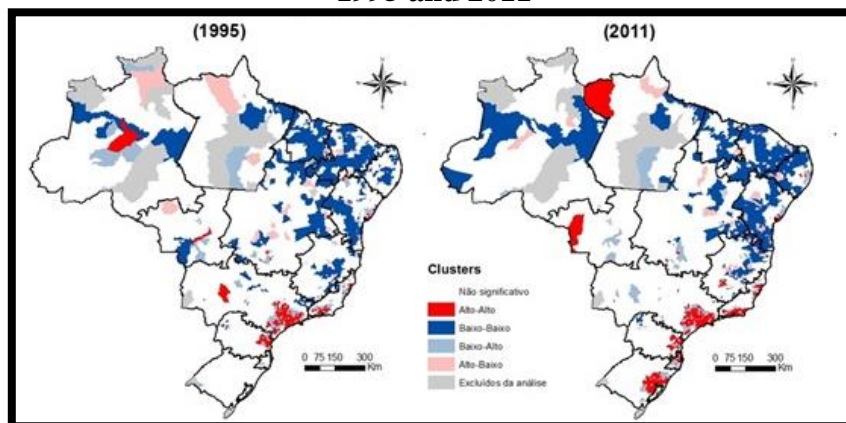
In this subsection we present the spatial configuration of the service sector in Brazil. For this, the variables that characterize the productive structure of the services, as described in subsection 4.1 are presented. It examines the pattern of location of services sectors from the study of the characteristics of their local productive structure, locational constraints agglomerations of services can be observed. First is described the pattern of spatial association of specialization variable (Equation 1) between 1995 and 2011 showing the degree of specialization of each locality, while pointing out which sectors are concentrated in it or not. Figures 2 to 5 show that the sectors discussed services have similar spatial pattern between them. The sector 60 - Road Transport - has a distribution with greater industry concentration in South and the lower in Northeast. The sector 74 - Services to Companies presents the low-low pattern in the areas of Northeast Brazil, showing that the concentration of productive sectors in this region is low. Also visible is the high-high concentration in metropolitan areas in both the North and the South axis.

Figure 2: Local Moran's of specialization variable for 60 – Road Transport, in 1995 and 2011



Source: results have been derived based on RAIS.

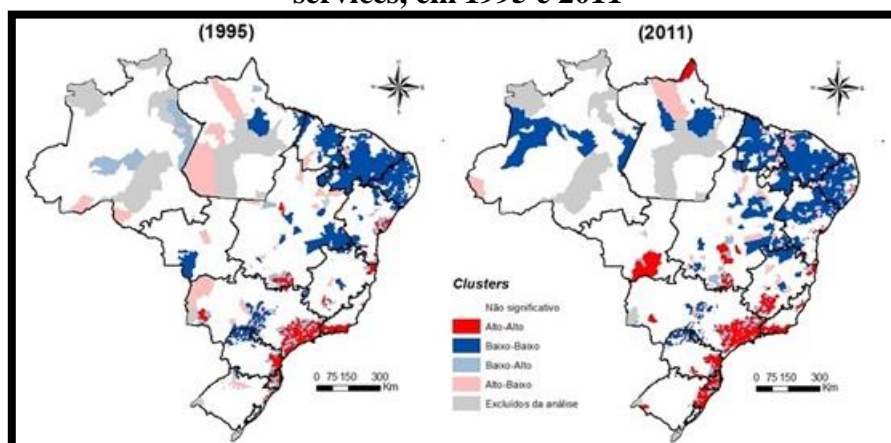
Figure 3: Local Moran's of specialization variable for 74 – Services to companies, in 1995 and 2011



Source: results have been derived based on RAIS.

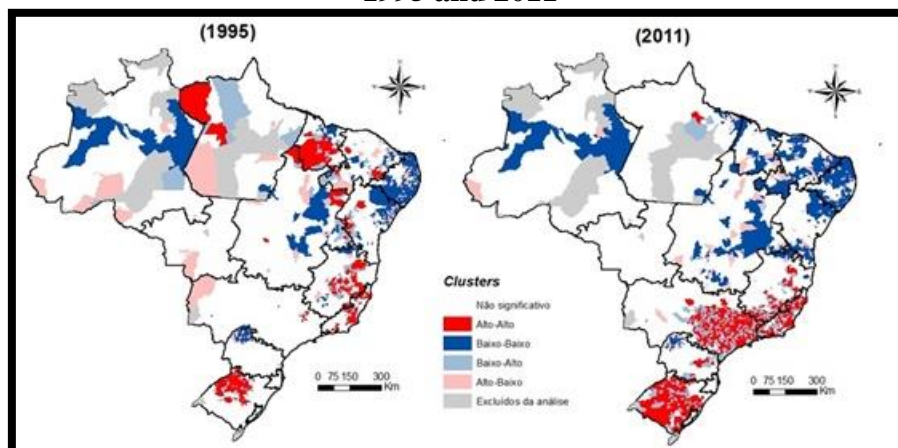
For the sector 55 - Hotels and restaurants services, it is also possible to observe a low concentration in the Northeast axis of the country. Regions with greater specialization, ie, high-high standards, are also those located in South axis, particularly also for the metropolitan areas. This North-South pattern is also seen for the sector 85 - Health and Social Services, but more expanded beyond metropolitan regions.

Figure 4: Local Moran's of specialization variable for 55 – Hotel and restaurant services, em 1995 e 2011



Source: results have been derived based on RAIS.

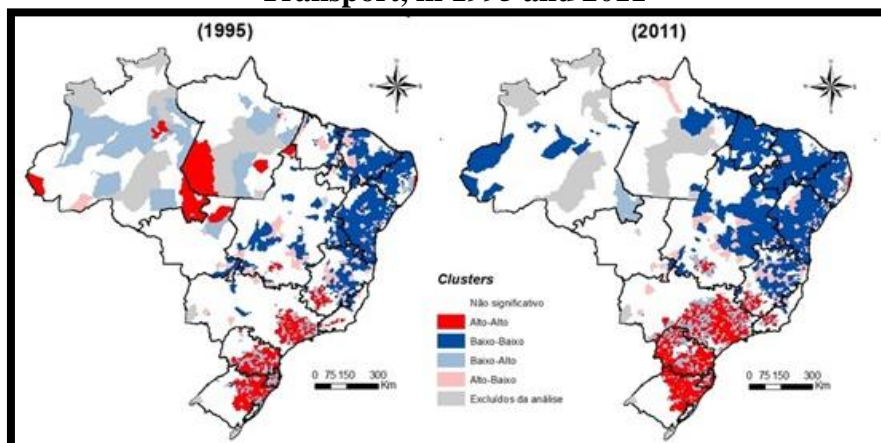
Figure 5: Local Moran's of specialization variable for 85 – Health and Social Services, in 1995 and 2011



Source: results have been derived based on RAIS.

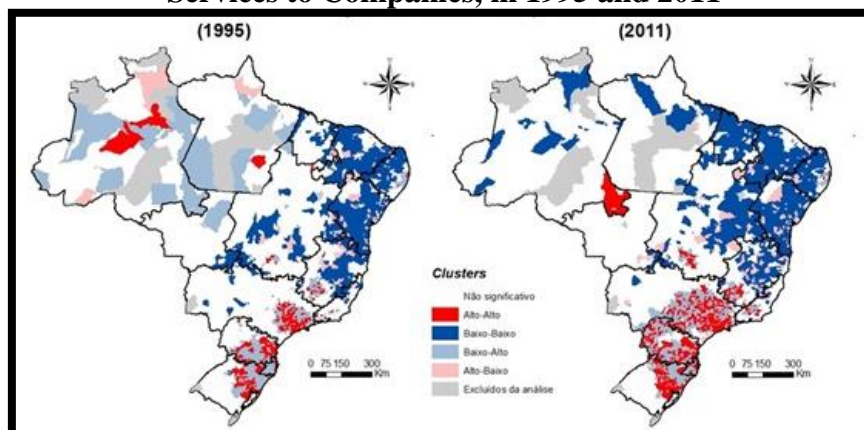
The relationship between the service sector and the industrial sector is analyzed statistics from bivariate Local Moran's I between specialization of each service sector and the industrial sector specialization. Figures 6, 7, 8 and 9 show the results. The spatial association are fairly similar, with a persistent relation Low-Low on north-northeast axis of the country, which shows that service industries are less concentrated where there is also less industrial concentration.

Figure 6: Bivariate Local Moran's of specialization variable for industry and 60 – Road Transport, in 1995 and 2011



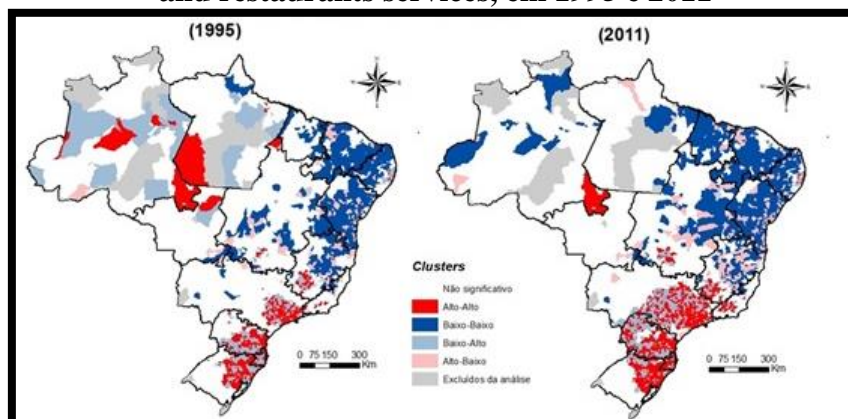
Source: results have been derived based on RAIS.

Figure 7: Bivariate Local Moran's of specialization variable for industry and 74 – Services to Companies, in 1995 and 2011



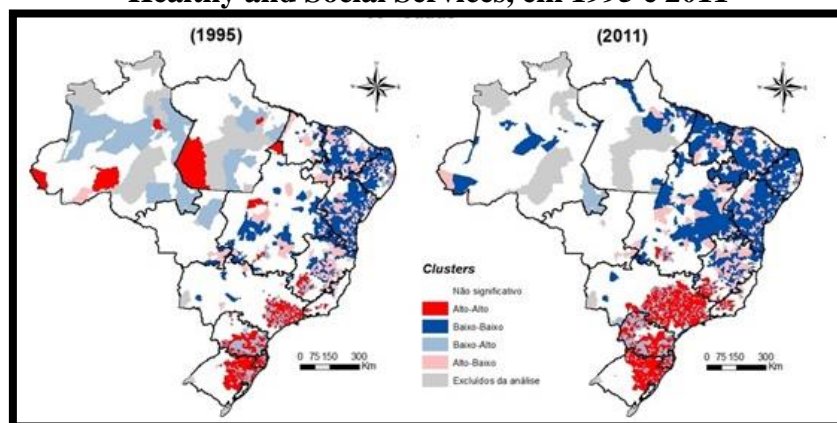
Source: results have been derived based on RAIS.

Figure 8: Bivariate Local Moran's of specialization variable for industry and 55 – Hotel and restaurants services, em 1995 e 2011



Source: results have been derived based on RAIS.

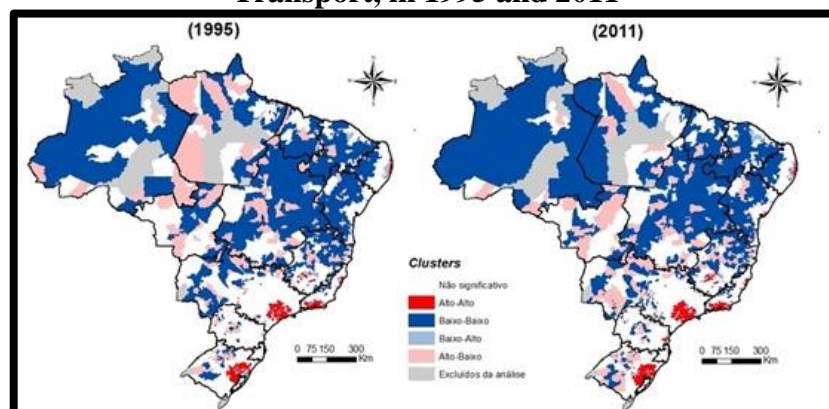
Figure 9: Bivariate Local Moran's of specialization variable for industry and 85 – Healthy and Social Services, em 1995 e 2011



Source: results have been derived based on RAIS.

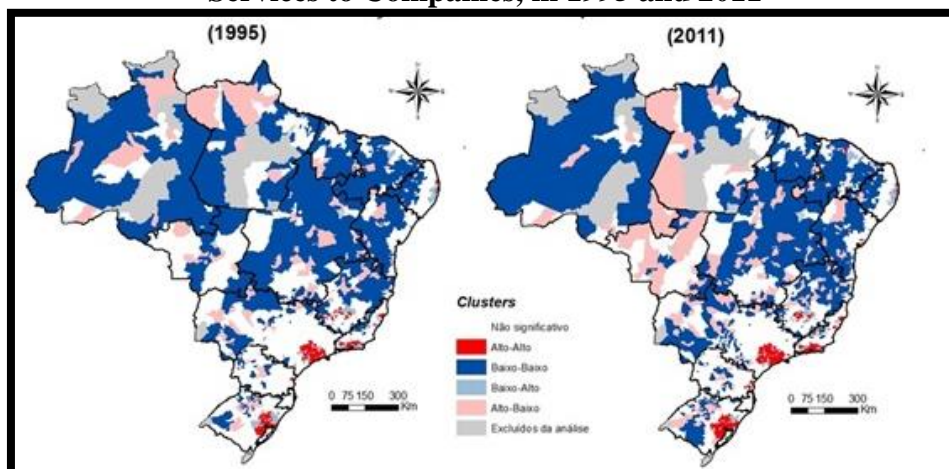
To capture the relationship between specialization in an industry in a particular location and size of this location in the urban hierarchy, statistics bivariate Local Moran's I between specialization (Equation 1) and the variable density (Equation 4) are calculated. Figures 10, 11, 12 and 13 show the results. You can corroborate the hypothesis that agglomeration and scale contribute to the development of the service sector, since it is not a pattern of concentration Low-Low and High-High exactly where observed lower and higher population density, respectively.

Figure 10: Bivariate Local Moran's of density variable and specialization for 60 – Road Transport, in 1995 and 2011



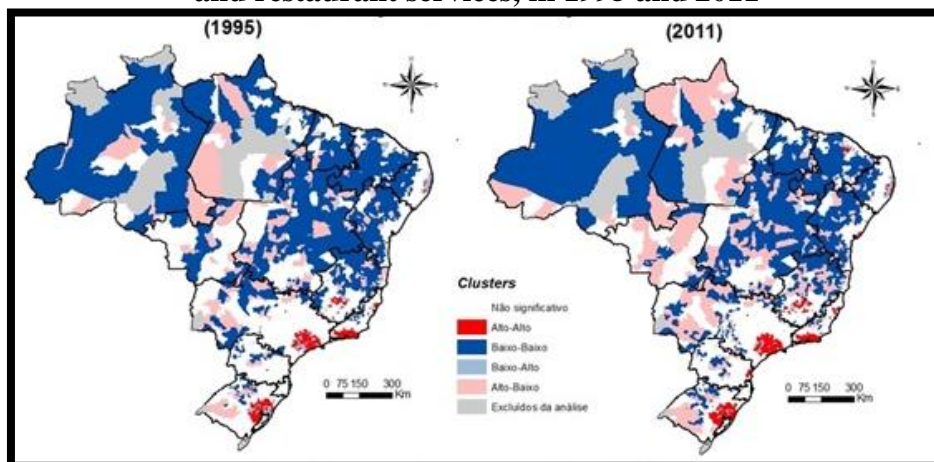
Source: results have been derived based on RAIS.

Figure 11: Bivariate Local Moran's of density variable and specialization for 74 – Services to Companies, in 1995 and 2011



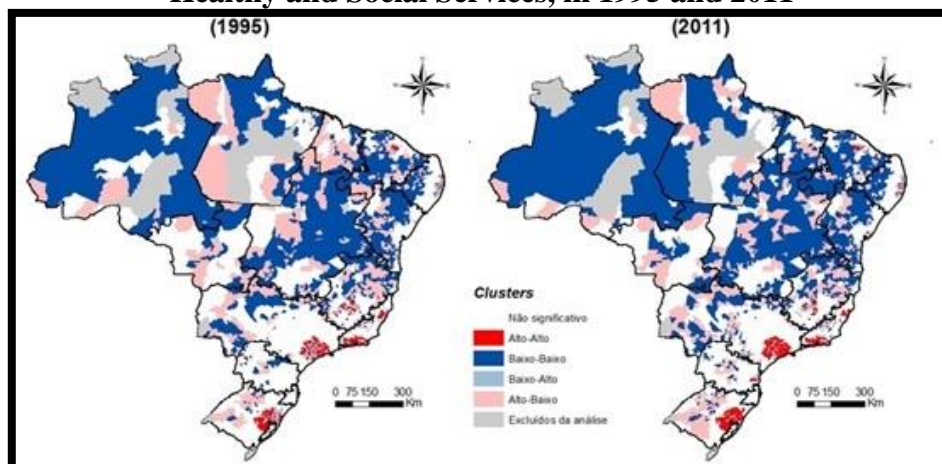
Source: results have been derived based on RAIS.

Figure 12: Bivariate Local Moran's of density variable and specialization for 55 – Hotel and restaurant services, in 1995 and 2011



Source: results have been derived based on RAIS.

Figure 13: Bivariate Local Moran's of density variable and specialization for 85 – Healthy and Social Services, in 1995 and 2011

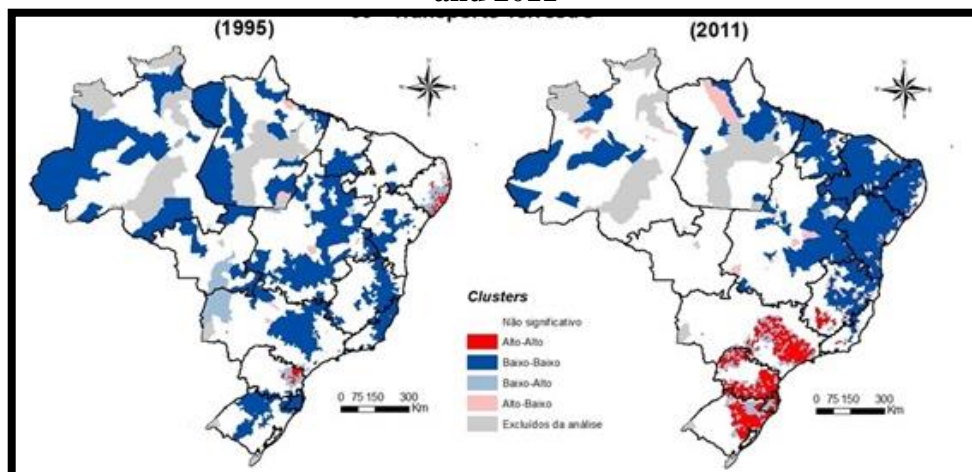


Source: results have been derived based on RAIS.

The diversification variable (Equation 2) is analyzed spatially. In Figures 14, 15, 16 and 17, this indicator reflects the sectoral diversity, facing the service sector. A north-south pattern

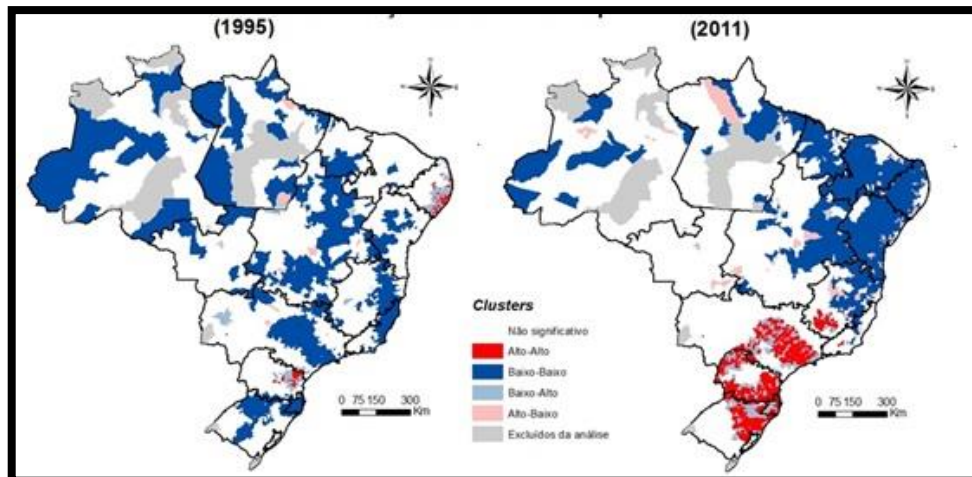
with North Low-Low and High-High South, mainly in 2011, can be seen in almost all sectors. The year 1995 shows very similar pattern in different sectors. The low diversity of services may indicate that the areas of influence further south of the country the service sector is more diversified, corroborating the earlier analysis of specialization variable, which shows that the North has lower concentration of almost all service sectors.

Figure 14: Local Moran's I for diversification variable for 60 – Road Transport, in 1995 and 2011



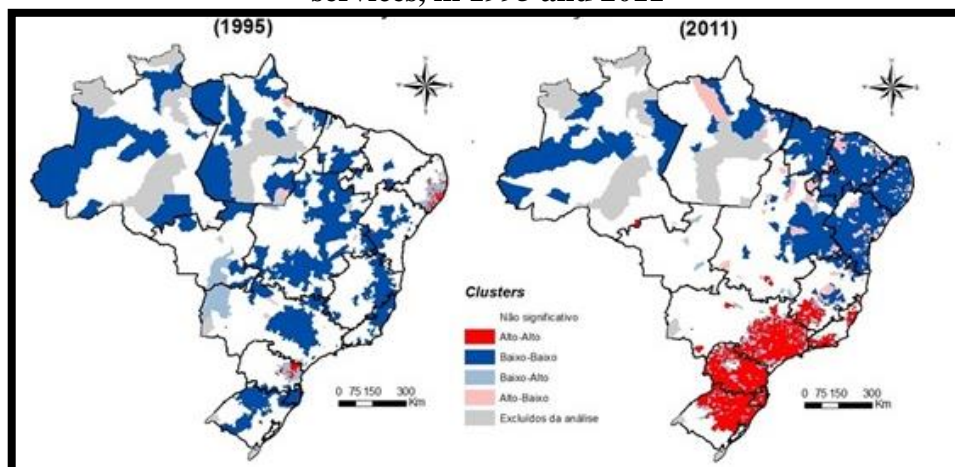
Source: results have been derived based on RAIS.

Figure 15: Local Moran's I for diversification variable for 74 – Services to Companies, in 1995 and 2011



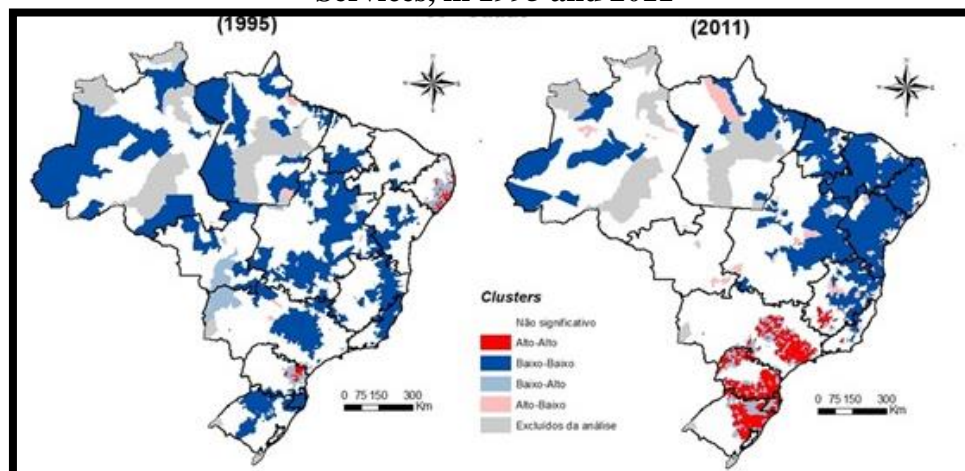
Source: results have been derived based on RAIS.

Figure 16: Local Moran's I for diversification variable for 55 – Hotel and restaurant services, in 1995 and 2011



Source: results have been derived based on RAIS.

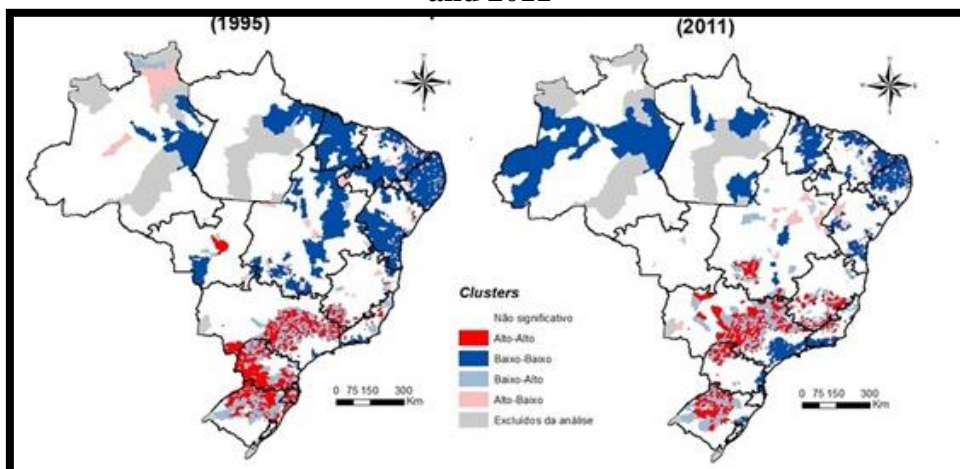
Figure 17: Local Moran's I for diversification variable for 85 – Healthy and Social Services, in 1995 and 2011



Source: results have been derived based on RAIS.

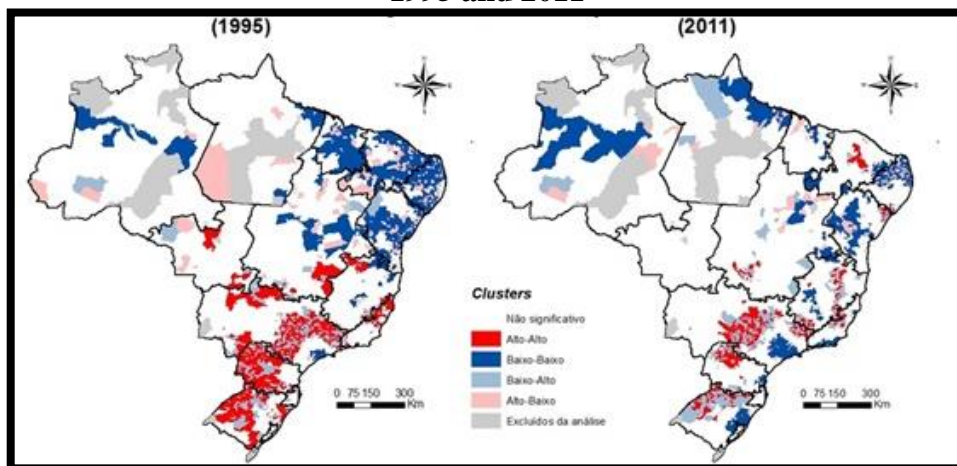
Figures 22, 23, 24 and 25 show the distribution and spatial correlation of the competition variable (Equation 3) of services sectors. To a higher value of the variable indicates that the sector in a locality is more competitive than in other parts of the country, it is possible to observe some spatial patterns of different sectors. The sectors 60 – Road Transport 74 – Services to Companies and 55 - Hotels and restaurants have a homogeneous pattern between them, regions with high-high in the South and Low-Low on the North. Have the sector 85 - Health and Social Services has no well-defined spatial pattern.

Figure 18: Local Moran's I for competition variable for 60 – Road Transport, in 1995 and 2011



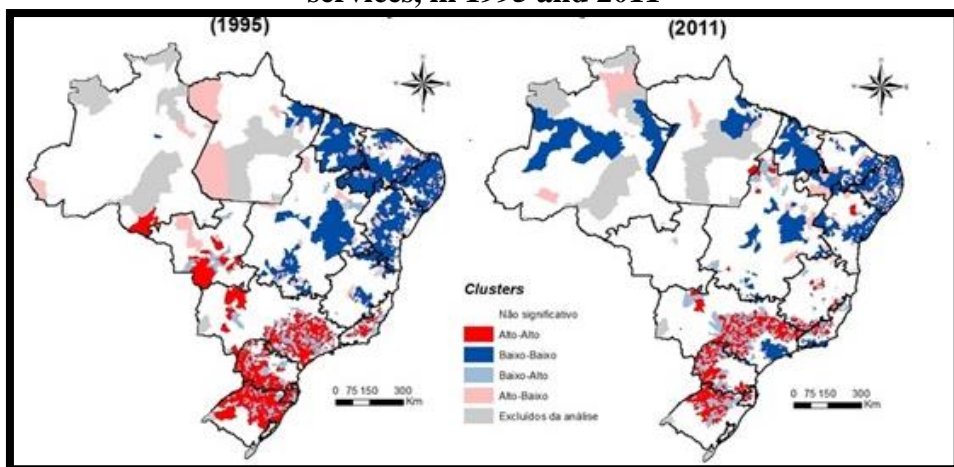
Source: results have been derived based on RAIS.

Figure 19: Local Moran's I for competition variable for 74 – Services to Companies, in 1995 and 2011



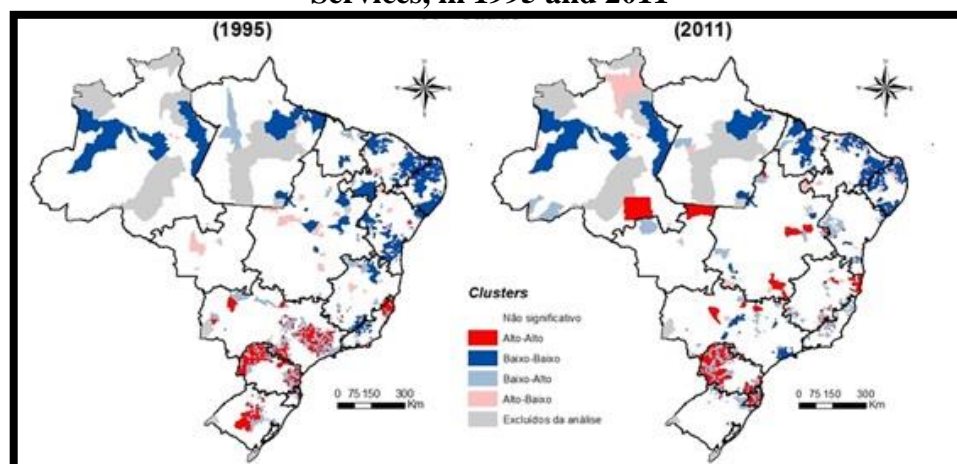
Source: results have been derived based on RAIS.

Figure 20: Local Moran's I for competition variable for 55 – Hotel and restaurant services, in 1995 and 2011



Source: results have been derived based on RAIS.

Figure 21: Local Moran's I for competition variable for 85 – Healthy and Social Services, in 1995 and 2011



Source: results have been derived based on RAIS.

CONCLUSION

Despite representing more than 50% of the Brazilian economy, the service sector is still little studied in Brazil. To discuss the pattern of sectoral and spatial concentration of services in Brazil, this article assessed the productive structure of four service sectors, with RAIS database, for the years 1995 and 2011.

A key finding was the significant regional concentration of services sectors. It was observed that most of the services activity is geographically concentrated in a small number of AMCs, with the largest share to the major economic centers of the country, as well as Brazilian metropolitan areas. Meanwhile, other localities showed great lack of service sectors. These results are in line with previous studies (DOMINGUES et al. 2006; AZZONI, 2005).

The results also point to the interaction between the service sector and the industrial sector. The service sector has been concentrated in regions where industrial activity is also concentrated. However, it is also possible to observe a concentration of services in the surrounding areas of industrial concentration. This is related to a peculiar characteristic of these sectors: not necessary to locate where the demand is, but working in a service network.

The study reaffirmed South axis of the country as the part most polarizer and services holder, thus more developed. Likewise the influence areas located in the Northeastern and Northern Brazil, regions with high barriers to development historically, they also present barriers in the provision of services, with low diversity in the region.

Thus, the argument that Brazil is an economy of services is accepted in the sense that most of the regions have large service sector participation both in income and employment. But by observing the pattern of regional concentration, specialization, diversity and competitiveness is difficult to say that the service economy is dynamic and independence to sustain the local economy.

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