

REGIONAL DEVELOPMENT POLICY: THE CASE OF FUNDOPEM/RS

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Abstract

The objective of this study is to evaluate the contribution and limitations of FUNDOPEM in reducing regional inequalities in the state of Rio Grande do Sul, through the analysis of the spatial distribution of investments and jobs resulting from the program. This research is exploratory, descriptive, and quantitative in nature, and the data were collected from two sources: the Department of Economic Development and the Annual Social Information Report. Descriptive and spatial statistics were used for data analysis. The results indicate the program's contribution to job creation over the historical series, which, for the most part, proved to be much higher than the initial projections. The spatial analysis of Rio Grande do Sul in terms of jobs and values projected by FUNDOPEM revealed that the Northwest and Northeast regions of Rio Grande do Sul stood out. In this context, it becomes necessary to promote strategies related to FUNDOPEM aimed at minimizing regional imbalance, with the intention of eliminating low productivity and poverty in municipalities that are still stagnant.

Keywords: Inequality. Regional Development. Development Policies. Jobs. FUNDOPEM

Política de desarrollo regional: el caso de FUNDOPEM/RS

Resumen

El objetivo de este estudio es evaluar la contribución y las limitaciones de FUNDOPEM en la reducción de las desigualdades regionales en el estado de Rio Grande do Sul, a través del análisis de la distribución espacial de las inversiones y los empleos resultantes del programa. Esta investigación es de naturaleza exploratoria, descriptiva y cuantitativa, y los datos se recopilaban de dos fuentes: el Departamento de Desarrollo Económico y el Informe Anual de Información Social. Se utilizaron estadísticas descriptivas y espaciales para el análisis de datos. Los resultados indican la contribución del programa a la creación de empleo a lo largo de la serie histórica, que en su mayoría resultó ser mucho mayor que las proyecciones iniciales. El análisis espacial de Rio Grande do Sul en términos de empleo y valores proyectados por FUNDOPEM reveló que las regiones del Noroeste y el Noreste de Rio Grande do Sul destacaron. En este contexto, se hace necesario promover estrategias relacionadas con FUNDOPEM con el objetivo de minimizar el desequilibrio regional, con la intención de eliminar la baja productividad y la pobreza en los municipios que aún están estancados.

Palabras clave: Desigualdad. Desarrollo Regional. Políticas de Desarrollo. Empleos. FUNDOPEM

1 Introduction

Inequality is perceived as a strategic challenge that encompasses the political, economic, cultural, and social development of the Brazilian context (COSTA; SILVA, 2020). Research on inequality in the country has been conducted since the 1970s (MENEZES-FILHO; RODRIGUES, 2009). This reality is explained by the fact that income inequality increased in previous decades. This topic is relevant to the development of society, as it is evident that research addressing this issue is driven by the high levels of inequality experienced by the population (FLEURY, 2007; ARAUJO, 2010; PIRES, 2019; MARCONDES et al., 2022).

The capacity for socioeconomic development can contribute to balancing these inequalities. According to Furtado (2000), development is a global process oriented toward progress and brings about social transformations that aim to expand productive capacity, labor capacity, cooperation, and the introduction of new products and forms of consumption—factors that necessarily depend on social structure and the exercise of power.

In this context, concerns about regional inequalities arise from socioeconomic discrepancies that require the development of policies with region-specific characteristics. Disparities involving quality of life, income, employment opportunities, public services, health, education, and infrastructure are notable, all associated with the National Regional Development Policy and the concept of development (CARNIELLO; DOS SANTOS, 2021). In an effort to change this scenario, actions aimed at industrialization and urbanization are promoted to overcome poverty and underdevelopment (ETGES; DEGRANDI, 2013), especially to avoid territorial vulnerability and economic dependence on a single activity in the region (SANTOS; CASTILHO, 2023).

Industries have strong potential regarding income and employment, promoting structural changes in the economic system. Differences in the level of

industrial development between regions are reflected in the level of development of states, and thus development gains prominence in discussions and public policies due to the challenges identified and its importance to the economy (BIANCARELLI; FILIPPIN, 2017).

Seeking to understand the relationship between regional inequalities in the country, Lopes and Schuler (2016) highlight concerns about this issue in Rio Grande do Sul, as the state presents a peculiar scenario regarding economic development when compared to other Brazilian states. There was unequal growth among some regions of the state, with certain areas concentrating a greater share of wealth (BATISTA; SILVEIRA; ALVES, 2005), justified, for example, by political interests (CARNIELLO; DOS SANTOS, 2021).

From this perspective, the State has a relevant role in proposing actions aimed at decentralizing industry and encouraging migration to underserved regions, such as fostering and financing policies that can promote greater equity in economic development and reduce market failures (BARTIK, 2019). Thus, FUNDOPEM/RS, as a developmentalist policy of the state of Rio Grande do Sul, was implemented with the aim of promoting greater industrialization in regions with development deficits (RIO GRANDE DO SUL, 2021). Created in 1972 and reformulated over the following decades, the program grants long-term financing to companies based on the ICMS (state sales tax) generated by their own productive activity established in the state. In this way, part of the tax that would otherwise be collected into the state treasury is redirected as credit to the enterprise, reducing the cost of establishing and expanding industrial units, especially in municipalities with lower economic dynamism.

This program uses incremental ICMS as an incentive for the installation of new local industrial investments, with a view to developing regions with low levels of development, generating equity, and reducing inequalities in the state of Rio Grande do Sul (FIORI, 2017; RIO GRANDE DO SUL, 2021). In this regard, the objective of this study is to evaluate the contribution and limitations of FUNDOPEM in reducing regional inequalities in the state of Rio Grande do Sul, through the analysis of the spatial distribution of investments and jobs resulting from the program.

The innovation of this study relates to its object—the FUNDOPEM/RS policy, one of the public incentive policies for development implemented in the state—associated with the variable of regional inequality. The theoretical and practical justification for the study stems from a gap not yet explored in the literature, as studies on regional inequality and development policy do not empirically evaluate FUNDOPEM as an instrument for reducing inequality. Furthermore, no studies were found that combine FUNDOPEM data with information from RAIS using spatial analysis techniques to examine the distribution of investments and jobs generated through the program's support. By filling this gap, the study contributes theoretically by applying the regional development framework to evaluate a policy that lacks scholarly attention, and contributes empirically by providing evidence that can guide and align the program with respect to the equity of regional development in the state of Rio Grande do Sul, especially when regions are characterized as clusters.

Structurally, this article is organized into five sections. Following this introductory section, regional development and industrial inequalities are discussed. Subsequently, the methodological aspects applied are presented, followed by the

descriptive/statistical results and the practical implications of the study. Finally, concluding remarks are offered.

2 Development and Regional Industrial Inequality

The debate on regional development gained momentum before and after World War II, when programs were created to reduce inequalities between wealthier regions and more underdeveloped ones (SCOTT; STORPER, 1990). In contemporary times, regional development receives limited attention in politics and economics, as it involves structural problems that require a long-term horizon to be overcome (MONTEIRO NETO; CASTRO; BRANDÃO, 2017).

With the reconstruction of nations and the Welfare State policy, economic development came to be viewed as the improvement of the population's quality of life. Starting in the 1950s, studies dedicated to examining development in a regionalized manner were developed, considering industrialization as the means to promote development (MADUREIRA, 2015).

In Friedmann's (1967) view, development occurs unevenly, permeated by dynamic centers and peripheries, in which the development of the periphery is structurally dependent, within the spatial system, on the central region, which is the place with the highest concentration of purchasing power and innovation. Thus, peripheral regions are highly dependent and have less decision-making influence over planning for development. Scott and Storper (1990) engage with the same center-periphery idea, noting that capitalism tends to produce these developed centers and dependent peripheral regions, which results in regional inequalities. Hence, thinking about regional development requires understanding how each decision made in the present can contribute to or hinder the transformation necessary to overcome underdevelopment and redefine the direction of a region or country (MONTEIRO NETO; CASTRO; BRANDÃO, 2017).

The historical origins of development in Rio Grande do Sul are linked to agriculture and livestock farming, which meant that, until the late 1930s, the state was characterized as essentially agricultural (BANDEIRA, 1991). This model, however, sustained only limited growth over a long period, generating the need for economic restructuring and the creation of new jobs. But this transformation only gained momentum with the growth of the industrial sector, which drove the state's development (FIORI, 2017).

Regional inequality reflects a scenario oriented toward capitalist production in relation to development, as income is perceived as an important variable in delineating disparities between certain territorial spaces (SCHULZ; KÜHN, 2020). In this context, new actions aimed at industrialization and urbanization emerge with the goal of minimizing these disparities by seeking to overcome poverty, underdevelopment (ETGES; DEGRANDI, 2013), and intraregional inequalities (CARNIELLO; DOS SANTOS, 2021).

Industries generate income and jobs for society, and the effects of these companies can modify the economic system. Thus, it is understood that contemporary economic dilemmas necessarily involve industrialization, as it plays a fundamental role in the state's developmental strategy (BIANCARELLI; FILIPPIN, 2017). However, there is a configuration that follows extreme points in the

industrialization of Brazilian regions, as well as the polarization of metropolitan areas, given the need for basic parameters for industries to choose their locations (SILVA, 2021).

Regarding Rio Grande do Sul, Benetti (2007) states that in this region of the country there is a concentration of economic activities, industries, and industrial jobs in certain cities, reinforcing regional inequality. Alonso and Bandeira (1994) point out that the Southern, Northern, and Northeastern regions of Rio Grande do Sul show economic concentration driven by the production of industrial companies. This agglomeration and preference for economic units with greater dynamism brings advantages to companies (MARASCHIN et al., 2022) but generates an imbalance in industrial distribution. In other words, industrial concentration produces regional inequalities (BANDEIRA, 1991). Combating regional imbalances requires the development of strategies to address poverty and low productivity in cities considered stagnant (ALONSO, 2006).

To better visualize these disparities, the Human Development Index, developed by Mahbub ul Haq and Amartya Sen in 1990, is a synthetic measure of human development analyzed over the long term, obtained through indicators of education, longevity/health, and income (MALIK, 2014). This indicator at the municipal level, the Municipal HDI (IDHM) of municipalities in Rio Grande do Sul, is classified as high at 0.771 (ATLAS, 2021), surpassing even the national HDI of 0.754, and ranks 87th in the global ranking according to the United Nations Development Programme (UNDP, 2022).

However, when examining the state across its nine functional divisions, as shown in Chart 1, there is a disparity in development and regional productive capacity. The functional division is carried out for planning purposes, considering municipalities and the Regional Development Councils (COREDEs), based on factors such as economic, environmental, and social homogeneity, employment polarization, health, education, urbanization, and other factors (RUMOS, 2015).

Chart 1 – Regional Differences in Rio Grande do Sul Over the Historical Series from 2010 to 2019

Functional Region	IDHM *	Average GDP of Functional Regions per Year									
	2010	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
RF1	IDHM *	Metropolitan Delta do Jacuí, Centro-Sul, Vale do Caí, Vale do Rio dos Sinos, and Paranhana-Encosta da Serra									
	0,715	1,47 B	1,57 B	1,72B	1,88 B	2,03 B	2,25 B	2,39 B	2,45B	2,60 B	2,76 B
RF2	IDHM *	Vale do Rio Pardo e Vale do Taquari									
	0,709	263 M	298 M	327 M	392 M	442 M	449 M	473 M	494 M	547M	576 M
	99%	18%	19%	19%	21%	22%	20%	20%	20%	21%	21%

Vale do Rio Pardo and Vale do Taquari

RF3	IDHM *	Campos de Cima da Serra, Hortênsias and Serra									
	0,739	702 M	786 M	857 M	939 M	1,02 B	1,02 B	1,04 B	1,09 B	1,22B	1,29 B
	103%	48%	50%	50%	50%	50%	45%	44%	44%	47%	47%
RF4	IDHM *	Litoral Norte									
	0,710	297 M	326 M	382 M	406 M	462 M	518 M	568 M	587 M	611 M	659 M
	99%	20%	21%	22%	22%	23%	23%	24%	24%	23%	24%
RF5	IDHM *	Sul									
	0,670	671M	756 M	867 M	1,01B	1,04B	1,11 B	1,30 B	1,34 B	1,46 B	1,51 B
	94%	46%	48%	50%	54%	51%	50%	54%	55%	56%	55%
RF6	IDHM *	Campanha and Fronteira Oeste									
	0,698	462 M	463 M	506 M	620 M	672 M	757 M	807 M	846 M	886 M	906 M
	98%	31%	30%	29%	33%	33%	34%	34%	34%	34%	33%
RF7	IDHM *	Fronteira Noroeste, Missões, Noroeste Colonial and Celeiro									
	0,715	243 M	278 M	282 M	358 M	382 M	401 M	434 M	456 M	501M	524 M
	100%	17%	18%	16%	19%	19%	18%	18%	19%	19%	19%
RF8	IDHM *	Alto Jacuí, Central, Jacuí-Centro and Vale do Jaguari									
	0,713	225 M	260 M	261M	355 M	372 M	405 M	443 M	454 M	518M	526 M
	100%	15%	17%	15%	19%	18%	18%	19%	19%	20%	19%
RF9	IDHM *	Norte, Produção and Rio da Várzea									
	0,715	221M	252 M	266 M	337M	352 M	364 M	392 M	413 M	440 M	468 M
	100%	15%	16%	15%	18%	17%	16%	16%	17%	17%	17%

Note: * Corresponds to the average IDHM of municipalities. The average GDP value considers all municipalities in the FR; ** FR 1 serves as the reference for all GDP and IDHM variation comparisons.

Note: B = values in billions; M = values in millions.

Source: Adapted from the Secretariat of Planning, Governance, and Management (2022), UNDP (2022).

Industry plays an important role in the GDP of states and municipalities and has the capacity to reduce inequalities. Most municipalities with high GDP have significant industrial presence in their territory, as is the case with the concentration in the Porto Alegre Metropolitan Region extending toward Caxias do Sul (SECRETARIA DE PLANEJAMENTO GOVERNANÇA E GESTÃO, 2022).

Given the importance of industrial location across different spatial contexts, there are legal mechanisms to attract investments and enable states to compete in the preference for the establishment of new businesses for industrial and related productive activities. In Rio Grande do Sul, one of the programs that fosters development and spatial deconcentration is the Business Operations Fund of the State of Rio Grande do Sul – FUNDOPEM/RS (FIORI, 2017; RIO GRANDE DO SUL, 2021).

Fiscal incentives are instruments of public policy and an interventionist form of state action (LACOMBE, 1969) that seeks to fill market failures (BARTIK, 2019). Incentives and investments represent potentialities that can optimize the costs of a region or company, making it more competitive (MADUREIRA, 2015). However, although these instruments may unlock regional potentialities, criticisms exist that relate primarily to the use of the instrument as a political tool (ESQUERDO; GIUBERTI, 2020), high costs that outweigh the program's benefits (BARTIK, 2019), and a fiscal war between states in the pursuit of new business ventures (TOIGO; LOBO E SILVA, 2012).

In the contemporary debate on industrial policies, there are several structural limitations that slow development, and incentives are used as instruments to reduce regional inequalities. However, they often reinforce existing patterns and benefit centrally located regions that are strategically positioned in development clusters. These dynamic regions frequently benefit from such incentives, exacerbating program inefficiencies and undermining their stated objectives (SLATTERY; ZIDAR, 2020; PAS; RADÜNZ, 2011; FERRAZ; MENNA-BARRETO, 2012; BARTIK, 2019). Thus, FUNDOPEM constitutes a relevant case study for evaluating the effectiveness of fiscal incentives, contributing to the assessment of policies that may either mitigate or reproduce regional inequalities. Analysis using spatial methods engages with the literature and fills the theoretical gap regarding the role of fiscal incentives in regional development.

3 Method

This research is characterized as exploratory, as no studies were found that explore data and delve deeply through statistical and econometric methods into the variables examined in the study of FUNDOPEM/RS. Exploratory studies involve empirical investigations aimed at increasing the researcher's familiarity with an environment, fact, or phenomenon, providing greater precision to the research (MARCONI; LAKATOS, 2021; GIL, 2019). It is also configured as a descriptive and quantitative study, with the aim of deepening understanding of the characteristics observed in the program's historical performance, using statistical measures to describe the phenomenon (SAMPLIERI; COLLADO; LUCIO, 2013; GIL, 2019).

Two databases were used for this research. The first is the database of the Department of Economic Development (Sedec) of the state of Rio Grande do Sul, derived from the records of projects registered with this agency, covering the period from 2011 to 2020. The second database is the formal employment records made available by the Annual Social Information Report (RAIS). RAIS provides sectoral and municipal employment data for studies at the state and national levels, with its management and availability handled by the Ministry of Labor. Analyses using RAIS are limited to the period from 2011 to 2017. Based on these databases, the variables used to analyze regional development were: nominal financing value received per project, projected employment figures in the projects, and formal jobs generated as evidenced in the RAIS system. The analysis was developed by cross-referencing the CNPJ (business tax identification number) of the companies, making it possible to verify the amount of financing each company received and the number of jobs it generated.

Descriptive statistics were used for the descriptive analyses. To spatially evaluate the object of study, the spatial analysis method was employed, which is the area of statistics that aims to analyze data through geographic location, thereby examining data that have a spatial dimension (CLIFF; ORD, 1973). Spatial analysis is applied in various fields such as economics, business administration, regional and urban planning, and geography, among others, enabling the development of various spatial techniques (CRESSIE; WIKLE, 2015), such as spatial regression models, exploratory data analysis, dependence tests, and others.

Spatial dependence tests are applied to analyze statistically significant relationships between a variable in a geographic space and observations in nearby areas. The spatial test is applied to identify patterns and determine whether randomness should be excluded from the data analysis (CLIFF; ORD, 1973). The authors note that there are various spatial analysis methods, each with its own assumptions, application procedures, analytical objectives, and data characteristics.

Among these, the Moran's spatial dependence test is used to analyze spatial autocorrelation across a dataset—that is, it seeks to measure the association between the values of a given location and those of nearby locations. It also identifies whether spatial clusters exist, helping to understand the spatial structure of the information and to present results of association between the variables under study (MORAN, 1950).

The literature has shown that Moran's dependence test has been extended by an approach known as the LISA test (Local Indicators of Spatial Association), used to identify and analyze local spatial clusters across a set of information. This test provides the researcher with a statistical measure for each location on the map, indicating values that are similar to or different from those in neighboring locations. The application of this test allows for the identification of non-uniform spatial clusters, as different regions of the map may exhibit different levels of spatial autocorrelation (ANSELIN, 1995). Based on this, the LISA test was used in this research.

4 Discussion of Results

4.1 Projects: Regional Characteristics of FUNDOPEM

The resources allocated to investments in development and job creation in Rio Grande do Sul during the study period from 2011 to 2020 totaled R\$ 7,506,456,966.19 (seven billion, five hundred and six million, four hundred and fifty-six thousand, nine hundred and sixty-six reais and nineteen centavos), including both completed projects and those awaiting verification of investments.

Among the 28 COREDEs, 24 have projects registered with the Department of Economic Development. Within this time frame, R\$ 2,334,733,601.00 (two billion, three hundred and thirty-four million, seven hundred and thirty-three thousand, six hundred and one reais) corresponded to withdrawn projects, of which three million, four hundred and six thousand reais (R\$ 3,406,078.20) were withdrawn without a single project having been initiated. Table 01 presents a statistical overview of the FUNDOPEM data.

Table 01 – Descriptive Statistics of FUNDOPEM for the Period 2011 to 2022

Variável	Média	D. Padrão.	Mín	Máx
FUNDOPEM resource value	26,2 million	93, 6 million	R\$ 240 thousand	1,45 billion
Projected number of jobs	33,78	48,81	1	320
Withdrawn projects	29,9 million	89, 5 million	R\$ 445 thousand	740,2 billion
Projected jobs from withdrawn projects	35,96	29,75	2,00	100

Note: *Data considering current projects, projects awaiting investment verification, withdrawn projects, and projects not yet initiated. Data are reported on an annual basis.

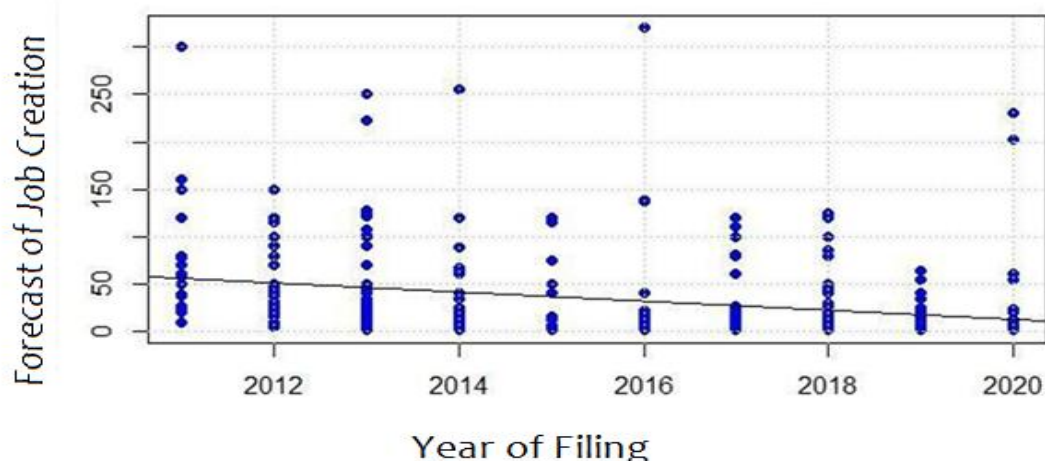
Source: Prepared by the authors (2026).

As shown in Table 01, the average projected FUNDOPEM resource value is 26.2 million (R\$ 26,180,914.28) for the 10-year study period, considering the 112 municipalities in Rio Grande do Sul that maintained active projects, as well as some that still need to report on project expenditures. There is a relatively high standard deviation relative to the resource average, given that the values are not distributed around the mean, indicating that there may be municipalities with values highly dispersed, either much higher or much lower, relative to the mean. Regarding the minimum investment in projects, the case identified in Flores da Cunha in 2016 is notable, with an investment of R\$ 240,465.38 (two hundred and forty thousand, four hundred and sixty-five reais and thirty-eight centavos) projected to generate one job. The largest investment in the historical series refers to the project registered in the municipality of Gravataí in 2017, which resulted in 1.45 billion reais (R\$ 1,454,988,660.42) in investments for job creation and development. This project refers to an expansion of the GM-General Motors plant, which created a production line for a new vehicle model (GAÚCHA ZH, 2017).

The average projected job creation figure, considering these 112 municipalities with active projects, is 33.78 positions per year per project. The project with the highest projected number of positions accounts for 320 jobs, registered in 2014 in the city of Arroio do Meio. This project, when compared with others, has a relatively low investment, approximately 73 million (R\$ 73,880,497.32) yet generates a large number of jobs. By way of comparison with the case of Gravataí, which had the largest resource investment, approximately twenty times greater than the Arroio do Meio case, it did not even generate 50% (specifically 38%) of the jobs. This fact reinforces evidence in the literature that has already identified this problem involving high investments and a reduction in job positions (PAS; RADÜNZ, 2011; FERRAZ; MENNA-BARRETO, 2012). According to Slattery and Zidar (2020) and Bartik (2019), this outcome would be justifiable in cases involving poorer areas, where there are indeed higher costs per job generated.

As a way of providing a general projection, Figure 01 illustrates the behavior of the Projected Job Creation variable for projects associated with FUNDOPEM over the study period from 2011 to 2020.

Figure 01 – Scatter Plot of Projected Job Creation – 2011 to 2020



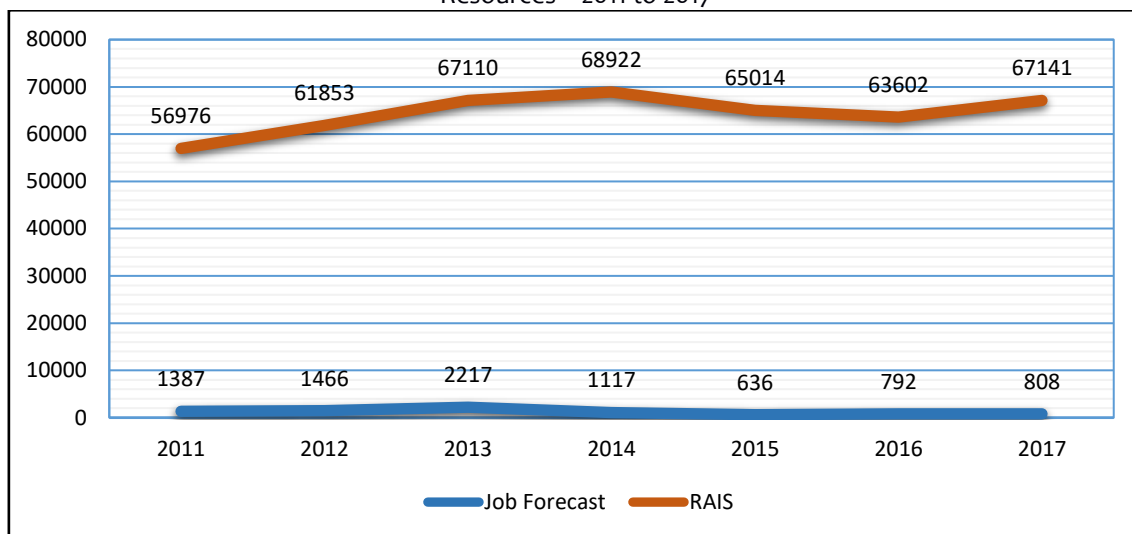
Source: Prepared by the authors (2026).

Figure 02 demonstrates, through the regression line, that there is a negative linear relationship between the variables, as over the years the program has been losing its capacity to generate jobs, given the decline in the number of projects. The year with the highest projected employment was 2013, with 2,217 projected positions. From 2015 onward, these projections fell consecutively to less than half of what had been projected, reaching 2020 with an outlook of 753 job positions for the year. The smallest projected employment figures occur in small projects developed in Caxias do Sul (2014), Flores da Cunha (2016; 2017), Montenegro (2013), and Vila Maria (2019). Despite the growth of small businesses in the state, it is essential to evaluate the scale and feasibility of expansion of these enterprises and their future capacity to generate more jobs.

4.2 Analysis of Program Data

Following the specific analysis of projects, this section associates concrete data obtained from RAIS, enabling a comparison between what was projected in projects filed with the Secretariat of Planning and what was actually carried out by companies receiving FUNDOPEM incentives. The general relationship observed in Figure 2 is positive when analyzing the program's contribution to effective job creation between 2011 and 2017.

Figure 2 – General Estimate of Projected Jobs vs. Jobs Generated in Municipalities with FUNDOPEM Resources – 2011 to 2017



Source: Prepared by the authors (2026).

When analyzed jointly, as shown in Figure 3, the program in practice contributes to job creation, even though over the years there has been a reduction in the number of filed projects (Figure 2). The actual job creation over the years is far greater than what was initially propose, that is, the total increase in employment at companies that received program financing exceeds the figures stipulated in the filed projects. The number of active employment bonds observed in the Annual Social Information Report indicates a symmetry in the curves of increase or reduction, as occurred in 2015 and 2016, shaping the performance curve in line with the initial projected employment estimate.

Although the overall relationship is positive, specific cases observed in certain companies showed inefficiencies in meeting the employment target projected for the venture. Seventy-two companies did not produce results that contributed to the generation of direct jobs. Another consideration in this study relates to the initial projections of the projects in terms of job generation. According to cross-referenced data from RAIS 2017, fifty-eight projects did not produce efficient results, as shown in Chart 2.

Chart 2 – List of Projects with Negative Employment Balances

Region	Projects w/Deficits	%	Municipalities of the Projects
RF1	14	24%	Eldorado do Sul, Alvorada, Campo Bom, Canoas, Feliz, Gravataí, Gravataí, Guaíba, Porto Alegre, Presidente Lucena, São Sebastião do Caí, Sapiranga, Sapiranga, Vale Real
RF2	10	17%	Arroio do Meio (2) *, Bom Retiro do Sul, Estrela, Imigrante, Mato Leitão, Passo do Sobrado, Passo do Sobrado, Rio Pardo, Santa Cruz do Sul
RF3	5	9%	Bento Gonçalves, Caxias do Sul, Farroupilha, Vacaria, Veranópolis
RF4	1	2%	Osório
RF5	1	2%	Canguçu
RF7	5	9%	Ijuí (2) *, Itaqui, Santo Ângelo, São Borja

RF8	4	7%	Santa Maria (2) *, Cachoeira do Sul, São João do Polêsine
RF9	18	31%	Almirante Tamandaré do Sul, Aratiba, Carazinho, Casca, Caseiros, Coqueiros do Sul (3) *, Erechim (3) *, Frederico Westphalen, Getúlio Vargas, Ibiraiaras, Lajeado do Bugre, Soledade, Três Arroios (2) *

Source: Prepared by the authors (2026).

As shown in Chart 2, the highest incidence identified in the study was found in Functional Region 9, located in the northern part of the state. The municipalities with the highest share of deficit results belong to the COREDEs Alto da Serra do Botucaraí, Médio Alto Uruguai, Nordeste, Norte, Produção, and Rio da Várzea. The only region that did not present deficits relative to its initial projection was Region 6, covering the Corede Campanha. However, it should be noted that this region has only one project, meaning it has less representativeness and statistical probability than the others.

4.3 Spatial Analysis

As presented in the methodology, the LISA indicator provides information about local spatial dependence, revealing patterns of agglomeration or dispersion in a given geographic area. In this context, correlations can be classified into four categories: high-high, high-low, low-high, and low-low. The high-high correlation is observed when a high concentration of similar values occurs in a given geographic area. This situation indicates the presence of clusters or agglomerations of similar characteristics or phenomena. The high-low correlation occurs when a high concentration of high values is surrounded by a low concentration of low values. This situation is known as a spatial "outlier" pattern and indicates the presence of an atypical point in an area with characteristics different from its surroundings. The low-high correlation occurs when a low concentration of values is surrounded by a high concentration of high values. This indicates the presence of areas where a given characteristic is less prominent compared to its surroundings. The low-low correlation occurs when a low concentration of values is surrounded by a low concentration of similar values.

The data analysis in Table 02 reveals a variety of results among municipalities in different regions of Rio Grande do Sul in terms of high-high and high-low clusters of jobs generated and financing through the FUNDOPEM program.

Table 02 – Clusters (high-high and high-low) of jobs and nominal values projected by FUNDOPEM in municipalities of the State of Rio Grande do Sul, cumulated between 2011 and 2016

COREDE	EMPLOYMENT CLUSTER	TOTAL FUNDOPEM VALUE CLUSTER
ALTO JACUÍ	0	1
CENTRAL	0	1
CENTRO-SUL	0	1
FRONTEIRA NOROESTE	1	1
FRONTEIRA OESTE	1	0
HORTÊNSIAS	1	1
LITORAL	1	0
MÉDIO ALTO URUGUAI	1	1
METROPOLITANO DELTA DO JACUÍ	2	2
NORDESTE	1	0
NOROESTE COLONIAL	0	1
PARANHANA ENCOSTA DA SERRA	1	0
PRODUÇÃO	0	1
RIO DA VÁRZEA	1	1
SERRA	5	0
SUL	1	1
VALE DO CAÍ	1	1
VALE DO RIO DOS SINOS	5	1
VALE DO TAQUARI	4	2
VALE DO RIO PARDO	0	1
TOTAL GERAL	26	17

Source: Data prepared by the authors based on information provided by the Rio Grande do Sul State Revenue Service (Sefaz/RS).

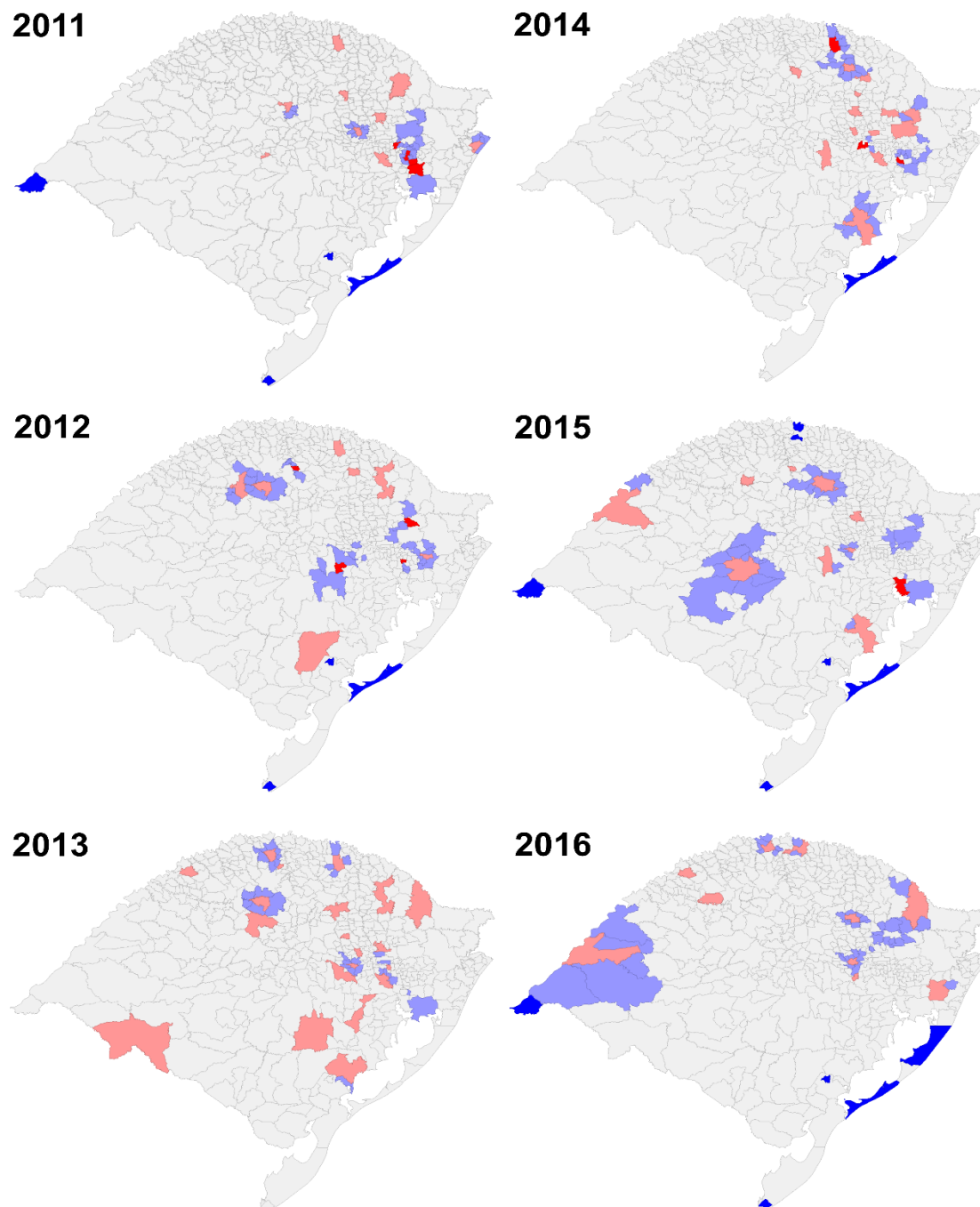
Some regions stand out for having generated a considerable number of employment clusters across municipalities, such as "Metropolitano Delta do Jacuí," "Vale do Rio dos Sinos," "Vale do Taquari," and "Serra," with 2, 5, 4, and 5 clusters, respectively. However, it is important to note that there was not always a direct correlation between the number of employment clusters generated and the financing received from FUNDOPEM. For example, although "Serra" generated 5 municipalities with employment clusters, it shows no agglomerations with respect to values.

The amount financed by FUNDOPEM varies across regions, reflecting different levels of investment in each. Some municipalities received greater financing, such as "Metropolitano Delta do Jacuí," "Vale do Caí," "Vale do Rio dos Sinos," and "Vale do Taquari," with total values of 2, 1, 1, and 2 municipalities with clusters respectively, as shown in Table 02.

Figures 03, 04, 05, and 06 shows the composition of agglomerations with respect to projected jobs and FUNDOPEM values between 2011 and 2014 and the cumulative total for all years. In the maps, it is possible to observe that the distribution pattern of the fund did not undergo major changes over the years regarding employment and invested value. In red, the high-high pattern can be

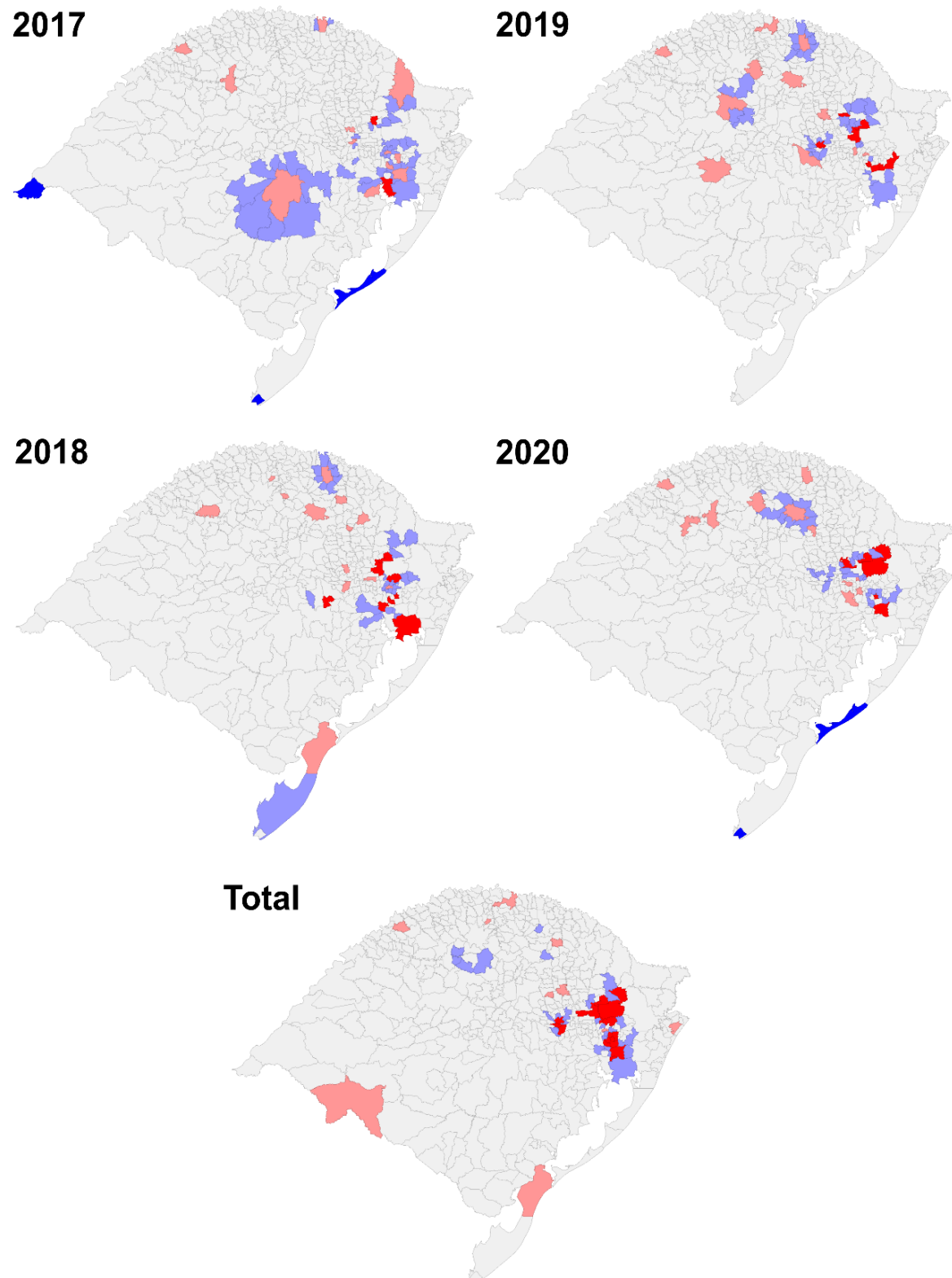
tracked, and in blue, the low-low pattern. The patterns show locations with high and low correlation among municipalities.

Figure 03 – LISA of Jobs Projected by FUNDOPEM in Municipalities of the State of Rio Grande do Sul between 2011 and 2016



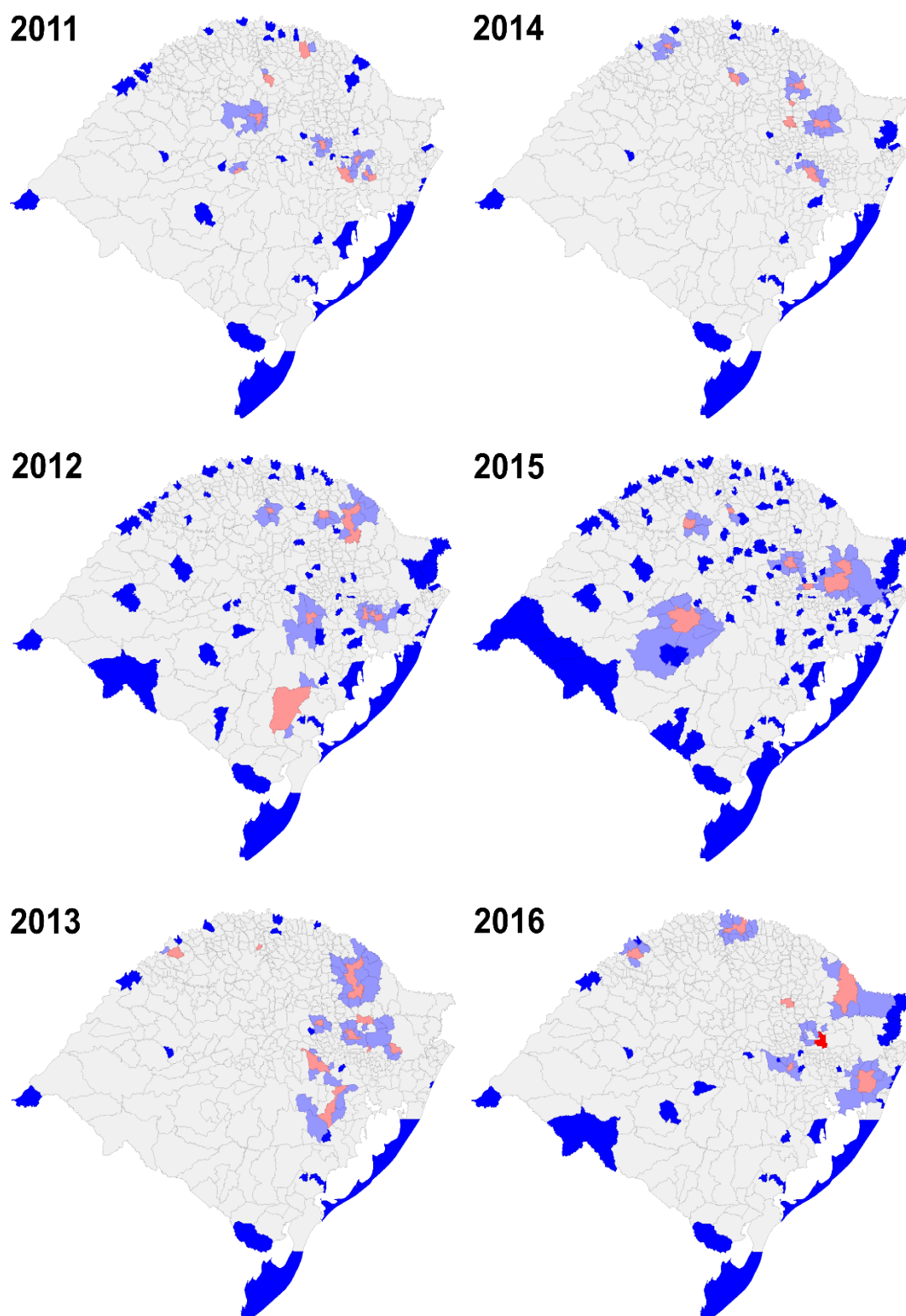
Source: Prepared based on information provided by the Rio Grande do Sul State Revenue Service (Sefaz/RS).

Figure 04 – LISA of Jobs Projected by FUNDOPEM in Municipalities of the State of Rio Grande do Sul between 2017 and 2020 and Cumulative Total



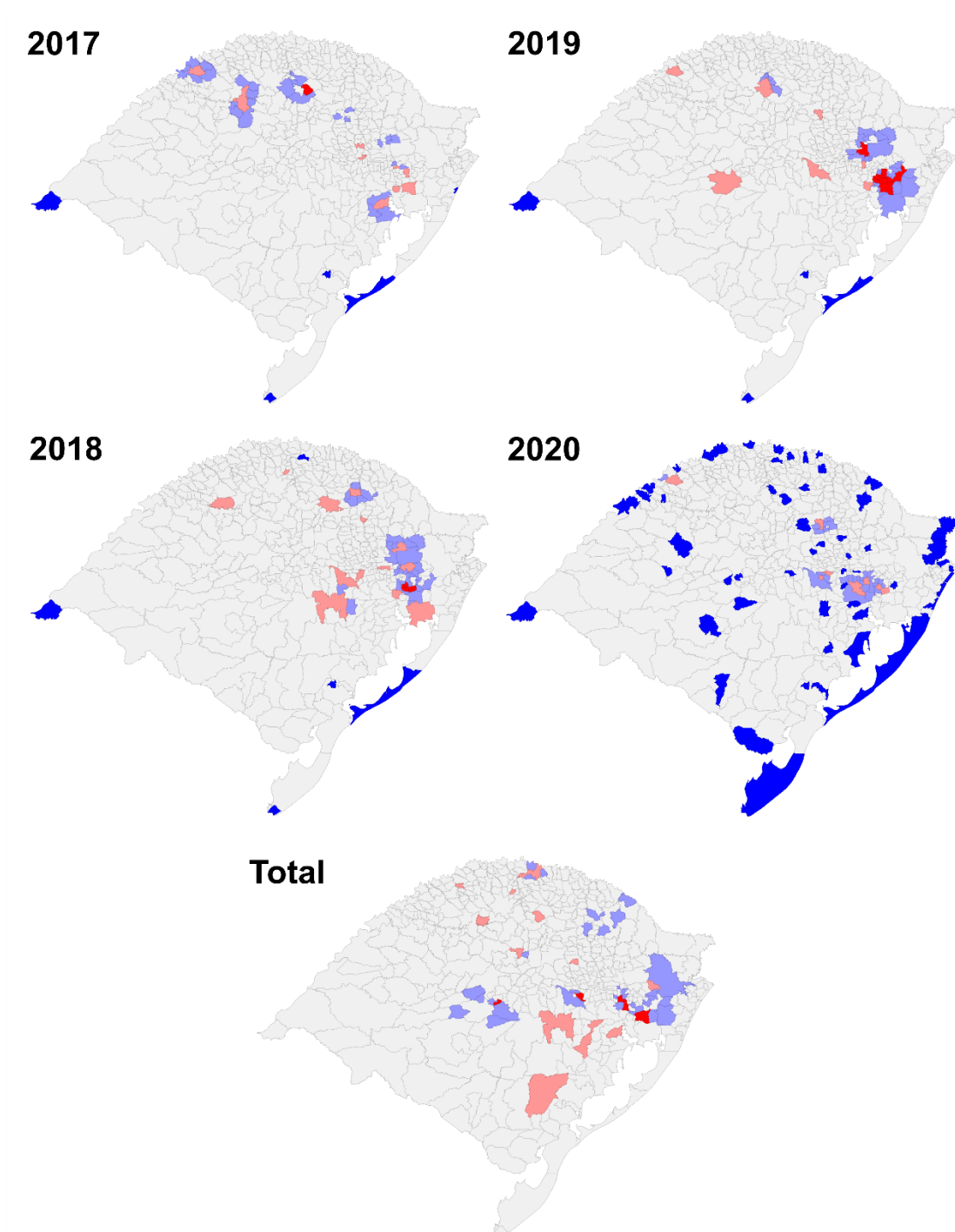
Source: Prepared based on information provided by the Rio Grande do Sul State Revenue Service (Sefaz/RS).

Figure 05 – LISA of Nominal Values (R\$) Projected by FUNDOPEM in Municipalities of the State of Rio Grande do Sul between 2011 and 2016



Source: Prepared based on information provided by the Rio Grande do Sul State Revenue Service (Sefaz/RS).

Figure 06 – LISA of Nominal Values (R\$) Projected by FUNDOPEM in Municipalities of the State of Rio Grande do Sul between 2017 and 2020 and Cumulative Total.



Source: Prepared based on information provided by the Rio Grande do Sul State Revenue Service (Sefaz/RS).

Broadly speaking, the spatial analysis indicates a concentration of values in project resources throughout the study period, primarily in the Porto Alegre Metropolitan Region and the Noroeste Rio-Grandense. This identifies the formation of clusters regarding the association of project resource values, which is not a positive outcome for the public policy in question, since the aim is spatial

deconcentration, bringing resources to municipalities that are deficient in investment and development.

Regarding the distribution of employment across the state, spatial autocorrelation was also observed over the years in the Metropolitan region, the Northwest (Noroeste), and the Northeast (Nordeste) of Rio Grande do Sul. The persistence of these clusters demonstrates the concentration of jobs in municipalities close to these regions, that is, geographic proximity also influences job creation. This evidence highlights the importance of extending the program to different regions so that new jobs are generated there and in neighboring municipalities. Similarly, the ideal outcome would be for there to be no correlation between regions, considering the program's effectiveness in addressing regional inequality. Thus, the results indicate that although changes have occurred over time, there is still greater development and investment in the metropolitan area in the aspects analyzed.

Appendix 1 provides an overview of the spatial analysis with the most significant correlations in the formation of employment clusters, as well as the values financed by FUNDOPEM and the results identified in the respective municipalities. Regarding projected employment, the Corede da Serra deserves special mention for presenting several municipalities with a High-High pattern, which had submitted projects to expand employment and whose neighboring municipalities are also working toward the same goal, aligning the Serra region in pursuit of employment expansion. In addition, municipalities in the Corede Vale do Rio dos Sinos, Vale do Taquari, and Metropolitana do Delta do Jacuí also showed clusters identifying agglomerations with surrounding municipalities in a High-High pattern.

It is also notable that the greatest emphasis in terms of High-High pattern correlations regarding financing values for new employment was distributed to the following COREDES: Vale do Taquari, Vale do Rio dos Sinos, Vale do Caí, Metropolitana do Delta do Jacuí, and Central. That is, they are largely municipalities in the Porto Alegre Metropolitan Region, which receive high monetary investment from FUNDOPEM and, likewise, bring together a greater number of neighboring municipalities with this same characteristic, thereby forming FUNDOPEM investment clusters. The dynamics of networks affect existing clusters by bringing benefits, even when no significant transformations occur, the mere fact of agglomeration impacts logistics, innovation, outcomes, and so on (MARASCHIN et al., 2022).

In this regard, it can be observed that the Southwest, Southeast, and Eastern Central regions of Rio Grande do Sul were not highlighted in terms of these variables. The Southern half, according to Cargnin (2014), is historically characterized by the predominance of agricultural and livestock activities. The reduction, cessation, or absence of investment in industrial activities and energy plants can generate negative effects on regions in the long term, such as stagnation and decline in economic activity, population migration, and financial dependence of municipalities on state and federal agencies (SANTOS; CASTILHO, 2023). Furthermore, this study has already highlighted in the theoretical discussion that FR5, which encompasses the municipalities of Corede Sul, has the lowest IDHM in Rio Grande do Sul, followed by FR6 (Corede Campanha and Fronteira Oeste), reinforcing the need and importance of efficient and effective action by social actors to deconcentrate industrial activity in the state and contribute to balanced and equitable development..

4.4 Practical Implications

The results of the study allow for advances in the discussion about FUNDOPEM's role in the dynamics of development expansion across the territory of Rio Grande do Sul. The historical concentration of investments and job creation in the most dynamic regions reveals the fragility of the program in fulfilling its objective (spatial deconcentration), even with constant amendments to the law governing the program. This reinforces already-existing trajectories of industrial concentration and, in fact, operates more as a competitiveness mechanism for companies than as an effective public policy directed at territorial development equity.

The identified clusters indicate that peripheral municipalities that are stagnant remain lacking in investment flows, and this deepens regional disparities. The spatial analysis very clearly shows the concentration in already-industrialized areas and the isolation of those municipalities with low capacity to attract investments due to their location and infrastructure. In this regard, a market failure arises due to location, one that can be corrected through state intervention by integrating infrastructure policies for these regions. In other words, the program alone is not capable of allocating new investments and requires complementary policies, such as the integration of the state's role, in order to jointly deliver greater attractiveness through differentiated territorial compensation strategies and to alter the productive structure and dependence on large industrial hubs.

The findings highlight the need to reorient FUNDOPEM to incorporate more robust criteria that can assess the territorial impact of these projects and their future capacity for expansion. Defining and incorporating explicit territorial equity targets and feasibility assessments relative to those targets could serve as a decision-support instrument. Compensation mechanisms for disadvantaged regions must be more attractive, in order to incentivize the allocation of more industries precisely where they are needed most. Furthermore, monitoring and transparency mechanisms are needed to enable broader and better evaluations of FUNDOPEM, preventing its contribution from benefiting only already-consolidated companies..

5 Concluding Remarks

The objective of this study consists of analyzing, through the framework of FUNDOPEM/RS's Regional Development Policy, regional inequality in the state of Rio Grande do Sul. FUNDOPEM is understood as a tool to promote partnership between private companies and the state government, fostering the socioeconomic, sustainable, and integrated development of Rio Grande do Sul. The program's purpose is to support industries through partial ICMS financing, reduce regional inequality, decentralize strategies related to industrial production, and promote competitiveness in the agro-industrial and industrial sectors. In addition, the program aims to create new job opportunities, advance technological development, innovation, and sustainability.

Based on the presented results, it can be observed that some regions of the state have been benefiting, with greater concentration of employment and economic development. In contrast, it was noted that in some municipalities the program has

not yet produced results that minimize the effects of regional inequality. The regions that most concentrate the benefits generated by this tool are located in the Northwest (Noroeste) and Northeast (Nordeste) of Rio Grande do Sul.

Another point worth highlighting is the program's contribution to the increase in job positions, surpassing the initially projected numbers throughout most of the study. The impacts on employment and industrial development in the regions are positive. However, the exemptions granted by the program are relatively high, and throughout the study a high average cost per projected job was identified. This finding aligns with the work of Bartik (2019), who reports that tax exemptions are frequently granted in amounts greater than the resulting benefits, as incentive costs are high.

Among the study's limitations, one aspect not analyzed concerns the viability of the incentive for the state's financial situation. As a suggestion for future studies, the following question remains: does the program, with the incentives it provides, pay for itself, that is, is the tax revenue collected by the state as a result of the jobs generated greater than the exemptions granted? Another limitation relates to the impossibility of comparing FUNDOPEM data from Rio Grande do Sul with the incentives of other Brazilian states. Although such information exists, each state adopts different formats, criteria, and methods of application, which prevents the construction of a comparable and homogeneous database. This lack of standardization restricts the analytical scope of the study and limits the possibility of broader interstate analyses, opening the door for future investigations that explore ways to standardize or integrate this data.

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Submitted: 28/02/2024

Accepted: 11/04/2026

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Fontes de financiamento: Esta pesquisa possui apoio financeiro da Agencia de Financiamento FAGERPS e SEFAZ/RS.

Appendix 1 - Clusters of Projected Jobs by FUNDOPEM in Municipalities of the State of Rio Grande do Sul between 2011 and 2016

COREDE	Municipality	LISA Proposed Employment	Employment Cluster	Significance Level	LISA FUNDOPEM Value	Employment Cluster	Significance Level
Alto da Serra do Botucaraí	Alto Alegre	-0.002		0.278	-0.288	Baixo-Alto	0.04
Alto Jacuí	Santa Bárbara do Sul	-0.299	Baixo-Alto	0.020	0.056		0.499
	Quinze de Novembro	0.109		0.262	-1.321	Alto-Baixo	0.001
Campos de Cima da Serra	Campestre da Serra	-0.327	Baixo-Alto	0.017	0.056		0.408
	Pinhal da Serra	0.023		0.266	-0.384	Baixo-Alto	0.037
Central	Itaara	-0.131		0.165	-0.449	Baixo-Alto	0.013
	São João do Polêsine	0.080		0.265	3.868	Alto-Alto	0.038
	São Martinho da Serra	-0.039		0.261	-0.247	Baixo-Alto	0.031
	Silveira Martins	-0.067		0.223	-0.353	Baixo-Alto	0.005
	Dilermando de Aguiar	-0.073		0.206	-0.323	Baixo-Alto	0.022
	Formigueiro	-0.131		0.149	-0.449	Baixo-Alto	0.018

Centro-Sul	São Jerônimo	0.002		0.397	-0.658	Alto-Baixo	0.001
Fronteira Noroeste	Santo Cristo	-0.039	Alto-Baixo	0.001	0.056		0.398
	Nova Candelária	0.012	Baixo-Alto	0.497	-1.130	Alto-Baixo	0.001
Fronteira Oeste	Santana do Livramento	-0.002	Alto-Baixo	0.001	0.056		0.186
Hortênsias	Nova Petrópolis	2.588	Alto-Alto	0.023	0.056		0.392
	Gramado	-0.445	Baixo-Alto	0.014	-0.167		0.089
	São Francisco de Paula	-0.038	Baixo-Alto	0.299	-0.160	Baixo-Alto	0.031
	Canela	-0.073		0.065	-1.061	Alto-Baixo	0.001
Jacuí Centro	Restinga Seca	-0.057		0.249	-0.217	Baixo-Alto	0.025
Litoral	Três Cachoeiras	-0.312	Alto-Baixo	0.001	0.056		0.36
Médio Alto Uruguai	Nonoai	-0.002	Alto-Baixo	0.001	-1.255	Alto-Baixo	0.001
	Rio dos Índios	0.049		0.272	-0.599	Baixo-Alto	0.026
	Gramado dos Loureiros	0.049		0.268	-0.599	Baixo-Alto	0.031
Metropolitano Delta do Jacuí	Viamão	-0.484	Baixo-Alto	0.002	-0.074		0.283
	Alvorada	8.110	Alto-Alto	0.003	-0.168		0.128
	Cachoeirinha	-0.640	Baixo-Alto	0.002	0.008		0.309
	Glorinha	-0.473	Baixo-Alto	0.019	-0.591	Baixo-Alto	0.007
	Gravataí	6.466	Alto-Alto	0.013	0.967	Alto-Alto	0.017
	Santo Antônio Da Patrulha	-0.049		0.233	-0.231	Baixo-Alto	0.02
Nordeste	Guaíba	0.059		0.457	-0.996	Alto-Baixo	0.001
	Tapejara	-1.446	Alto-Baixo	0.001	0.056		0.353
	Ibiaçá	-0.206		0.107	-0.343	Baixo-Alto	0.01
	Ibiraiaras	0.031		0.4	-0.422	Baixo-Alto	0.008
Noroeste Colonial	Capão Bonito do Sul	-0.076	Baixo-Alto	0.184	-0.384	Baixo-Alto	0.043
	Pejuçara	-0.446	Baixo-Alto	0.012	0.056		0.318
	Bozano	-0.413	Baixo-Alto	0.018	-0.073		0.194
Norte	Ajuricaba	-0.282	Baixo-Alto	0.022	-0.591	Alto-Baixo	0.001
	Erebango	-0.342	Baixo-Alto	0.022	0.056		0.309
Paranhana Encosta da Serra	Faxinalzinho	0.066	Baixo-Alto	0.394	-0.381	Baixo-Alto	0.049
	Morro Reuter	-0.363	Baixo-Alto	0.026	0.056		0.341
	Presidente Lucena	-0.956	Alto-Baixo	0.001	0.056		0.361
	Taquara	-0.175	Baixo-Alto	0.003	-0.863		0.476
	Igrejinha	-0.465		0.349	-0.282	Baixo-Alto	0.031
	Parobé	-0.067		0.202	-0.366	Baixo-Alto	0.007
	Rolante	0.049		0.379	-0.366	Baixo-Alto	0.01
Produção	Três Coroas	-0.024		0.296	-0.411	Baixo-Alto	0.006
	Mato Castelhano	-0.252	Baixo-Alto	0.046	0.056		0.36
	Ciríaco	0.074		0.315	-0.186	Baixo-Alto	0.027
Rio da Várzea	Coqueiros do Sul	-0.018		0.26	-0.253	Alto-Baixo	0.001
	Lajeado do Bugre	-0.075	Alto-Baixo	0.001	-0.448	Alto-Baixo	0.001
Serra	Nova Roma do Sul	-0.187	Baixo-Alto	0.023	-0.510		0.351
	São Marcos	-0.043	Baixo-Alto	0.01	0.056		0.253
	Caxias do Sul	3.866	Alto-Alto	0.024	-0.055		0.218
	Farroupilha	3.916	Alto-Alto	0.011	-0.012		0.334
	Flores da Cunha	0.991	Alto-Alto	0.008	-0.046		0.224
	Garibaldi	0.231	Alto-Alto	0.041	0.056		0.338
	Guaporé	-0.111	Alto-Baixo	0.001	0.056		0.478

	Pinto Bandeira	-0.459	Baixo-Alto	0.017	-0.104		0.165
Sul	Rio Grande	-0.106	Alto-Baixo	0.001	0.056		0.265
	Canguçu	-0.003		0.331	-0.015	Alto-Baixo	0.001
Vale do Caí	Linha Nova	-0.374	Baixo-Alto	0.021	0.056		0.307
	Vale Real	5.013	Alto-Alto	0.001	0.056		0.322
	Alto Feliz	-0.425	Baixo-Alto	0.01	-0.169		0.074
	São Jose do Hortêncio	-0.167		0.118	-0.215	Baixo-Alto	0.036
	São Sebastião do Caí	-0.007		0.3	4.782	Alto-Alto	0.021
	São Vendelino	0.018		0.202	-0.331	Baixo-Alto	0.03
	Capela de Santana	-0.222		0.105	-0.477	Baixo-Alto	0.002
	Feliz	0.406		0.104	-0.306	Baixo-Alto	0.011
	Harmonia	-0.038		0.275	-0.450	Baixo-Alto	0.004
Vale do Rio dos Sinos	Ivoti	-0.680	Baixo-Alto	0.002	0.056		0.363
	Nova Santa Rita	-0.128	Baixo-Alto	0.036	0.424		0.269
	Novo Hamburgo	7.311	Alto-Alto	0.007	-0.164	Baixo-Alto	0.038
	São Leopoldo	0.794	Alto-Alto	0.019	-0.124		0.138
	Sapiranga	0.298	Alto-Alto	0.007	-0.155		0.056
	Sapucaia do Sul	-0.496	Baixo-Alto	0.002	-0.198	Baixo-Alto	0.049
	Campo Bom	0.913	Alto-Alto	0.003	0.056		0.186
	Dois Irmãos	5.428	Alto-Alto	0.02	0.056		0.32
	Estância Velha	-0.236	Baixo-Alto	0.015	-0.088		0.172
	Esteio	-0.339	Baixo-Alto	0.042	-0.155		0.115
	Portão	-0.146		0.48	2.200	Alto-Alto	0.041
Vale do Rio Pardo	Araricá	0.043		0.37	-0.366	Baixo-Alto	0.015
	Rio Pardo	-0.067		0.093	-0.520	Alto-Baixo	0.001
Vale do Taquari	Venâncio Aires	0.040		0.337	-0.146	Baixo-Alto	0.04
	Ilópolis	-0.002	Alto-Baixo	0.001	-1.372	Alto-Baixo	0.001
	Lajeado	5.782	Alto-Alto	0.016	-0.034		0.261
	Marques de Souza	-0.447	Baixo-Alto	0.007	0.056		0.412
	Roca Sales	-0.394	Baixo-Alto	0.008	-0.098		0.171
	Arroio do Meio	6.687	Alto-Alto	0.009	0.056		0.449
	Capitão	-0.714	Baixo-Alto	0.005	0.056		0.246
	Colinas	-0.461	Baixo-Alto	0.009	-0.045		0.238
	Cruzeiro do Sul	-0.173	Baixo-Alto	0.02	2.210	Alto-Alto	0.028
	Estrela	2.237	Alto-Alto	0.003	-0.160		0.071
	Santa Clara do Sul	-0.258		0.055	-0.185	Baixo-Alto	0.045

Source: Prepared based on information provided by the Rio Grande do Sul State Revenue Service (Sefaz/RS).