SOCIO-ECONOMIC PROFILE OF THE MUNICIPALITIES OF RIO GRANDE DO SUL, BRAZIL, AND REGIONAL INEQUALITIES

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Abstract

This article profiles the municipalities of Rio Grande do Sul according to socio-economic indicators, using data from the censuses of cattle husbandry and farming held in 1995/96 and of population in 1996. The conceptual framework followed considers that rural poverty and inequalities create obstacles that prevent individuals and/or their families from having sufficient means to satisfy their basic needs. The methodology used is based on factor analysis and classification of municipalities, grouping them into five classes according to their similarities.

Key-words: regional inequalities, rural poverty, typology, factor analysis.

1. Introduction

This article positions itself within the context of the current thematic and analytic renovation of the rural social sciences, which started in the previous decade and has since been fostering studies on rural poverty, social exclusion, and public policy aimed at reducing social inequalities in rural areas. These issues are being taken up again after

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having been the object of academic studies and initiatives on the part of governmental agencies and international organizations in the 1960s and 1970s.[2] However, it is important to highlight that rural poverty and hunger, conditions that the modernization of production intended to abolish, are still current for a large part of the population of Brazil and of Latin America as a whole (International Fund for Agricultural Development - FIDA, 2000, 2001).

It is not within the aims of this article to deepen discussions of these conditions, but to identify and characterize the rural populations of the municipalities of Rio Grande do Sul based on socio-economic indicators and relate these indicators to some aspects of the state's agrarian structure. The authors believe that an analytical, descriptive analysis of the regions, as well as of the characteristics of the municipalities and their people, is a fundamental stage in the reduction or eradication of rural poverty, hunger, and environmental degradation.[3] Therefore, this article intends to construct a typology of the municipalities of Rio Grande do Sul based on a series of socio-economic indicators that provide grounds for the assessment of the population's quality of life and the ways in which natural resources are used.

2. Analytical Elements and a Brief Description of Recent Agrarian Development in Rio Grande Do Sul

Using an empirical analysis based on socio-economic indicators of Rio Grande do Sul's municipalities, this study contributes to the debate about social and regional inequalities and poverty. It is intended to identify some elements of analysis that show the unequal effects of the

[2] For a more detailed analysis, see Hoffmann (1984, 1995) e Graziano da Silva (1995).

[3] It should also be noted that this paper incorporates information and results of earlier studies by the authors, especially those carried out in the context of consultancies performed on behalf of the government of the state of Rio Grande do Sul (Schneider e Waquil, 2000; Schneider e Brumer, 1997).

state's agriculture development process over the last decades.

It is not within the scope of this article to provide a theoretical contribution to the issue of rural poverty, since its objectives lie more precisely in the analysis of socio-economic indicators that reflect the realities found in the municipalities of Rio Grande do Sul. The conceptual framework is inspired by theoretical considerations that define the social phenomenon of rural poverty as a situation of need which prevents individuals and/or their families from having sufficient means to satisfy their basic needs (Rocha, 2000; Romão, 1993). According to a recent study carried out by the Fundo Internacional de Desenvolvimento (FIDA), this does not mean that rural poverty should be taken as an attribute of certain individuals or groups; on the contrary, it should be understood as a consequence of the dynamic process of human relationships and interactions which are expressed in historical, social, political and economic terms (FIDA, 2000, p. 13).

The main argument developed in this study is that poverty and inequality are not always the result of unequal access to fundamental agriculture production factors, such as land and technology. That is, we are opposed to the idea that the impoverishment of rural populations is determined by natural factors, such as the quality and capacity of soils, or by the forms of use of other available factors of production, such as the labor force and the means of production (machinery, implements, etc)[4]. In this sense, it is understood that social exclusion, degradation of natural resources, and regional imbalances, the most immediate effects of poverty and inequality, do not inexorably result from the inadequate use of production factors, principally land and labor.

Of course, on smaller properties in regions where soil and

[4] For a better understanding of this analytical frame of reference and its application in the explanation of the recent impoverishment of Brazilian agriculture, see Alves, Lopes e Contini (1999).

topography are less favorable to intensive agricultural practices, it is difficult to significantly improve producer income. However, an assessment of the dynamics of Rio Grande do Sul's agriculture sector over recent decades shows that unfavorable soil conditions and the predominance of small properties have not prevented improvement of rural population's quality of life in some regions. On the other hand, it is also possible to find areas where soil conditions favorable to farming and ranching activities did not result in the expected improvement of the social and economic conditions (Waquil, 1992). We intend to argue that in Rio Grande do Sul, the worst socio-economic indicators - those which identify and characterize the phenomenon of rural poverty and the processes of natural resource degradation – do not exclusively result from variables related to agricultural production factors, such as soil type, topology, or the use of productive resources on small properties. Our research is based on the cross-comparison of a set of indicators drawn from the Brazilian farming and cattle census of 1995/96,

An analysis of the process of transformation experienced by Rio Grande do Sul's agriculture sector in the last four decades shows that significant social and economic differentiation in the productive structure started in the 1960s. During this period, many agrarian regions of the state were introduced to the soybean boom, which led agricultural producers to modify their productive processes and their traditional agricultural practices. Since the end of the 1970s, there has been a rapid growth in the supply of agricultural produce and a reduction of agricultural produce prices, a result of the incorporation of new areas and an increase in agricultural productivity.

The recent behavior of Rio Grande do Sul's farming and cattle husbandry sector is characterized by significant productivity growth. According to data from the Foundation of Economy and Statistics (FEE), the average rate of growth of Rio Grande do Sul's farming and cattle husbandry sector between 1990 and 1998 was 2.4% per year. In 1999, crops production alone boasted growth of 12.4%. The

impressive performance is fundamentally due to increased productivity by grain producers. Though the acreage devoted to soybean, rice, and corn cultivation diminished between 1980 and 1995, the amount harvested increased. In 1980, there were approximately 8 million hectares used for growing grains, yielding around 12.3 million metric tons; by 1995 the planted area had been reduced to 6.3 million hectares while production had risen to 17.3 million metric tons. In these 15 years there was an increase of 78% in the physical productivity of these crops, growing from 1.53 to 2.72 metric tons per hectare, a 41% increase in the total grain production, and a 20.4% reduction in area under grain cultivation (Grando et al, 1996). However, this improved production efficiency has not fostered a proportional improvement in the income of farmers nor in their living conditions.

These changes are even more significant, given that in the past few years there has been a constant reduction in the number of families involved in agriculture activities. Based on data collected by the Brazilian Institute of Geography and Statistics (IBGE) through its National Home Survey (PNAD), a recent study found that between 1981 and 1987 there was a sharp reduction in the number of people involved in agricultural activities: from 1.160 million to 815 thousand, a loss of 345 thousand jobs for those occupied in agriculture activities. (Schneider and Navarro, 1999)

These data seem to suggest that social and economic differentiation within Rio Grande do Sul's farming and husbandry sector is worsening. On one hand, there are social categories and landowner groups that employ current agricultural technologies, especially those related to agribusiness complexes, and operate beyond local, regional, or national economic limitations (Waquil, 1999). On the other hand, there are social categories and rural enterprises excluded from this hegemonic pattern due to the large scale of production required and the high financial costs of current technology. Many farmers are unable to take advantage of the sector's new production dynamic and because

of this fall behind in the quest for social and economic growth.

To examine this line of argument, a study of the typology of Rio Grande do Sul's municipalities based on socio-economic indicators is now presented. The principal objective of this study is to characterize groups of municipalities and demonstrate that the state's rural poverty and regional inequalities occur as much in areas with a predominance of small properties as in those made up of larger holdings.

3. Methodology

3.1 Sources of data and research objective

The database used in this study is a set of 16 variables, 15 of which came from the Cattle Husbandry and Farming Census of 1995/96 and the other from the Population Census of 1996. The variables were chosen with a view to meeting a request made by the Executive Secretariat of Rio Grande do Sul - Rural, a governmental program to reduce rural poverty. The objective was to construct a methodology for the classification of the state's municipalities using socio-economic indicators: personal income, land tenure structure, handling and use of production resources, and infrastructure[5]. The census data were used to construct the variables shown below, which were later processed based on an analysis of each one of the state's 427 municipalities existing in 1996[6].

[5] Although based on different objectives, it is worth consulting the pioneering work of Kageyama e Leone (1999), was of great value for this article.

[6] It should be noted that data refering to the areas of the 70 new municipalities created in Rio Grande do Sul since 1996 appear in this study included with the data of the respective municipalities from which they were made independent.

3.2. Variables used

The 16 variables used to form the set that was investigated by means of factor analysis are shown below. The variables are presented using Portuguese contractions, as they appear in the tables.

1. POPRURAL: Proportion of the rural population in relation to the total population of the municipality. Unit: %.
2. PO_EA: Average number of people per rural property. Unit: people per rural property.
3. VBP_EA: Gross value of cattle husbandry and agricultural production per property. Unit: R$ per property.
4. VBP_HA: Gross value of cattle husbandry and agricultural production per hectare. Unit: R$ perc hectare.
5. VBP_PO: Gross value of cattle husbandry and agricultural production per person. Unit: R$ per person.
6. DESP_EA: Maintenance and other costs of the property. Unit: R$ per property.
7. AREAMED: Average area of the properties: Unit: ha.
8. P_ATE_10: Proportion of properties of up to 10 hectares. Unit: %.
9. P_ATE_20: Proportion of properties of up to 20 hectares. Unit: %.
10. P_ATE_50: Proportion of properties of up to 50 hectares. Unit: %.
11. P_PRCONS: Proportion of properties that practice conservation. Unit: %.
12. P_MATAS: Proportion of land with natural or planted forests. Unit: %.
13. P_FINAN: Proportion of properties that receive financing. Unit: %.
14. FINAN_EA: Average value of financing per property. Unit: R$ per property.
15. P_ASSTEC: Proportion of properties receiving technical assistance. Unit: %.
16. P_ELETR: Proportion of properties using electricity. Unit: %.

3.3. Factor analysis

Factor analysis is a statistical technique used to identify a small number of factors (non-observable dimensions) to represent complex relationships among sets of variables. In other words, factor analysis highlights the links among variables, grouping them according to their correlations, which result from shared non-observable factors.

In factor analysis, the factors are estimated as linear combinations of the observable variables. The general expression for the jth factor (F_j) is:

$$F_j = \sum_{i=1}^{p} w_{ij}\, x_i = w_{1j}\, x_1 + w_{2j}\, x_2 + \ldots + w_{pj}\, x_p$$

where w_{ij} are the factor coefficients, x_i the observable variables, and p the number of variables.

The phases developed in factor analysis are usually: (i) calculation of the correlation matrix among all the variables; (ii) enumeration and extraction of factors; (iii) rotation of factors, transforming them so as to facilitate their interpretation; (iv) and calculation of the factorial scores. These scores are then used in other analyses, such as the formation of clusters, making it possible to classify individuals.

As one of the aims of factor analysis is to find factors that make it possible to explain the correlations among variables, these variables must correlate with each other for the model to be appropriate. Bartlett's sphericity test can be used to test the hypothesis that the correlation matrix is an identity matrix, consisting of the $?^2$ test (chi-squared transformation) of the determinant of the correlation matrix. Another way to test the appropriateness of the factor analysis is by means of the Kaiser-Meyer-Olkin measurement (KMO), which compares the values of the coefficients of correlation observed with the values of the partial correlation coefficients, which is calculated as follows:

$$KMO = \frac{\sum \sum_{i \neq j} r_{ij}^2}{\sum \sum_{i \neq j} r_{ij}^2 + \sum \sum_{i \neq j} a_{ij}^2}$$

where r_{ij} is the coefficient of simple correlation among the variables x_i and x_j, and a_{ij} is the coefficient of partial correlation among the variables x_i e x_j. If the KMO measurement is close to one, factor analysis can be applied.

In the second stage of factor analysis, we advance to the

extraction of factors. One of the methods of extraction is the analysis of the principal components, which consists of forming linear combinations of the observed variables. At this point, it is important to express the variables in the standardized way, with zero mean and variance equal to one. Even when the matrix of factors obtained in the extraction stage points to a relation between the factors and observed variables, it is usually difficult to interpret them, since most factors correlate with several variables. The purpose of rotation is to find a simpler structure, that is, each factor with non-zero coefficients for only some variables, and each variable with non-zero coefficients for only some factors. The rotation affects the percentage of the total variance explained by each one of the factors, but does not affect the percentage of the total variance explained by the set of factors. In other words, the rotation redistributes the explained variance among the various factors.

Finally, the factorial scores are calculated for each individual. As each factor is estimated as a linear combination of the original variables, for the observation k, the score of the factor j is given by:

$$F_{jk} = \sum_{i=1}^{p} w_{ij}\, x_{ik} = w_{1j}\, x_{1k} + w_{2j}\, x_{2k} + \ldots + w_{pj}\, x_{pk}$$

where x_{ik} is the standardized value of the variable i for the observation k, and w_{ij} is the factorial coefficient associated to the variable i and the j.

3.4. The classification procedure

Classification is meant to identify homogeneous groups or clusters. In the same way as factor analysis highlights the links among variables, grouping them based on their correlations, classification highlights the links among observations, grouping them based on their similarities. The observations (here, the municipalities of Rio Grande do Sul) are divided into subsets, according to the degree of proximity (similarity). This degree of proximity or similarity among the observations is related to the concept of distance, that is, the smaller the distance

between two individuals, the larger the similarity. The distance can be measured in several ways, the most common one being the squared Euclidian distance, given by the sum of the squares of the differences of the values of all the variables. Thus, the distance between the observation k and the observation l is given by:

$$D^2_{k,l} = \sum_{i=1}^{p} (x_{i,k} - x_{i,l})^2$$

For large databases, the most common method of grouping individuals in subsets is *K-means*, which consists of previously defining the number of groups and the center of each group, and assigning each observation to the group whose center lies the shortest distance from it. When the centers of the groups are not previously known, they must be estimated by means of the available data. In the current analysis, five groups are defined to classify municipalities according to their similarities based on factorial scores. Results are shown as follows.

4. Results description

In the current analysis, the value found for the Bartlett's sphericity test is 7,373.24, which implies the rejection of the identity matrix hypothesis and, therefore, points to the appropriateness of the factorial model. In addition, the KMO measurement found (0.7727) confirms the adequacy of the analysis. Four factors were extracted that, jointly, explain 76.1% of the total variation of the indicators. After rotation, the four factors are the following:

Chart 1- Composition of the factors extracted

Factor 1 (Use of production resources and income)	Factor 2 (Tenure structure)	Factor 3 (Infrastructure and productivity)	Factor 4 (Use of production resources)
VBP_EA	AREAMED	P_ELETR	P_ASSTEC
DESP_EA	P_ATE_10	P_ASSTEC	P_MATAS
VBP_PO	P_ATE_20	VBP_HA	P_FINANC
FINAN_EA	P_ATE_50	P_MATAS	P_PRCONS
AREAMED	VBP_HA		POPRURAL
PO_EA			
POPRURAL			

It is by means of this set of four factors that the municipalities' homogeneity is highlighted in terms of the socio-economic indicators mentioned earlier. For example, Factor 1 congregates variables that measure the use of production resources and the income obtained from rural properties. It is an indirect measurement of the consumption of intermediate goods, and points, therefore, to intersectorail relations.

Before examining the groups of municipalities that resulted from the municipalities' classification according to the extracted factors, some basic statistics connected with the selected set of variables should be discussed. It should be noted that the results shown in Table 1 refer to means, standard deviations, and minimum and maximum values existing between municipalities, each of which is given equal weight. In this sense, Table 1shows that the proportion of rural population in the 'average municipality' is 51.83%, but cannot be interpreted as suggesting that the total population of the state is divided almost equally between rural and urban.

Table 1. Basic statistics of the 16 variables selected

Variables	Means	Standard deviation	Minimum	Maximum
POPRURAL	51.83	25.72	0.00	94.01
PO_EA	3.27	0.62	1.79	6.25
VBP_EA	16,087.52	14,826.86	3,017.00	128,791.00
VBP_HA	540.39	423.74	47.00	3,224.00
VBP_PO	4,704.06	3,196.96	957.00	21,524.00
DESP_EA	8,701.25	10,370.22	480.00	92,438.00
AREAMED	52.12	74.79	6.12	584.76
P_ATE_10	34.21	14.12	6.14	83.02
P_ATE_20	61.67	18.95	10.71	96.94
P_ATE_50	85.30	16.56	21.93	100.00
P_PRCONS	44.42	27.60	0.00	97.00
P_MATAS	16.25	9.15	0.29	59.90
P_FINAN	18.34	14.83	0.00	66.89
FINAN_EA	1,365.50	2,454.92	0.00	22,879.00
P_ASSTEC	50.55	22.99	0.00	98.66
P_ELETR	74.75	16.50	7.86	100.00

Source: IBGE.

As concerns the two population indicators (POPRURAL e PO_EA), it is worth mentioning that though on average the municipalities have 51.83% of their population living in rural areas, some municipalities that almost entirely rural (94.01%) others almost entirely urban. Also, though the average number of people living on a property is 3.27, there is great variation between municipalities, from a minimum of 1.79 people per property, to 6.25 people per property.

The set of variables giving information on property revenues and expenses includes maintenance expenses and other costs (DESP_EA) and the gross value of production per property (VPB_EA), per hectare (VBP_HA) and per person (VBP_PO). Large variations

were found, as exemplified by the high standard deviations and by the discrepancy between minimum and maximum values among municipalities, for example VBP_EA ranged from R$ 3,017.00 to R$ 128,791.00.

The municipalities' tenure structure presented a high standard deviation (74.79 ha), with average municipal property sizes ranging from a minimum of 6.12 hectares to a maximum of 584.76. The average area of holdings for all studied municipalities was 52.12 hectares. To better grasp tenure structure differences between individual municipalities, variables were created that grouped holdings according to their size: up to 10, up to 20, and up to 50 hectares. For the municipalities of Rio Grande do Sul, most properties (61.67%) are up to 20 hectares large. When this range is extended to up to 50 hectares, 85.30% of the properties are accounted for. Although previously known, these data reaffirm the social and economic weight and the numerical importance of family-run agricultural businesses in the state of Rio Grande do Sul.

Another significant aspect that should be highlighted is access to and the form of use of production resources. As an average for all the municipalities studied, 50.55% of properties received technical assistance and 44.42% of the properties use some type of conservationist practice, such as leveling, contouring, etc. The data regarding access to and use of financing (P_FINAN e FINAN_EA) show another characteristic of Rio Grande do Sul's agriculture sector: its degree of integration with other economic sectors, mainly commerce and industry.

5. Homogeneous groups

Only by making comparisons can the basic statistics for the state as a whole be employed for effective explanation. In this article, homogeneous groups of municipalities are constructed for the purpose of comparison. Five groups of homogeneous municipalities were isolated

and are presented in Table 2. However, it is important to mention that within any given group it is possible to find differences between individuals (municipalities) if one single variable is considered in isolation.

Group A Municipalities (Small, poor and predominantly rural)

In Group A municipalities, an average 61.71% of the population lives in rural locations, average land holding size is 28.53 hectares, and more than 90% of the holdings are smaller than 50 hectares. The labor force has a low productivity rate, with VBP per person (R$ 3,751.96) below the state average. Even though the number of people occupied on the properties (3.26 people) is almost equal to the state average, the average VBP per property (R$ 12,353.83) is the lowest among all the groups. 63.30% of the properties use conservationist practices and 27.30% use financing, although with low average value (R$ 1,122.32).

Table 2. Averages for the 16 variables according to the homogeneous groups of municipalities

Variables	RS	A	B	C	D	E
POPRURAL	51.83	61.71	35.74	49.51	22.39	2.62
PO_EA	3.27	3.26	3.21	3.09	4.59	5.82
VBP_EA	16,087.52	12,353.83	15,762.59	14,804.63	70,825.16	111,231.
VBP_HA	540.39	480.97	177.50	935.51	260.57	3,205.34
VBP_PO	4,704.06	3,751.96	4,827.09	4,782.41	15,346.20	19,114.8
DESP_EA	8,701.25	6,042.02	8,112.76	8,390.33	44,283.63	92,437.5
AREAMED	52.12	28.53	111.87	17.39	304.19	34.70
P_ATE_10	34.21	34.95	21.76	44.46	15.52	52.13
P_ATE_20	61.67	65.57	39.66	75.52	25.42	68.09
P_ATE_50	85.30	90.48	65.91	95.87	42.02	85.11
P_PRCONS	44.42	63.30	22.39	25.85	38.93	19.68
P_MATAS	16.25	13.13	15.74	23.79	7.53	13.46
P_FINAN	18.34	27.30	7.83	9.25	18.24	3.19
FINAN_EA	1,365.50	1,122.32	1,315.21	473.18	11,233.40	526.60
P_ASSTEC	50.55	52.82	37.08	55.53	54.98	46.28
P_ELETR	74.75	73.76	61.81	87.00	68.58	78.19
Municipalities	427	214	83	113	16	1

Fonte: Results of the research.

Group B (Large, poor and predominantly urban)

With the exception of the poverty indicators, Group B municipalities have noticeably different characteristics than Group A. One of most distinctive traits Group B municipalities share is the large size of rural holdings, an average 111.87 hectares. On these properties, the productivity of the land is low, with a VBP per hectare (R$ 177.50) only one third of the state average. Two other variables are among the reasons for this low rate of productivity: only 37.08% of the Group B holdings use technical assistance, less than any other group; and only 61.81% of the holdings have electricity, again lowest of all the groups. Group B municipalities are also more urban than rural, with an average of 64.26 of their populations living in urban areas, a percentage noticeably higher than the state average.

Group C (Small, developed and relatively rural)

This group is formed of municipalities in which the average size of properties is the smallest in the state, an average of 17.39 hectares. Taking into account the categories according to intervals of area, 75.52% of the properties are no larger than 20 hectares, and 95.87% are no larger than 50 hectares. Despite this, we find that this group's land productivity to be the second highest among all groups (R$ 935.51), only below Group E, which will be shown to be an exception. However, performance is simply average when indicators of the productivity of the labor force (R$ 4,782.41) and revenue per property (R$ 14,804.63) are analyzed. The values of these two indicators might be associated with the low number of property owners that receive financing (9.25%). 49.51% of the people living in Group C municipalities live in rural areas, closest of all groups to the state rural/urban average. Though Group C is comprised of small holdings and is relatively rural, the municipalities in this group have superior infrastructure, with 87% of the properties

served with electric power.

Group D (Large, developed and predominantly urban)

The set of Group D municipalities are characterized by large scale agriculture and cattle husbandry operations and have the highest average property area, 304.19 hectares. Average maintenance expenses and other costs (R$ 44,283.63) in these municipalities are five times higher than the state average. Though the Group D per hectare productivity indicator (VBP per hectare) is only half the state average, productivity per property and per person is approximately four times higher than the state average. It was found that the value of financing used by Group D holdings is almost ten times higher than the state average, and the holding owners employ conservationist practices less frequently than the state average. The rural areas of municipalities forming this group are relatively under-populated, housing only 22.39% of the population. Because concentrated land tenure in Group D rural areas has imposed limits to population growth, this relatively low percentage of rural dwellers is not surprising.

Group E (Small, developed and essentially urban)

The last group contains only the municipality of Porto Alegre, the state capital. A very small proportion of Porto Alegre's population live in rural areas (2.62%). The municipality's agricultural properties average only 34.70 hectares with only slightly more than 14% of them larger than 50 hectares. The VBP per agricultural property is the highest in the state, and the same is true for the rates of productivity of land and labor. Fewer than half (46.28%) of the properties use technical assistance and fewer than 20% use conservationist practices. It is probable that many of these rural properties are hobby farms or belong to people working in the city of Porto Alegre.

A synthetic chart was made based on the characteristics presented for each group. The chart, Chart 2, is comprised of some variables considered as the most relevant ones among the sets of indicators selected and is a didactic way of presenting the results of factor and cluster analysis.

Chart 2 clearly shows the existence of two groups of municipalities ("A" and "B") which present social, economic, and productive indicators that mark rural poverty in Rio Grande do Sul. However, a direct comparison between groups "A" and "B" shows important differences in the property size indicator and the proportion of the population living in rural areas. Group A, as mentioned before, is formed of municipalities made up of small holdings with a high proportion of the population living in rural areas; whereas, Group B municipalities are made up of medium and large sized properties with a majority of the population living in urban areas. Despite this noticeable difference, both groups present indicators of income, productivity and infrastructure that can be considered insufficient to insure preservation of natural resources and the population's quality of life through economic exploitation of the land.

Chart 2. Characterization of the homogeneous groups

	A	B	C	D	E
Rural population	High	Low	Medium	Low	Low
Size of properties	Small	Large	Small	Large	Small
Infrastructure	Medium	Low	High	High	High
Revenue per property	Low	Medium	Medium	High	High
Productivity of the land	Medium	Low	High	Low	High
Productivity of the labor force	Low	Medium	Medium	High	High

Map 1 shows the municipalities that constitute the five homogeneous groups classified using factor analysis. This map makes it possible to better grasp each of the groups of municipalities dealt with in this study. It is important to highlight the formation of three highly

homogeneous and contiguous groups: A, B, and C. The intention here is to emphasize, that factor and cluster analysis shows a surprising regional homogeneity throughout the agrarian structure of Rio Grande do Sul.

Analyzing Group A, one finds that it contains regions in the northern half of the state, *Alto Uruguai* and part of *Planalto Médio*, and some municipalities in the state's southeastern *Serra do Sudeste* region. These regions are characterized by small holdings and a high proportion of people living in rural areas. On the other hand, Group B includes the areas in the state's south, the regions *Campanha*, *Depressão Centra* and part of the *Missões* region, and a micro region in the state's northeast, *Campos de Cima da Serra* . These areas are comprised of medium and large sized holdings where large cattle ranches predominate. For this reason, these are also areas of low rural population density. The municipalities that constitute Group C are part of micro regions located the *Serra do Nordeste, Encosta Inferior* and *Encosta Superior,* and were the first German and Italian immigrant settlements. Soils in this area are not appropriate for agricultural activities; but the indicators of land productivity and labor force are above the state's average, demonstrating that there is no inexorable relation between soil type and farmer revenue. Group D municipalities, characterized by large sized holdings, are distinctive as a group because they present high revenue indicators, a result of combining irrigated rice growing and cattle husbandry.

Examination of the findings presented in this study emphasizes that income generation, resource preservation, and the quality of life afforded by agricultural productive units depend, among other factors, on productive performance, adopted cultivation systems, individual competence and, today, on the productive unit's placement in a favorable social and economic environment.

6. Final comments

It is not the objective of this study to make definitive conclusions concerning the distribution of Rio Grande do Sul's municipalities. In fact, the main lesson that can be drawn from this article is that additional studies are needed to provide a more detailed image of the relation between agricultural production indicators and the socio-economic variables used in this paper.

Based on the hypothesis that rural poverty in Rio Grande do Sul is a consequence of the very dynamics of the agricultural development that has taken place in the state since the sixties, this study aimed at presenting evidence of the unequal and exclusory side of this process. Sixteen variables were selected to yield indicators of population, income, tenure structure, and the handling and use of production resources. These variables were later organized according to the degree of similarity among the municipalities of the state. The results obtained demonstrated the existence of five groups of municipalities, two of which (Groups A and B) showed that rural poverty and the degradation of natural resources are found as much on small properties as on large holdings, and this situation is relatively homogeneous throughout the state. Our finding that rural poverty appears throughout the state contradicts the evidence of polarization between southern and the northern Rio Grande do Sul shown by many regional studies.

Previous analyses have also maintained that the process of impoverishment of the state's rural population is related to the availability of production factors, especially property size and access to technology. The data from this study shows that these analyses are not supported by the dynamics found in some of Rio Grande do Sul's rural areas, specifically, the areas of Italian and German colonization in the northeastern part of the state. In these Group C municipalities, the average area of the properties is the smallest in the state and the capacity of the soils is among the most restrictive, but the indicators of revenue

and productivity per unit of land and unit of labor are among the highest. That means that the highest quality of agricultural life as expressed by socio-economic indicators is not contingent on large property size or extremely fertile soils. The importance of these two factors is not ignored, but they are not sufficient to explain the superior economic and environmental conditions found in regions that do not enjoy the best natural conditions.

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Mapa 1: Grupos homogêneos