

Concentration and regional specialization of food production in the State of São Paulo, Brazil, measured with locational gini and locational quotient coefficient's

Choose a Theme: G31-Location of Economic Activity

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Studies based on the spatial organization of agricultural production are focused on approaches to industrial districts, clusters, growth poles and local production systems. It is believed that such approaches contribute elements to issues related to local development and can serve as guidance for policies, production instruments and development of agro-industrial chains according to each rural territory and its local potential (Moraes, 2013).

The visibility of the economic effects of agglomerations of producers comes from studies by economists who in the 1970s published works on the competitiveness of companies and innovation processes, having as a reference the concepts of networks, innovative means and proximity effects from the theory Marshallian.

In this sense, Beccattini (1994) was one of the pioneers to explain the economic growth of some industrial concentrations in Italy using the concept of "industrial district". Through it, it was possible to characterize concentrations of small companies in which proximity relationships and their derived effects promoted local development.

According to Cecchi (2001) and Berti (2005), from the "territorialization" of the rural space, a process of adaptation of the conceptual base of the industrial district began for the formation of the concepts of "agricultural district" and "agribusiness district". The authors consider that these terms were coined to describe the economic organizational models, typical of the Italian agri-food system, based on clusters or agglomerations of small and medium-sized companies in the agricultural sector, but regionally concentrated.

These terms, concepts or forms of analysis were developed to explain the relevant importance of regional economic systems within Italian agribusiness (Brunore; Rossi, 2007). As explained by Moraes (2013), in these districts the relationships between agricultural production, industrial and service companies (suppliers, processors and distributors) and the socioeconomic environment stand out.

Such theoretical configuration is similar to the conceptual basis and interpretations of agro-industrial chains, including in the interpretative approach four segments: suppliers for agriculture, agricultural production, and agro-industrial companies and product distributors.

However, there is a fundamental difference between the agricultural district and the agro-industrial district, as the former would be formed only from the segments of agricultural production and input suppliers (in addition to machinery, goods and services). The second would be formed from these two, but also including the agro-industrialization and distribution segments, in addition to wholesale and retail.

For Cecchi (2001), the “agricultural district” is characterized by agglomerations in a given territory in which the agricultural production segment is the force that drives other activities, which are structured according to local agricultural production.

Brazil is recognized in the world as a major producer of agricultural commodities and meat. But their food production (vegetables and animals) goes far beyond that. The country is also a large and competent producer of fruits, vegetables, herbs and spices, aquaculture fish, milk and honey.

And in this context, the State of São Paulo is the protagonist. It is the largest producer of fresh fruits and vegetables in Brazil and the main food export platform. In addition, it is the main consumer market in South America and concentrates almost 20% of the population of Brazil.

This work was part of a broader research stage funded by FAPESP¹ that sought to identify and classify food production agglomerations in the State of São Paulo, Brazil, using concentration and specialization index, respectively, locational gini and locational quotient. Additionally, a new approach to the use of locational quotient was suggested with the calculation of the coefficient of variation for each product and location of origin. This allowed the comparison between the analyzed products as there was a reduction in the effect of the territory.

The coefficient of variation (CV) is a standardized measure of dispersion used to compare variables that have different standard deviations and means.

¹ The São Paulo Research Foundation (<https://fapesp.br/en>)

We identified and located agglomerations of food production, important for the localities and for the total product class, providing information on the concentration and economic specialization of 65 agricultural products in 40 microregions of the State of São Paulo.

The value of agricultural production (VPA) was used as the main variable in the analysis using data from 2015, calculating the locational gini (LG) and locational quotient (LQ) indices that are used in the international literature.

The Locational Gini Coefficient (LG). This indicator is typically used in studies on income distribution, but it can also be applied to visualize and interpret the degree of concentration of a given variable in the geographic space (in this case, the Value of Agricultural Production). The LG indicates the degree of spatial concentration of a given agricultural product in a given territory.

The coefficient varies from 0 to 1, one being that: the more spatially concentrated the value of agricultural production, the closer the index will be to unity; and if the value of production is evenly distributed, the index will be equal to zero.

Therefore, agricultural products with LG above 0.5 (Suzigan et al., 2003) present a greater geographic concentration of economic activity, indicating greater possibilities that local production systems are found in them. In calculating the LG, the Brown formula was used (Brown, 1994):

$$LG = 1 - \sum_{i=0}^{k-1} (Y_{i+1} + Y_i) (X_{i+1} - X_i)$$

Where:

Y_i = participation of the Agricultural Production Value of a given activity in the agricultural economy of the territory “i”;

X_i = participation of the Value of Agricultural Production of territory “i” in the sectoral economy of the State (value of agricultural production in the state).

The Location Quotient (LQ) is one of the most used measures in mapping productive agglomerations (Kim et al., 2019) and, in this work, corresponds to the relationship between: the relative share of the production value of a given product located in a given region in the region's total VPA; and the participation of the region's VPA in the total value of the State's Agricultural Production.

In the calculations of the Location Quotient of each of the products analyzed in 40 territories, the following formula was used:

$$QL = \frac{(VP_{ij} \div VPA_j)}{(VPA_j \div VPA_{SP})}$$

Where:

VP_{ij} = production value of agricultural product “i” in territory “j”;

VPA_j = value of agricultural production in territory “j”;

VPA_j = value of agricultural production in territory “j”;

VPA_{SP} = value of agricultural production in the State of São Paulo.

In this work, the LQ corresponds to the relationship between the participation of the value of the production of a given product in a given micro-region in the total VPA of the region; and the participation of the region's VPA in the total Value of Agricultural Production in the State of São Paulo.

To enable the comparison between the LQ results, a numerical variable was created based on the coefficient of variation obtained for each of the 65 products and then hierarchized and classified into four types (very high, medium and low specialization). The coefficient of variation (CV) is defined as the ratio of the standard deviation to the mean.

The results showed an average LG of 0.79 and only four products showed a small spatial concentration of the value of agricultural production ($LG < 0.5$): Sugarcane; Beef; Chilled milk and corn. These products were classified as “widely distributed”.

The other products were considered spatially concentrated because they obtained $LG > 0.5$.

For 08 products they had LG between 0.51 and 0.67 and were classified as “low geographic concentration”. Another 20 products had a LG result between 0.69 and 0.80 and were classified as “medium geographic concentration” (Figure 1).

Finally, 33 products were considered “high geographic concentration”

Figure 1. Locational gini values for 65 products in the State of São Paulo, Brazil.

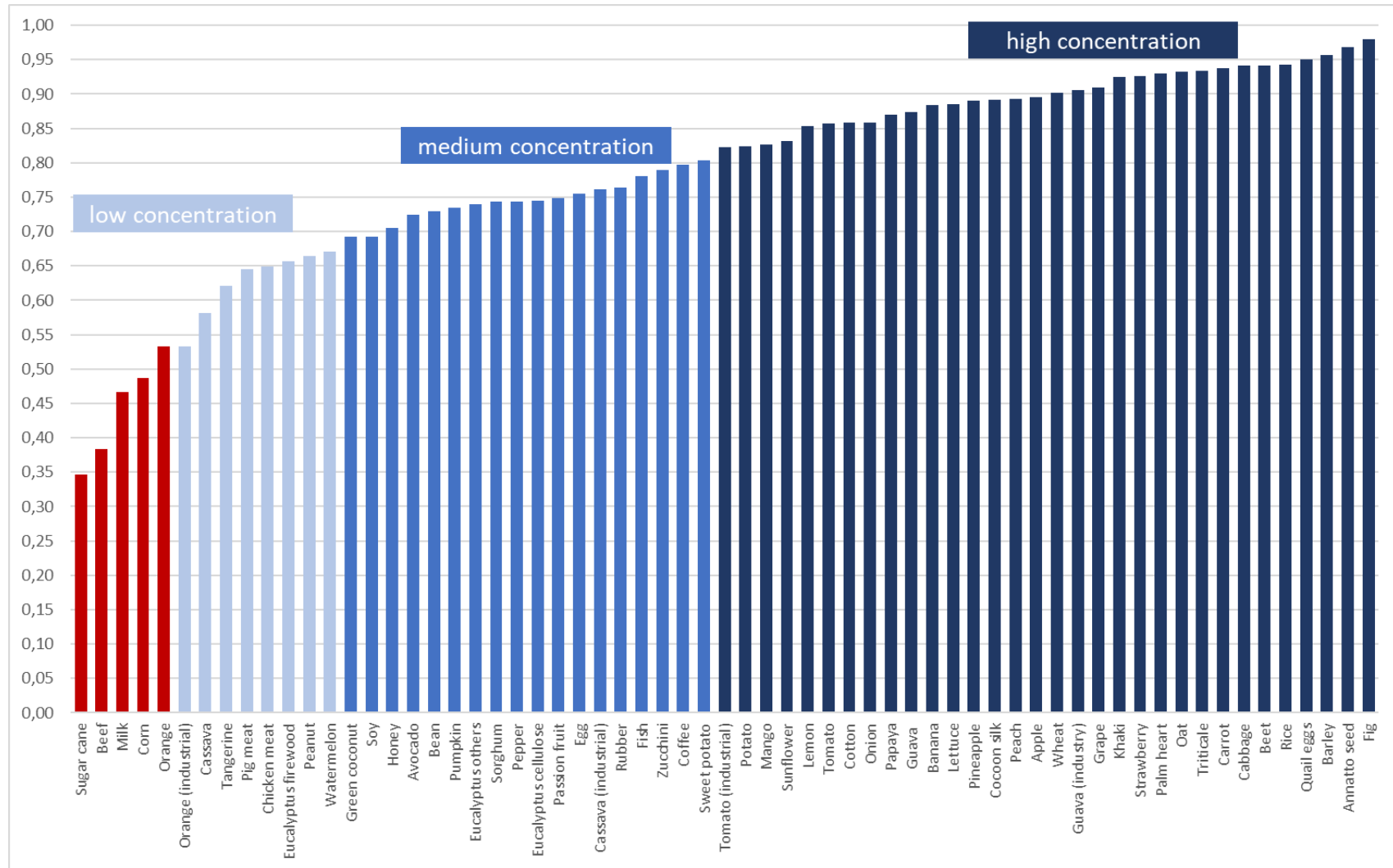
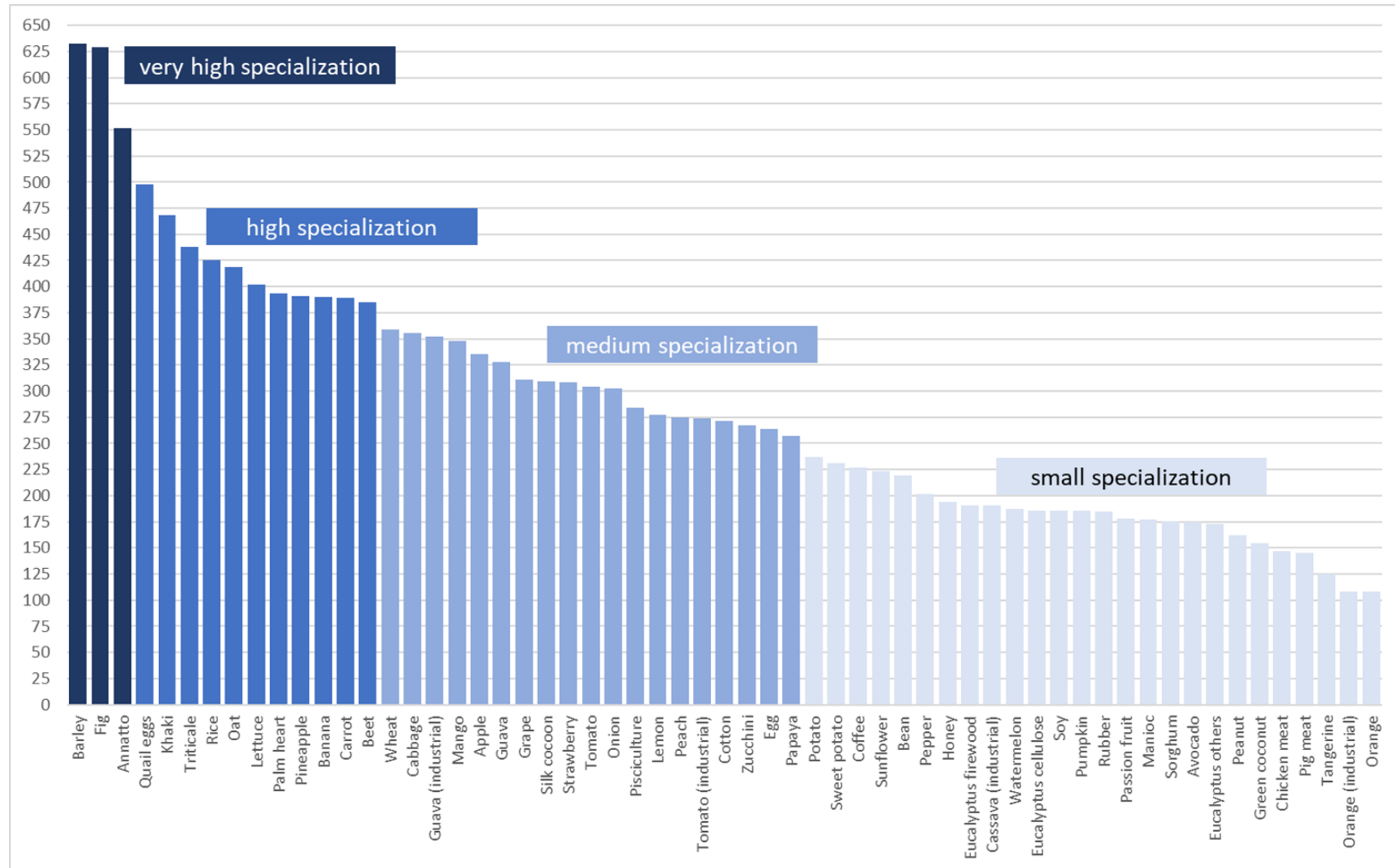


Figure 2. Levels of geographic specialization of agricultural production in the State of São Paulo, Brazil



The results obtained from the coefficient of variation of the LQ indicated that 03 products were considered of “very high specialization”; another 11 were classified as “high specialization”; 19 as “medium specialization”; and 26 classified as “low geographic specialization”.

The set of results obtained indicate the possibility of promoting development policies, endogenous or exogenous, in territories specialized in the production of certain foods and that stimulate the interaction of producers, universities and research institutes, generating gains in competitiveness.

They also open up new opportunities for research on local development, certification, cooperation and the potential for Geographical Indication of your origin.

REFERENCES

- Benko, G., & Lipietz, A. (1994). As regiões ganhadoras–distritos e redes: os novos paradigmas da geografia econômica. Oeiras: Celta, 2-23.
- Berti G. (2005) “The Rural District”, Quaderno n. 97. Quaderni del Laboratorio di Economia Locale (LEL), Facoltà di Economia, Università Cattolica del Sacro Cuore di Piacenza, Formaper Milano, Settembre 2005.
- Brown, M. C. (1994). Using Gini-style indices to evaluate the spatial patterns of health practitioners: theoretical considerations and an application based on Alberta data. *Social science & medicine*, 38(9), 1243-1256.
- Brunori, G., & Rossi, A. (2007). Differentiating countryside: Social representations and governance patterns in rural areas with high social density: The case of Chianti, Italy. *Journal of Rural Studies*, 23(2), 183-205.
- Cechi, L.; Schultz, G.; Niederle, P. (2016). Tradition and innovation intertwined in the consolidation of an Agro-Food System Located in yerba mate in southern Brazil. *Eutopía*, 10, 79-93.
- Kim, S., Suh, K., Kim, Y., Kim, C., & Jung, C. (2019). Quantitative Evaluation on Geographical Indication of Agricultural Specialty Products using Location Quotient (LQ) Index. *Journal of the Korean Society of Agricultural Engineers*, 61(2), 75-83.
- Moraes, J. L. A. (2013). The role of agrifood and agroindustrial systems and chains in the formation of productive agglomerations in rural territories. *COLÓQUIO-Revista do Desenvolvimento Regional*, 10(1), 71-97.
- Suzigan, W., Furtado, J., Garcia, R., & Sampaio, S. E. (2003). Local production systems: mapping, typology and policy suggestions. *Encontro nacional de Economia*, 31(2003), 1-29.