



SPATIAL DISTRIBUTION OF THE BRAZILIAN PHARMACEUTICAL INDUSTRY BETWEEN 2010 AND 2024: CONCENTRATION OR EQUITABLE REGIONAL DISTRIBUTION?

**DISTRIBUIÇÃO ESPACIAL DA INDÚSTRIA FARMACÊUTICA
BRASILEIRA ENTRE 2010 E 2024: CONCENTRAÇÃO OU
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Received: 02/04/2026

Accepted: 04/29/2026

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ABSTRACT

The pharmaceutical industry is technology-intensive, creates skilled jobs, and hosts major enterprises operating globally. However, production tends to be concentrated in specific central regions, with high population density and technical services. In Brazil, national pharmaceutical enterprises have strengthened since 2010, marking a distinct shift from the previous situation. This article aims to verify whether this development occurred equally across all regions of the country or if regional concentration persists, and what implications this has for the sustainability of quality of life in territories where the industry is absent. The methodology is descriptive and quantitative, using data on enterprise numbers, revenue and quantities sold, establishments, and employment relationships related to medicine manufacturing for human use from 2010 to 2024. The results show that, during the period studied, pharmaceutical enterprises tended to concentrate in the Southeast region, especially in the state of São Paulo, where the largest number of enterprises, employment relationships, percentage of revenue, and sales volume are located. Thus, it can be concluded that the strengthening of Brazilian national enterprises reinforced the regional concentration of their production, already observed before 2000, despite the decentralization effort represented by the Goiás experience, thus not contributing to the sustainable territorial development of other Brazilian regions.

Keywords: Pharmaceutical industry. Regions. Territorial development. Enterprises

RESUMO

A indústria farmacêutica é intensiva em tecnologia, gera empregos qualificados, e as maiores empresas atuam em escala mundial. Todavia, a produção tende a se concentrar em determinadas regiões centrais com densidade populacional e de serviços técnicos. No Brasil, desde 2010, observou-se um fortalecimento das empresas farmacêuticas nacionais, situação bem distinta da anterior. O objetivo deste artigo é verificar se esse desenvolvimento se deu de forma igual para todas as regiões do país ou se há um processo de concentração regional dessa indústria no território brasileiro e quais são as implicações para a sustentabilidade da qualidade de vida nos territórios em que ela está ausente. A metodologia é descritiva e quantitativa, utilizando-se dados sobre número de empresas, faturamento e quantidades comercializadas, estabelecimentos e vínculos empregatícios relacionados à fabricação de medicamentos para uso humano referente aos anos de 2010-2024. Os resultados mostram que, no período estudado, houve uma tendência de concentração na região Sudeste, com destaque para o estado de São Paulo, onde se localiza o maior número de empresas, de vínculos, de percentual de faturamento e de quantidades comercializadas. Assim, pode-se concluir que o fortalecimento das empresas nacionais brasileiras reforçou a concentração regional de sua produção, já observada antes de 2000, apesar do esforço de descentralização representado pela experiência de Goiás, não contribuindo, portanto, para o desenvolvimento territorial sustentável de outras regiões brasileiras.

Palavras-chave: Indústria farmacêutica. Regiões. Desenvolvimento territorial. Empresas.

INTRODUCTION

The pharmaceutical industry is technology-intensive, creates skilled jobs, and hosts major enterprises operating globally, although consumer markets remain fragmented and production tends to be regionally concentrated (Hasenclever *et al.*, 2010). Given these characteristics, the presence of this industry in specific territories can contribute to the sustainable development of a particular region regarding productivity, innovation, international competitiveness and reduced external dependence, while also strengthening domestic markets through income multipliers and higher-skilled job creation.

Enterprises' location decisions, however, are shaped by factors that are not evenly distributed across territories. In peripheral countries, Brazil being a prime example, income inequality and disparities in technical-scientific infrastructure vary considerably from region to region. Global economic conditions add another layer of complexity, as they directly influence the industrial and trade policies of these countries.

In Brazil, during the 1990s, the ongoing globalization process brought about trade liberalization and the reduction of tariff barriers, which intensified foreign import competition and eroded the productive capabilities of domestic pharmaceutical enterprises. That same period also saw the



reinstatement of industrial property rights for pharmaceutical products and processes (CGEE, 2017). As a result, the Brazilian pharmaceutical industry came to be dominated by transnational corporations, which accounted for 75 to 85% of the national pharmaceutical market's annual revenues in the early years of that decade (Bermudez, 1994).

Toward the end of the 1990s, a series of measures were taken to address the pharmaceutical industry's lack of competitiveness and external dependency: the creation of the National Health Surveillance Agency (*Anvisa*, acronym in Portuguese), under Law no. 9,782/99, and the establishment of the generics segment, under Law no. 9,787/99. These developments raised the regulatory standards for the commercialization of pharmaceutical products in Brazil and strengthened the capabilities of domestic enterprises in generic drug manufacturing (CGEE, 2017). At the same time, national enterprises that adapted to the new regulatory requirements were able to consolidate their market position.

In the early 2000s, faced with successive global capitalist crises, the Brazilian government brought industrial policy back onto the public agenda as a means of fostering competitiveness and innovative capacity, particularly in technology-intensive sectors with high-skilled employment, such as the pharmaceutical industry, with an eye toward territorial sustainability. Among the main policies implemented during this period, the following stand out: (i) the Industrial, Technological, and Foreign Trade Policy (PITCE, acronym in Portuguese), launched in 2003, which identified pharmaceuticals, medicines, and biotechnology as strategic areas and aimed to enhance economic efficiency while promoting the development and diffusion of new technologies; (ii) the Productive Development Policy, introduced in 2008, with a focus on innovation and scientific-technological advancement, and a strategy centered on meeting competitive challenges and expanding the country's integration into global markets; and (iii) the *Plano Brasil Maior*, in 2011, whose overarching objectives were to promote innovation and technological development, as well as to deepen the productive and technological density of value chains (Hasenclever *et al.*, 2016; CGEE, 2017).

Beyond formal policies, other instruments were deployed to strengthen the domestic pharmaceutical industry. One example is the Pharmaceutical Productive Chain Support Program (*Programa de Apoio ao Desenvolvimento da Cadeia Produtiva Farmacêutica – Profarma*, acronym



in Portuguese), developed and executed by the Brazilian Development Bank (*Banco Nacional de Desenvolvimento Econômico e Social – BNDES*, acronym in Portuguese) from 2003 to 2016. The program aimed to modernize, restructure, and expand the productive capacity of pharmaceutical enterprises by offering financing through credit lines with special terms. Another key instrument was the Economic Subsidy (*Subvenção Econômica*), which provided non-reimbursable public funding to support enterprises in developing innovative products, processes, and services, with the Brazilian innovation agency (*Finep*, acronym in Portuguese) serving as its managing body. Over the years, additional measures and instruments were also adopted, including Productive Development Partnerships (*PDP*, acronym in Portuguese), a revised Public Procurement Law, and the creation of *Finep's Inova Saúde* Plan (Hasenclever *et al.*, 2016; Paranhos *et al.*, 2021b).

As a result of these measures, the domestic pharmaceutical industry was strengthened, driven above all by the expansion of generic drug production. In 1997, only two Brazilian enterprises ranked among the top 20 pharmaceutical ones operating in the national market, holding a combined market share of 9.2%; by 2005, that number had risen to seven domestic enterprises among the top 20, with a market share of 25.5% (Rosenberg; Fonseca; D'avila, 2010). By 2014, eight domestic enterprises had captured 47.7% of the market among the top 20 enterprises operating in Brazil (CGEE, 2017). The generics segment also saw substantial growth, climbing from 5% in 2004 to 19% in 2009, 30% in 2015, and reaching 37% by 2018 (CGEE, 2017; Anvisa, 2019).

A relevant point is that the growth of Brazil's pharmaceutical industrial base has been driven primarily by the production of generic and similar drugs. According to data from the Statistical Yearbook of the Pharmaceutical Market (Anvisa, 2018), the Brazilian pharmaceutical market moved approximately R\$ 69.5 billion in 2017, with 214 enterprises commercializing 6,587 different products across 12,805 distinct commercial presentations. Of the registered commercial presentations with active commercialization, 4,202 were generics; of the total number of enterprises in the market, 88 operated in this segment, generating revenues of approximately R\$ 9.4 billion (Anvisa, 2018).

The research question is: what location pattern can be observed among pharmaceutical enterprises following their growth and consolidation in the Brazilian market from the 2010s onward? Has this expansion unfolded evenly across all regions of the country, or has there been a process of



concentration in a particular region?

The aim of this article is to examine how the location of pharmaceutical enterprises has evolved within the Brazilian market and to assess the implications of the observed pattern for the sustainable territorial development of Brazil's regions.

The hypothesis advanced here is that a technology-intensive industry, such as pharmaceuticals, is indispensable for sustainable territorial development. This type of industry brings together a range of contributing elements: the generation and diffusion of technology throughout the productive structure, making it more competitive; the reduction of external vulnerability in terms of medicines; the strengthening of domestic markets through income multipliers and higher-quality jobs; and the broadening of the population's access to healthcare.

The article is structured in three sections, besides this introduction and the conclusion. The first section presents the methodology for developing this study. The second reports the findings regarding the location of pharmaceutical enterprises. Finally, the third section discusses the results.

METHODOLOGY

The methodology employed in this article is descriptive and quantitative, and its object of study is the pharmaceutical industry located within Brazilian territory. The theoretical framework underpinning the analysis draws on scholarship addressing the regional question in countries marked by deep socioeconomic inequalities, as is the case of Brazil.

Sustainable territorial development is understood here as a concept capable of integrating economic development with improved living conditions within a territory (in this article, a region). Economic development can be measured by gains in productivity, innovation, and competitiveness, while improvements in living conditions are reflected in greater formalization of industrial employment and higher wages. This definition is grounded in the structuralist tradition of the ECLAC school of thought, which held that industrialization was the only viable path out of underdevelopment (Prebisch, 1949; Hirschman, 1958; Furtado, 1967).



According to these authors, peripheral economies are characterized by high structural heterogeneity and specialization in primary sectors. These features lead to inferior productivity gains, the production of goods with low-income elasticity of demand in international markets, low levels of formal employment, and limited backward and forward linkages within the economy. Breaking up these characteristics is therefore essential if the goal is to promote sustainable territorial development. This requires, on one hand, expanding the industrial sector, particularly technology-intensive industries, to reduce structural heterogeneity and, on the other, increasing industry's share of gross domestic product to improve income and employment outcomes. The scholars of this school further argue that industrialization centered on technology-intensive industries, such as pharmaceuticals, is a prerequisite for gaining access to the knowledge frontier and reducing external dependency, in the context of this article, in healthcare (Prebisch, 1949; Hirschman, 1958; Furtado, 1967).

Santos (2011) proposes two approaches to the regional question: one that seeks to identify material factors in the definition of regions and in the analysis of the diffusion of what he calls the technical-scientific-informational environment, and another that concerns the immaterial aspects that shape regions, which are nonetheless inseparable from the material base. This article emphasizes the first approach proposed by Santos (2011), that is, examining the role of technology-intensive industry, and the pharmaceutical industry in particular, as a material factor that determines the degree of development of a region and its role in the diffusion of the technical-scientific-informational environment. The second approach – the immaterial aspects of policies and public-private arrangements – will not be the primary focus but is considered a constitutive part of the backdrop of the period under analysis, as already noted in the introduction.

Technological transformations underway since the 1970s, according to Benko and Lipietz (1994), have generated differentiated locational advantages for industry. The regions that attract such activities are those that have advanced in modern communication and transportation infrastructure, encompassing science, information, and technology, and that draw automated production systems, high-tech enterprises, leading universities, and a skilled workforce, among other assets (Contel, 2015). All these activities and supporting networks constitute what Santos (2011) termed the technical-scientific-informational environment.



Less attractive regions are those where the spread of the technical-scientific environment is slower, causing them to fall behind in drawing the more sophisticated enterprises that depend on such infrastructure to operate. As a result, industries that generate higher-skilled jobs and higher wages, such as pharmaceuticals, tend not to develop in these territories to the same extent as less technology- and skill-labor-intensive sectors. These regional disparities are especially pronounced in peripheral countries, which are, for the most part, non-innovative and lack advanced technical-scientific infrastructure. The outcome is a reinforcement of the regional inequalities already emphasized by Furtado (1967).

To carry out the empirical analysis underlying the aim of this article, that is, to examine how the location of pharmaceutical enterprises has evolved within the Brazilian market from the 2010s onward, data were collected on enterprises holding drug registration licenses by Federative Unit (*UF*, acronym in Portuguese), given that pharmaceutical products may only be sold if registered with the National Health Surveillance Agency (Anvisa). The sources used were the Statistical Yearbooks of the Brazilian Pharmaceutical Market for the years 2016, 2017, and 2018 (Anvisa, 2017; 2018; 2019), 2019-2020 (SCMED, 2021), and 2023 (Anvisa; SCMED, 2024), all available yearbooks, as data for other years are not available. The variables selected were the number of enterprises, revenues, and quantities commercialized.

To supplement the enterprise-level data for the study's full period of analysis, spanning 2010 to 2024, data on establishments (the physical locations where enterprises' productive activities take place) and formal employment by establishment were collected from the Annual Social Information Report (*RAIS*, acronym in Portuguese). The years selected were 2010 (start of the period), 2016 (first available data from the Yearbook), 2021 (one year after the COVID-19 pandemic), and 2024 (last available data for the period).

The combined use of both sources (the Yearbooks and RAIS) broadens the analytical scope to cover the full 2010-2024 period, rather than being confined to the years for which Yearbook data are available. It also allows for the inclusion of data on the location of each enterprise's individual production facilities, since the information provided in the Yearbooks refers only to administrative headquarters and therefore does not capture the spatial distribution of productive activities.



RESULTS

Overall, it can be observed that enterprises holding drug registration licenses with active commercialization are in 14 UFs throughout the 2016-2019 period, except for 2023, which records only 13 UFs (see Table 1).

Table 1 | Number of enterprises commercializing medicines and growth rate (%) by Federative Unit, 2016-2019 and 2023

Federative Unit	2016	2017	2018	2019	2023	Growth rate (%) 2016-2018	Growth rate (%) 2018-2023
Amazonas	2	2	2	2	2	0	0
Bahia	1	1	2	2	1	100	-50
Ceará	2	2	2	2	1	0	-50
Distrito Federal	3	3	3	3	2	0	-33
Espírito Santo	3	3	3	3	3	0	0
Goiás	15	15	17	15	17	13	0
Minas Gerais	13	13	13	13	15	0	15
Pernambuco	4	3	4	4	4	0	0
Piauí	1	1	1	1	–	0	–
Paraná	5	5	6	6	7	20	17
Rio de Janeiro	34	34	33	32	32	-3	-3
Rio Grande do Sul	10	10	11	11	8	10	-27
Santa Catarina	4	3	3	4	4	-25	33
São Paulo	117	119	121	126	127	3	5
Average growth rate (%)	–	–	–	–	–	8	-7
Total	214	214	221	224	223	3	1

Source: Own elaboration based on (Anvisa, 2017; 2018; 2019; SCMED, 2021; Anvisa; SCMED, 2024).

The average growth rate was higher in the 2016-2018 period (8%), as was the growth rate for the combined 14 UFs (3%). The UFs that accounted for most of the growth in the first period, having expanded above the average growth rate, were, in descending order: Bahia, Paraná, Goiás, and Rio Grande do Sul. The state of São Paulo concentrates the largest number of enterprises throughout the entire period under analysis, accounting for approximately 56% of all drug registration license

holders located in Brazil. Moreover, the number of enterprises based in São Paulo increased between 2016 and 2023, rising from 117 to 127. The second largest concentration is found in Rio de Janeiro, which accounts for approximately 15% of all drug registration license holders in the country. Unlike São Paulo, however, Rio de Janeiro saw a decline in the number of enterprises over the same period, falling from 34 in 2016 to 32 in 2023. The state with the fewest enterprises is Piauí, with only one enterprise recorded between 2016 and 2019. Overall, the Southeast and South regions, together with the state of Goiás, concentrate most pharmaceutical enterprises in Brazil.

Regarding total revenue percentage, and consistent with the pattern observed in the number of enterprises, São Paulo is the most dominant state, accounting for approximately 77% of the country's total pharmaceutical revenue between 2016 and 2023 (see Table 2).

Table 2 | Percentage of total enterprise revenue and growth rate (%) by Federative Unit, 2016-2019 and 2023

Federative Unit	2016	2017	2018	2019	2023	Growth rate (%) 2016-2018	Growth rate (%) 2018-2023
Amazonas	0,4	0,42	0,42	0,34	0,7	5	67
Bahia	0,1	0,15	0,24	0,34	0,17	140	-29
Ceará	0,5	0,65	0,51	0,38	0,45	2	-12
Distrito Federal	1,1	0,7	1,02	1,05	0	-7	-100
Espírito Santo	0,3	0,24	0,41	0,48	0,46	37	12
Goiás	4,5	4,52	4,34	4,34	4,79	-4	10
Minas Gerais	0,9	1,08	1,34	1,68	1,7	49	27
Pernambuco	0,1	0,12	0,21	0,21	0,1	110	-52
Piauí	0	0,05	0,04	0,01	-	-	-
Paraná	3,7	3,55	3,77	3,77	2,68	2	-29
Rio de Janeiro	11,2	11,21	9,05	10,14	9,75	-19	8
Rio Grande do Sul	0,5	0,42	0,5	0,33	0,31	0	-38
Santa Catarina	0	0,06	0,04	0,07	0,06	-	50
São Paulo	76,6	76,83	78,1	76,85	78,83	2	1
Average growth rate (%)	-	-	-	-	-	26	-7
Total	100	100	100	100	100	0	0

Source: Own elaboration based on (Anvisa, 2017; 2018; 2019; SCMED, 2021; Anvisa; SCMED, 2024).



The second most significant state is Rio de Janeiro, accounting for approximately 10% of the country's total pharmaceutical revenue over the period. However, both states performed below the average growth rate of 26% between 2016 and 2018: São Paulo grew by just 2%, while Rio de Janeiro contracted by 19%. On the other hand, no single state can be consistently identified as the lowest revenue contributor throughout the period. In 2016 and 2018, Santa Catarina recorded the lowest revenue; in 2017 and 2019, Piauí held that position; and in 2023, the Federal District posted the lowest revenue.

Regarding the percentage of total commercialized presentations sold (see Table 3), São Paulo again stands out as the leading state, with approximately 60% of the total. In this case, the second largest percentage belongs to Goiás, at around 18%. The UF with the smallest percentage is the Federal District, accounting for less than 1%.

Table 3 | Percentage of total commercialized presentations and growth rate (%) by Federative Unit, 2016-2019 and 2023

Federative Unit	2016	2017	2018	2019	2023	Growth rate (%) 2016-2018	Growth rate (%) 2018-2023
Amazonas	2,5	1,9	1,02	0,8	1,11	-59	9
Bahia	0,8	1,23	1,71	2,24	1,34	114	-22
Ceará	0,7	0,73	0,45	0,37	0,37	-36	-18
Distrito Federal	0	0,02	0,03	0,03	0,01	-	-67
Espírito Santo	0,1	0,15	0,21	0,22	0,28	110	33
Goiás	18,5	19,48	17,71	14,61	19,02	-4	7
Minas Gerais	3,1	3,83	3,76	3,73	5,07	21	35
Pernambuco	0,2	0,11	0,14	0,13	0,1	-30	-29
Piauí	0,3	0,25	0,21	0,04	-	-30	-
Paraná	8,3	7,82	5,74	5,78	5,26	-31	-8
Rio de Janeiro	8,1	5,6	5,85	5,69	6,67	-28	14
Rio Grande do Sul	1,7	1,42	1,55	1,26	0,91	-9	-41
Santa Catarina	0,1	0,13	0,1	0,2	0,14	0	40
São Paulo	55,7	57,35	61,52	64,89	59,73	10	-3
Average growth rate (%)	-	-	-	-	-	2	-4
Total	100	100	100	100	100	0	0

Source: Own elaboration based on (Anvisa, 2017; 2018; 2019; SCMED, 2021; Anvisa; SCMED, 2024).



From this data, it was possible to identify which regions are winners and losers in the spatial distribution of the pharmaceutical industry in Brazil. Overall, São Paulo emerges as the state with the largest share across all three variables analyzed; notably, its share of total revenue exceeds its share of quantities commercialized, suggesting that the products sold there may carry higher added value. This dominant position highlights São Paulo's role as the central hub of the Brazilian pharmaceutical market (Anvisa; SCMED, 2024). The state of Rio de Janeiro is also highly significant, particularly in terms of number of enterprises and revenue share; as in São Paulo, its revenue share surpasses its share of quantities commercialized, likely indicating that the products manufactured there also command higher added value. The strong performance of Minas Gerais is also significant, with a meaningful share across the number of enterprises, revenue, and quantities commercialized.

Together, these three states account for the Southeast region's dominant weight in the location of Brazil's pharmaceutical industry. This concentration is explained by the region's higher technical and informational densities, as well as its comparatively higher income levels, which make it the most attractive location for pharmaceutical enterprises, given their demanding requirements in terms of productive allocation decisions.

Another state worth highlighting is Goiás, though for reasons distinct from the attractiveness factors previously identified. It holds the second largest share in terms of quantities commercialized, yet its revenue contribution is less pronounced, placing it third in total revenue share. This pattern suggests that the products manufactured in Goiás are predominantly generic and similar drugs, which typically carry lower added value than patented products. The reasons behind the concentration of enterprises in Goiás, which ranks third in number of firms, are therefore rooted in a state-led industrialization project that created the Anápolis industrial district with the explicit goal of attracting generic drug enterprises (Gomes, 2014), a reason quite distinct from that of the Southeast region.

Conversely, the states of the North and Northeast regions appear to be the losers in this distribution, posting the weakest performance across all variables analyzed, with the smallest shares in number of enterprises, revenue, and quantities commercialized. This outcome is explained by



their lower levels of technical and informational density, as well as lower income levels, which make them considerably less attractive for pharmaceutical enterprise location decisions.

Drawing on RAIS data regarding formal employment by establishment over the 2010-2024 period, it is possible to observe both the spatial distribution of pharmaceutical establishments across UFs and the evolution of enterprise size, as measured by the number of formal employment.

In relation to the number of establishments, Table 4 shows that there was an overall reduction across Brazil, falling from 550 in 2010 to 355 in 2024. Consistent with the CMED data, São Paulo concentrates the largest number of establishments, with its share increasing from 37.3% in 2010 to 43.9% in 2024. The other states with the highest shares are Rio de Janeiro, Minas Gerais, and Goiás, reflecting the concentration of pharmaceutical enterprises in the Southeast region. The state of Rio de Janeiro held second place until 2020, when it was overtaken by Minas Gerais. The latter had ranked third until 2019 before moving up to second in 2021. Goiás ranked fourth until 2019, after which it rose to third. Mirroring the overall trend observed for Brazil as a whole, all of these states recorded a decline in the number of establishments over the period. The North region, notably, has the highest number of states with no pharmaceutical establishments whatsoever.

Regarding formal employment, also shown in Table 4, the overall trend diverges from that of establishments: rather than declining, the number of jobs in the pharmaceutical industry increased between 2010 and 2024, rising from 75,372 to 99,699. As in previous analyses, São Paulo accounts for the largest share of employment, growing from 42,252 jobs in 2010 to 50,904 in 2024, with its share of total employment fluctuating between 51% in 2024 and 56% in 2010. Goiás ranks second, with its share of total employment ranging from 12% in 2010 to 15% in 2024, nearly doubling its total number of jobs over the period, despite ranking between third and fourth in terms of number of establishments. Rio de Janeiro holds third place in employment until 2015, after which Minas Gerais occupies that position through 2024. As with establishments, the Southeast region concentrates the largest share of pharmaceutical industry employment in Brazil. Among the states mentioned, only Rio de Janeiro experienced a contraction in employment over the period. The North region has the highest number of states with no employment linked to this industry.



About the average size of establishments (measured by the number of formal employment per establishment), Table 4 shows a marked increase over the period in Brazil, rising from 137 in 2010 to 280.8 in 2024. This reflects the consolidation of the sector throughout the period under analysis, a trend already confirmed by the observed decline in both the number of enterprises and establishments.

The UFs with the largest average establishment size in 2010 were, respectively: Goiás, São Paulo, Ceará, the Federal District, and Paraná. By 2024, the ranking had shifted to: Goiás, Paraná, the Federal District, Amazonas, and Ceará, a result of the varying growth rates observed across UFs. Notably, between 2010 and 2024, the UFs that recorded the greatest growth in average establishment size were: Amazonas (1,181%), Bahia (588%), Santa Catarina (263%), Espírito Santo (260%), and Paraná (235%). Conversely, the largest reductions in average establishment size were recorded in Maranhão, Mato Grosso do Sul, Rio Grande do Norte, Sergipe, and Tocantins, all with approximately 100% contraction.



Table 4 | Number of establishments, formal employment, average establishment size, and growth rate (%) by Federative Unit, 2010–2024

UF	2010			2016			2021			2024			Growth rate 2010-2024		
	E	V	T	E	V	T	E	V	T	E	V	T	E (%)	V (%)	T (%)
Acre	0	0	–	0	0	–	1	3	3,0	0	0	–	–	–	–
Alagoas	1	96	96,0	0	0	–	2	13	6,5	3	14	4,7	200	-85	-95
Amapá	0	0	–	0	0	–	0	0	–	0	0	–	–	–	–
Amazonas	3	91	30,3	3	510	170,0	2	771	385,5	3	1166	388,7	0	1181	1181
Bahia	10	347	34,7	7	812	116,0	6	808	134,7	4	955	238,8	-60	175	588
Ceará	14	2.749	196,4	13	2.567	197,5	6	2.951	491,8	9	3.432	381,3	-36	25	94
Distrito Federal	8	1.085	135,6	5	1.698	339,6	3	1.623	541,0	5	1.976	395,2	-38	82	191
Espírito Santo	5	100	20,0	7	228	32,6	4	314	78,5	5	360	72,0	0	260	260
Goiás	41	8.797	214,6	43	11.248	261,6	34	14.710	432,6	33	15.448	468,1	-20	76	118
Maranhão	1	3	3,0	1	1	1,0	0	0	–	0	0	–	-100	-100	-100
Mato Grosso	0	0	–	1	2	2,0	0	0	–	0	0	–	–	–	–
Mato Grosso do Sul	1	15	15,0	0	0	–	0	0	–	0	0	–	-100	-100	-100
Minas Gerais	64	5.999	93,7	44	6.860	155,9	39	8.614	220,9	39	10.477	268,6	-39	75	187
Pará	8	34	4,3	3	3	1,0	1	3	3,0	4	17	4,3	-50	-50	0
Paraíba	4	53	13,3	2	10	5,0	1	14	14,0	1	16	16,0	-75	-70	21
Paraná	26	3.299	126,9	17	4.701	276,5	15	4.787	319,1	12	5.102	425,2	-54	55	235
Pernambuco	19	825	43,4	16	1051	65,7	14	1052	75,1	17	1256	73,9	-11	52	70
Piauí	6	274	45,7	6	320	53,3	8	77	9,6	4	110	27,5	-33	-60	-40
Rio de Janeiro	75	6.698	89,3	55	6.416	116,7	34	5.702	167,7	31	5.816	187,6	-59	-13	110
Rio Grande do Norte	2	150	75,0	2	2	1,0	1	0	–	2	2	1,0	0	-99	-99
Rio Grande do Sul	35	1.887	53,9	20	1.459	73,0	22	1.499	68,1	18	1.539	85,5	-49	-18	59
Rondônia	1	2	2,0	0	0	–	0	0	–	1	1	1,0	0	-50	-50
Roraima	0	0	–	0	0	–	0	0	–	0	0	–	–	–	–
Santa Catarina	15	572	38,1	14	452	32,3	9	952	105,8	8	1108	138,5	-47	94	263
São Paulo	205	42.252	206,1	180	47.711	265,1	160	47.257	295,4	156	50.904	326,3	-24	20	58
Sergipe	4	40	10,0	5	40	8,0	2	24	12,0	0	0	–	-100	-100	-100
Tocantins	2	4	2,0	2	3	1,5	0	0	–	0	0	–	-100	-100	-100
Average growth rate (%)													-34	54	120
Total	550	75.372	137,0	446	86.094	193,0	364	91.174	250,5	355	99.699	280,8	-35	32	105

Legend: AES – average establishment size; FE – formal employment; NE – number of establishments.

Source: Own elaboration based on RAIS (2025).



DISCUSSION

The data analyzed reveal a clear concentration of pharmaceutical enterprises in the UFs of the Southeast region, particularly in the state of São Paulo, a pattern also reflected in the spatial distribution of establishments and formal employment. This high degree of concentration appears to stem both from the presence of a more developed technical-scientific-informational environment and higher population density in these UFs, and from other factors rooted in more favorable immaterial conditions in certain states or in the prevailing political-economic context. The implications for sustainable territorial development, in terms of economic growth and improvements in quality of life, point to a reinforcement of the regional inequality already described by Furtado (1967), further exacerbated by the uneven distribution of the technical-scientific-informational environment among regions.

The existing literature on this subject corroborates the findings presented here: other studies similarly confirm the importance of the stimulus generated by the technical-scientific-informational environment in attracting technology-intensive enterprises to specific localities, as opposed to cost-reduction policies based on tax incentives or infrastructure investments, which ultimately prove insufficient to influence the location decisions of such enterprises in a more equitable manner, thereby reinforcing the explanation for sustainable territorial development advanced in this article.

Costa (1997), for example, identifies several key factors in determining enterprise location. According to the author, two factors that led small enterprises to relocate from Rio de Janeiro to São Paulo were: (i) São Paulo offering stronger locational advantages; and (ii) the São Paulo economy exhibiting higher growth and development indices than that of Rio de Janeiro. Costa (1997) also noted that enterprises linked to the pharmaceutical industry tend to be interdependent, particularly micro and small enterprises in relation to medium and large ones, giving rise to a spatial integration dynamic, consistent with Hirschman (1958). According to Costa (1997), spatial concentration results from the availability of locational factors such as a skilled workforce, accessibility, infrastructure and service availability, proximity to consumer markets, and export-oriented transportation facilities.

The results presented in the previous section highlight the concentration of pharmaceutical establishments in the Southeast region, and in São Paulo in particular, the region and state with the greatest availability of physical, human, scientific, and technological infrastructure. In contrast,



the states of the North and Northeast regions recorded the lowest numbers of pharmaceutical establishments and formal employment, likely due to the absence of those factors which, according to Benko and Lipietz (1994), enable enterprises to develop in certain localities at the expense of others, factors whose unequal distribution has been further widened by the technological advances registered since the 1970s.

As for the immaterial factors that may influence industry location in a given territory, Silva (2016) notes that the state of Rio de Janeiro implemented various measures to attract and retain pharmaceutical enterprises through tax incentives in the early 2000s, taking advantage of the expansion of domestic enterprises. Nevertheless, even these strategies failed to prevent enterprises from leaving the state of Rio de Janeiro over the years, as documented in this article. Despite Rio de Janeiro's large consumer market and other favorable assets, such as science and technology institutions and universities that could support the development of the pharmaceutical industry, other immaterial factors appear to be discouraging business growth in the state, including the application of one of the highest rates of Tax on the Circulation of Goods and Services (*ICMS*, acronym in Portuguese) in the country, which can negatively affect medicine consumption, since higher tax rates translate into higher prices in a given locality.

Silva (2016) corroborates the findings of this article, noting that between 1995 and 2013, the state of Rio de Janeiro experienced productive losses in the pharmaceutical sector, with declines in the number of establishments, employment, and physical output, despite the state's innovative potential, scientific and technological capabilities oriented toward the pharmaceutical sector, the presence of researchers and scientific and technological institutions, a skilled workforce, and port and airport facilities that facilitate the transportation of goods. The more recent data examined in this article, however, show that Rio de Janeiro has continued this trajectory, with further reductions in the number of enterprises and formal employment, while losing ground to states such as Minas Gerais and Goiás.

According to Manhães and Hasenclever (2017), the spatial distribution of the generic drug industry in Brazil is heavily concentrated in the Southeast region (77.6% of enterprises), followed by the South (8.6%), the Midwest (7.8% of enterprises), the Northeast (5.7% of enterprises), and the North (0.4% of enterprises). The authors also demonstrate that, over the years, a gradual process of



deconcentration has taken place within the generic drug segment of the pharmaceutical industry in the country. These findings are consistent with the results presented in this article, which shows that São Paulo, despite remaining the state with the highest concentration of pharmaceutical enterprises, has grown more slowly and below the national average compared to other states that have gained increasing prominence over the years, most notably Goiás, which has specialized in the generic drug segment.

Gomes (2014) conducted a comparative analysis of pharmaceutical enterprise clusters located in Goiás and Rio de Janeiro. According to the author, the Goiás cluster is representative of the evolution of domestic pharmaceutical enterprises driven by generic drug production, while the Rio de Janeiro cluster reflects the classic strategy of multinational corporations establishing themselves with mature technologies and exploiting the passive advantages offered by peripheral countries, such as tax incentives.

Also, according to Gomes (2014), the Anápolis Agroindustrial District (*Daia*, acronym in Portuguese) was planned by the state of Goiás as an industrial district, offering enterprises a range of facilities, including technical-scientific infrastructure and a dry port for the importation of inputs, to attract investment. In Jacarepaguá, by contrast, the retention of multinational corporations was achieved at the cost of ever-increasing state tax incentives. The author further argues that clusters built on this type of advantage lack long-term sustainability: as soon as another location offers more attractive incentives, enterprises will simply relocate.

The *Daia* cluster has attracted government investment aimed at improving not only its internal infrastructure but also its surrounding area. The Jacarepaguá cluster, by contrast, is one where enterprises are focused solely on exploiting low-cost labor and tax incentives. These factors may partly explain why Goiás has seen growth in the number of enterprises over the years while Rio de Janeiro has lost enterprises over the same period (Gomes, 2014). Another factor accounting for the decline in enterprises located in Rio de Janeiro, most of which are multinationals, is that in recent years many have chosen to consolidate their production at their headquarters, as has been the case with Roche¹.

A further point that corroborates the article's findings emerged from a consultation with the

1 <https://g1.globo.com/economia/noticia/2019/03/26/farmaceutica-roche-decide-encerrar-producao-de-medicamentos-no-brasil.ghtml>; <https://www1.folha.uol.com.br/mercado/2019/04/saida-de-fabricas-do-brasil-preocupa-setor-farmaceutico.shtml#:~:text=Em%20um%20per%C3%ADodo%20de%20tr%C3%AAs,de%20dois%20a%20cinco%20anos.>

Accessed on: Apr. 23 2025.



Association of Official Pharmaceutical Laboratories of Brazil (ALFOB, acronym in Portuguese)² regarding the location of its 21 Official Pharmaceutical Laboratories³. Most of these laboratories are also located in the Southeast region, particularly in the state of Rio de Janeiro, evidence that government investment does not always succeed in counteracting market logic.

The concentration of enterprises and public laboratories in the Southeast region may also affect access to medicines. This is because pharmaceutical distribution enterprises likewise tend to cluster in the South and Southeast regions⁴, potentially hampering access for more distant regions that lack local production facilities, as is the case of parts of UFs in the North and Northeast, and thereby undermining improvements in the population's access to healthcare inputs.

CONCLUSION

The study finds an inequitable regionalization of the pharmaceutical industry in Brazil, with a significant concentration of enterprises in the UFs of the Southeast region, particularly in the state of São Paulo. At the same time, the North region has the highest number of states with no pharmaceutical enterprises whatsoever. This demonstrates a persistent tendency for enterprises to cluster in the same locations, despite the consolidation of domestic enterprises and the market growth observed over the period. As a result, equitable sustainable territorial development has not been achieved across all Brazilian regions, consistent with the hypothesis advanced in this article, which holds that industrial participation, particularly in technology-intensive sectors such as pharmaceuticals, is what enables the reduction of structural heterogeneity and the improvement of quality of life in terms of income and formal employment.

Regions with lower concentrations of pharmaceutical industry activity contribute less to the generation and diffusion of technology within their productive structures and, as a consequence, become less competitive, face greater external vulnerability in terms of medicine supply, and have less developed domestic markets, owing to weaker income multipliers, limited backward and

2 <https://alfob.org.br/rede-publica-de-laboratorios/> Accessed on: Apr. 23 2025.

3 Bahiafarma (BA), Butantan (SP), Bio-manguinhos (RJ), Certbio (PB), CPPI (PR), FAP (RJ), Farmanguinhos (RJ), Funbits (PB), Funed (MG), Fundação Mais Vida (RJ), Furp (SP), Hemobrás (PE), IBMP (PR), IPeFarM (PB), IQUEGO (GO), LFM (RJ), LAFEPE (PE), LAQFA (RJ), LQFex (RJ), NUPLAM (RN), NUTES (PB), TECPAR (PR), IVB (RJ).

4 <https://abafarma.com.br/associadas/>.



forward linkages, and reduced population access to healthcare. In short, in regions lacking the presence of a technology-intensive industry such as pharmaceuticals, both economic development and improvements in quality of life are undermined. as the ECLAC school of thought would argue.

It was also noted that the number of enterprises located in the state of Rio de Janeiro has declined throughout the period under analysis, with the state being overtaken by both Minas Gerais and Goiás in terms of enterprise count, largely due to the immaterial incentives offered by local governments to the generic drug segment. This outcome is likely explained by the fact that generics are a more commoditized segment, less dependent on technical-scientific-informational environments than innovative pharmaceutical enterprises.

Among the policy implications suggested by the study, two stand out. For attracting innovative pharmaceutical enterprises, tax incentives and physical infrastructure alone are not sufficient. The regions must also be equipped with technical-scientific-informational resources through meaningful structural change policies. For generic drug manufacturers, however, the provision of incentives may well be sufficient.

Finally, it is worth acknowledging a limitation of this study, which relied solely on a quantitative analysis of the effects of regional inequality in the location of the pharmaceutical industry and its consequences for economic development and quality of life. The hypotheses raised by the article could therefore be further explored through qualitative fieldwork, investigating in greater depth the reasons behind each pharmaceutical enterprise's decision to locate in the Southeast region rather than in other parts of the country.

ACKNOWLEDGMENTS

The authors are grateful to the Coordination for the Improvement of Higher Education Personnel (*CAPES*, acronym in Portuguese) for the postdoctoral fellowship awarded to the first author, which made this study possible.



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