The process of industrial decline in the São Paulo metropolis: restrictions, trends, and perspectives

O processo de esvaziamento industrial da metrópole paulista: restrições, tendências e perspectivas

Alexandre *Abdal* [I]
Felipe *Madio* [II]

Abstract

The main objective of this article is to present and discuss the set of pressures that, over the past fifty years, have led to an industrial decline in the São Paulo Metropolitan Region. The article formulates and proposes a working hypothesis called 'triple pressure'. Each of such pressures integrates a different causal set associated with a different scale. The three pressures are deindustrialization on the national scale, the formation of the São Paulo Megalopolis on the regional scale, and the real estate market's insistence on repurposing industrial areas on the local scale. Our results suggest that the industrial decline, which is a long-term process in the city of São Paulo, might be spreading to São Paulo's metropolitan surroundings.

Keywords: manufacture; São Paulo Metropolitan Region; deindustrialization; production decentralization; São Paulo Megalopolis.

Resumo

*Este artigo tem por objetivo apresentar e discutir o conjunto de pressões que, nos últimos 50 anos, vem produzindo um resultado de esvaziamento industrial na Região Metropolitana de São Paulo. Para tanto, formula e propõe a hipótese de trabalho da tripla pressão. Cada uma delas integra um conjunto causal diferente, associado a uma escala também diferente. As três pressões são: 1) desindustrialização em escala nacional; 2) formação da Macrometrópole Paulista em escala regional; 3) assédio do mercado imobiliário para a reconversão de uso em áreas industriais em escala local. Nossos resultados apontam para o diagnóstico de que o esvaziamento industrial que é de longo prazo no município de São Paulo pode estar se espraian*do para o seu entorno metropolitano.

Palavras-chave: *indústria de transformação; Região Metropolitana de São Paulo; desindustrialização; desconcentração produtiva; Macrometrópole Paulista.*

TIRÉSIAS [to Oedipus]: Terrible is the knowledge that befalls the ineffective knower. [...] The sounds you utter are untimely; I do not wish to suffer the same fate.
(Oedipus Rex, by Sophocles)

Introduction[1]

The objective of this article is to present and discuss the set of pressures that, over the past 50 years, have contributed to the industrial decline in the São Paulo Metropolitan Region (RMSP). This decline has been more longstanding and pronounced in the municipality of São Paulo (MSP) but may be approaching and intensifying unevenly across the surrounding metropolitan municipalities. An example of this is the recent exodus of automakers from the ABC region of São Paulo, with Ford and Toyota being notable cases. This decline in manufacturing poses significant challenges for the affected municipalities and their populations, as their economic dynamics, development, labor markets, and income levels have been fundamentally tied to the manufacturing industry throughout the 20th century.

At the same time, this outcome-process of industrial decline in the RMSP is generating an increasing stock of unused and vacated industrial buildings, which are available for repurposing. These repurposing processes may or may not involve the preservation and adaptation of such spaces for public purposes. Discussing the possibilities and limitations of industrial development in the RMSP, as well as exploring potential future scenarios and trends, also means addressing how to manage and preserve the memory and material industrial heritage inherited from the past – around which hundreds of thousands of workers built and organized their lives. It is in this context that this article aligns with the current dossier of *Cadernos Metrópole* n. 62.

The article is structured into five sections, including this introduction. The next section presents our working hypothesis, referred to as the "triple pressure", and explains why only two of the three pressures will be elaborated upon in the subsequent sections. Section three details the first pressure, which is associated with national-scale deindustrialization. Section four addresses the second pressure, linked to the formation of the São Paulo Macrometropolis (MMP) on a regional scale. Finally, the concluding section discusses possible future scenarios for the RMSP, considering the potential for halting and reversing the process of industrial decline, while also outlining the research agenda prompted by the article.

Working hypothesis: the triple pressure

The outcome-process of industrial decline in the RMSP is conditioned by a triple pressure, with each of the three pressures associated with a different scale and a distinct causal set. The first pressure is vertical (top-down), operating on a national scale, as it consists

of the deindustrialization of the country, stemming from the new pattern of Brazil's integration into the global economy beginning in the 1980s and 1990s. The second pressure is horizontal and situated on a regional scale, as it involves the formation of the MMP and arises from the characteristics of the industrial deconcentration process that began in the 1970s. The third pressure is also vertical, like the first, but operates from the bottom up and is situated on a local scale, as it pertains to the repurposing of traditionally industrial areas for new non-industrial uses. This pressure arises from the real estate expansion process in the city of São Paulo and in some of its surrounding municipalities. Figure 1 summarizes the hypothesis of the triple pressure.

In the next two sections, we will detail pressures 1 and 2, while not delving deeply into pressure 3. The primary reason for this decision is not analytical but rather personal, as our academic and research trajectories are closely tied to studies of development at the regional, national, and supranational scales, which correspond to pressures 1 and 2. Nevertheless, we acknowledge the importance of pressure 3 and indicate that it, in itself, constitutes an interesting and significant research agenda, which we would like to pursue in the near future and encourage other researchers to explore.

Discussions regarding the relationships between industrial dynamics and location at the local scale, urban planning and policies, and real estate dynamics and expansion are still limited in Brazil. Social scientists (including economists) in general, and urban planners in particular, as diagnosed by Abreu (2017), tend to focus more on the "production of the city" than on the "production within the city" (emphasis added). Nevertheless, some studies have suggested (1) the low effectiveness of fostering and attracting economic activity through urban planning instruments within the framework of urban planning (Abdal; Wissenbach, 2022; Menegon,

Figure 1 – The hypothesis of triple pressure on the manufacturing industry of the RMSP

	Scale	Expression	Conditioning factors	Temporality
Pressure 1: vertical (top-down)	National	Desindustrialization	Subordinate international integration	1980-1990
Pressure 2: horizontal	Regional	São Paulo Macrometropolis	Deconcentration of industrial production	1970
Pressure 3: vertical (bottom-up)	Local	Repurposing of industrial use to non-industrial use	Real state expansion	1990-2000

Source: authors' elaboration.

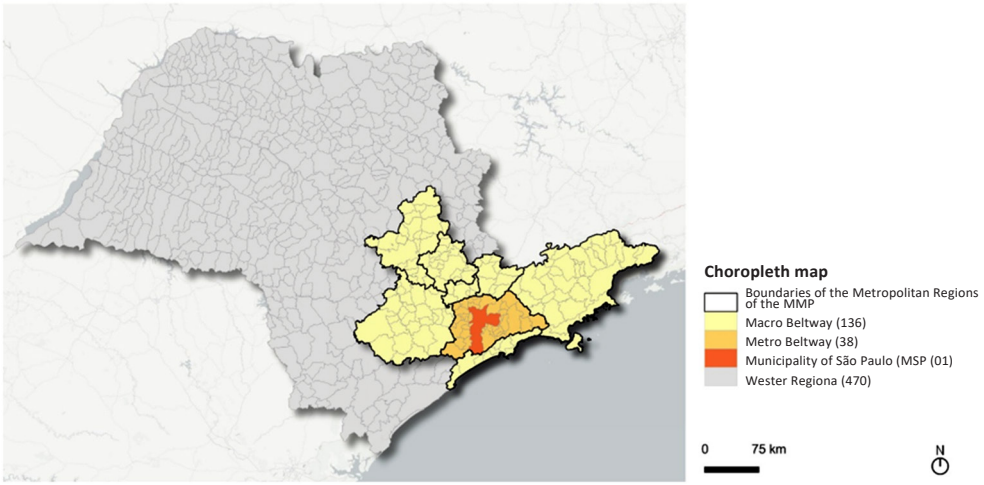
2008), although zoning specifically can protect industrial areas and, in this sense, help retain existing industries (Abreu, 2017); and/or (2) the historical pressure that the process of real estate expansion, particularly in the city of São Paulo, has exerted on traditionally industrial areas for conversion to more profitable uses, such as high-end housing and more sophisticated service activities (Bessa et al., 2012; Caldeira, 2000; Frúgoli Jr., 2000; Santoro; Rolnik, 2017; Wissenbach, 2012).

Regarding the detailed examination of pressures 1 and 2 that follows, we will utilize a set of data from various sources, particularly the National Accounts and the Municipal Gross Domestic Product (GDP-M) from the Brazilian Institute of Geography and Statistics (IBGE), the Industrial Transformation Value (VTI) of the São Paulo industry calculated by the Foundation for the State System of Data Analysis (Seade), and the Annual Social Information Report (RAIS) from the Ministry of Labor and Employment (MTE). Sectorally, whenever possible, we will work with the strict category of manufacturing industry and, when that is not feasible, with the broader category of industry, which includes, in addition to the manufacturing sector, the extractive industry and construction. Subsequently, we will disaggregate the manufacturing industry category by two digits according to the National Classification of Economic Activities (CNAE 2.0) and by a classification of technology and knowledge intensity, following the methodology developed by Abdal, Torres-Freire, and Callil (2016).

In territorial terms, we will work with the category of the São Paulo Macrometropolis (MMP), theoretically formulated by Abdal (2009) and operationally defined by Emplasa (2014). Thus, an initial division of the State of São Paulo (ESP) is established: MMP versus the western São Paulo region. Within the MMP, we choose to disaggregate three analytically relevant territories based on the existing state political-administrative divisions. These are: (1) the São Paulo Municipality (MSP); (2) the Metropolitan Beltway (Anel Metro), composed of the municipalities of the RMSP, excluding the MSP; and (3) the Macrometropolitan Beltway (Anel Macro), composed of the municipalities of the MMP, excluding the municipalities of the RMSP. Figure 2 summarizes these territorial definitions.

The subdivision of the MMP into MSP, Macrometropolitan Beltway, and Metropolitan Beltway, while analytically grounded, operates at a regional scale and, in this sense, is relatively undifferentiated. Although it is sufficient for the purposes of this analysis and appropriate for the size of the article, it may obscure territorial heterogeneities and specific local dynamics. Consequently, from our analysis, it is not possible to draw conclusions about specific territories such as the São Paulo ABC region or individual municipalities. Therefore, we view the analysis presented here more as an opening and an invitation for subsequent, more specific research with greater territorial disaggregation, rather than as an attempt to conclude and close the debate. It is more a starting point than an endpoint.

Figure 2 – The MMP and its subdivisions



Notes:
1) MSP = Municipality of São Paulo (capital) (1 municipality)
2) Metropolitan Beltway = RMSP as formally defined, excluding the MSP (38 municipalities)
3) Macrometropolitan Beltway = MMP excluding the formally defined RMSP (136 mun municipalities)
4) *MMP (total): 175 municipalities (27% and 3% of the municipalities in São Paulo and Brazil, respectively)*
5) ESP = 645 municipalities; Brazil = 5,570 municipalities
Source: authors' elaboration based on Emplasa (2014).

Vertical pressure: deindustrialization at the national scale

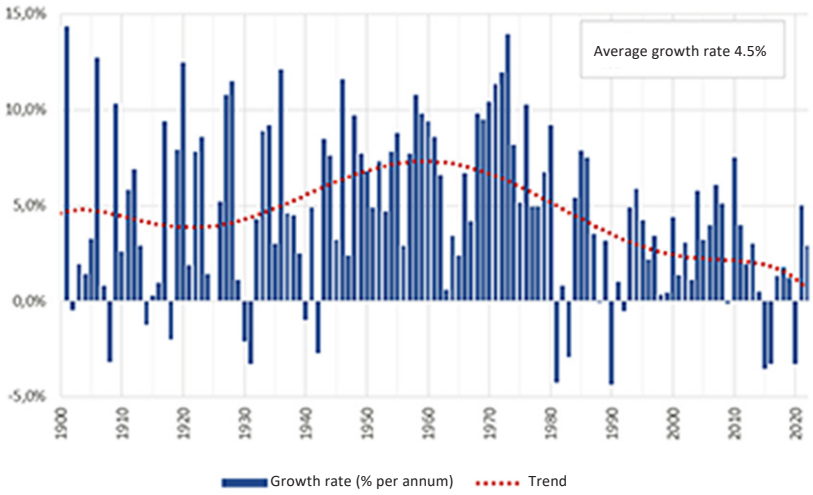
Throughout the 20th century, Brazil was able to construct a relatively complete, integral, and integrated industrial matrix, with productive capacity in the sectors typical of the Second Industrial Revolution and some capacity for incorporating technical progress. This construction began in 1930, with the onset of the Vargas Era (Nogueira, 1998), and was completed in the second half of the 1970s as part of the Second National Development Plan (II PND) (Castro, 1985). This journey was not without contradictions, notably the failure to address poverty and the increase in inequalities, the absence of a representative democratic system, a limited consumer market, the inability to keep pace with the global technological frontier amidst the informational revolution, and the failure to overcome underdevelopment and dependency relations (Abdal, 2015; Evans, 1982; Furtado, 2000; Lipietz, 1987; Oliveira, 2003; Rangel, 2012). Nevertheless, Brazil achieved what few countries in the periphery have managed to

do: a structural transformation of the economy and society, expressed in an average growth rate of around 5% per year throughout the 20th century, particularly during the period from 1940 to 1980, which experienced growth trends above this average (). In 1985, for example, the manufacturing industry alone accounted for 36% of the national GDP (Figure 4, forthcoming).

This true Brazilian industrial revolution occurred within the context of national developmentalism, characterized by: (1) converging macroeconomic and industrial policies expressed through strong state intervention, including the state acting as a direct producer and sharing risks with the private sector via investment banks; (2) a closed and protected economy, embodied in the import substitution model with an emphasis on the domestic market; and (3) a regional policy aimed at reducing regional disparities only from the 1960s onward (Abdal, 2015). We highlight the analytical categories of peripheral Fordism (Lipietz, 1987), the tripartite alliance (Evans, 1982) and late industrialization (Amsden, 2009) as appropriate and complementary ways to conceptualize this trajectory.

However, the exhaustion of the national developmentalist cycle, expressed in the crisis of the developmental state during the 1980s (Bresser-Pereira, 2014; Sallum Jr., 1996), marked the end of that trajectory of structural change in the Brazilian economy,

Figure 3 – Growth rate of Brazilian GDP and secular trend (1900-2022)



Source: authors' elaboration based on IBGE/National Accounts System (SCN) Annual and Ipeadata.

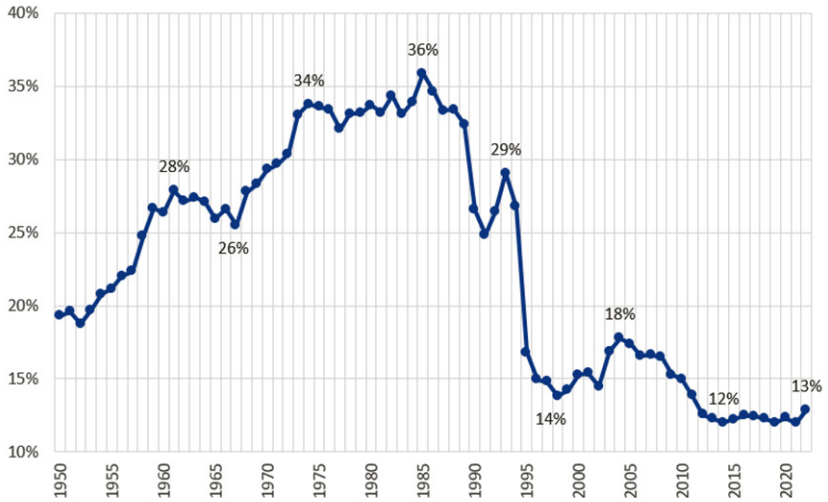
resulting in a near-stagnation that has lasted for 50 years (Bresser-Pereira, 2022) and bringing the trend growth rate of GDP down to a level well below the secular average of 4.5% per year (Figure 3). Although the political dimension of the crisis of the developmental state was addressed through the process of redemocratization, the economic and state financing crises would only be "resolved" in the transition to the 1990s, coinciding with the dismantling of national developmentalist institutions and the establishment of a new and subordinate integration of the national economy into the international market, wherein the manufacturing industry gave way to commodities in the export agenda (Carvalho, 2020; Sallum Jr., 1996; Sallum Jr., 1999).

This "resolution", however, came at a high price, with the national industry bearing the brunt of the costs – a set of liberalizing economic reforms characterized by a program of trade openness, financial liberalization, and privatizations, complemented by a monetary stabilization plan that, despite being heterodox, implied exchange rate parity and high interest rates. Together, the liberalizing economic reforms and the stabilization plan triggered a defensive productive restructuring (Coutinho e Ferraz, 1994; Kupfer, 2003) and deindustrialization (Drach, 2016). Specifically concerning the exchange rate, it is noteworthy that it remained overvalued for almost the entire subsequent period, except for the years 1999-2005, undermining the competitiveness of the Brazilian manufacturing industry.

Even after 2003, with the return of more vertical industrial policies, the situation did not improve. On one hand, the macroeconomic tripod established in 1999, characterized by high interest rates, a floating exchange rate, and primary surpluses, created a situation of divergence between macroeconomic and industrial policies (Abdal, 2019; Carvalho, 2020). On the other hand, the consolidation of China as a center of global production solidified Brazil's new position as an exporter of commodities and an importer of manufactured goods (Barbosa, 2011; Borghi, 2020). Ultimately, the country was engulfed in what is referred to as the liberalization trap (Bresser-Pereira, 2020) and was unable to escape from it.

Figure 4 illustrates the evolution of the participation of the manufacturing industry in the national GDP. It is evident that this participation increased until 1985, followed by a contraction from that point onward, providing a numerical expression of deindustrialization. Three periods of significant contraction stand out: (1) 1985-1991, marked by accelerating inflation and the election of former president Fernando Collor; (2) 1993-1998, coinciding with the Real Plan and its regime of high interest rates and an overvalued, fixed exchange rate; and (3) from 2004 onward, characterized by a tendency toward chronic appreciation of the exchange rate and the maintenance of an adverse macroeconomic policy regime, even during the Lula and Dilma administrations, which committed to pro-industry policies.

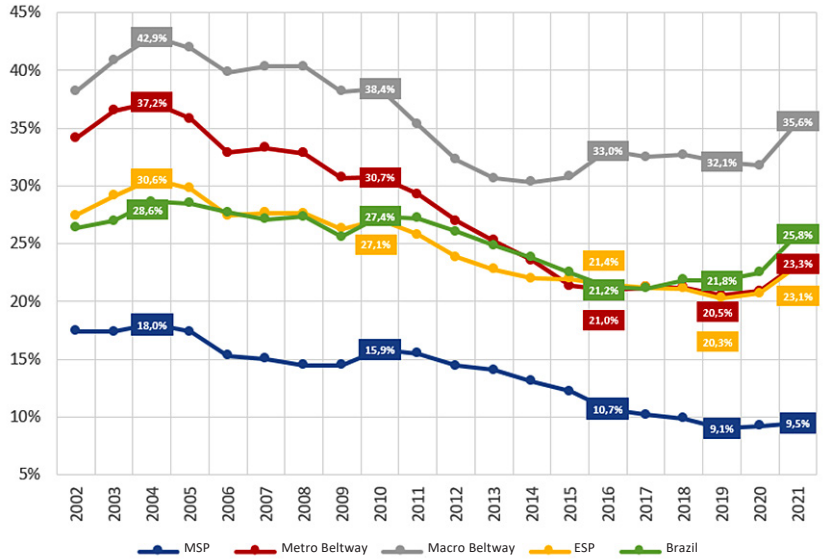
Figure 4 – Participation of the Manufacturing Industry in Brazilian GDP (1950-2022)



Source: authors' elaboration based on the Annual IBGE/SCN; Ipeadata.

Now, while productive restructuring and deindustrialization are phenomena that unfold on a national scale, anchored even in international dynamics, the effects that concern us here are felt on a regional scale. This is because the main regions affected by the loss of industrial competitiveness were precisely the most industrialized regions, with a particular emphasis on the São Paulo Metropolitan Region (RMSP) (Abdal, 2009; Abdal et al., 2019; Comin e Amitrano, 2003). Figure 5, which presents data on Municipal GDP (expanded definition of the industry category: manufacturing industry, extractive industry, and construction), fundamentally shows a decline in the participation of the manufacturing industry throughout the entire period, although this decline is more pronounced in the São Paulo Municipality (MSP) and the Metropolitan Beltway compared to Brazil, the State of São Paulo (ESP), and the Macro Beltway. While MSP and the Metropolitan Beltway lose 9 and 14 percentage points, respectively, Brazil, ESP, and the Macro Beltway lose at most 7 percentage points. In the case of MSP, the loss of 9 percentage points indicates that the weight of the industry has been cut in half!

Figure 5 – Participation of Gross Value Added (GVA) by Industry in the MSP, Metropolitan Beltway, Macro Beltway, ESP and Brazil (2002-2021)



Source: authors' elaboration based on IBGE/PIB-M.

In Figure 6, utilizing data on the Industrial Transformation Value Added (VTI) calculated by the Seade Foundation for the State of São Paulo (ESP), we observe the same trend: a contraction of the VTI from the São Paulo and metropolitan industries against an increase in the participation of the VTI from the Macro Beltway and the Western São Paulo region. We highlight (i) the Macro Beltway, which, in 2021, reached the significant mark of 50% of the total VTI of the ESP; and (ii) the Western São Paulo region, which, between 2003 and 2021, matched the Metropolitan Beltway at approximately 21%, tending to surpass it in the coming years.

We therefore arrive at the following conclusion: while the national manufacturing industry as a whole has been suffering and losing competitiveness since the mid-1980s, regionally, this decline is more pronounced in the MSP and the Metropolitan Beltway, corroborating the perception of industrial hollowing. Furthermore, we emphasize that the industrial hollowing in the MSP is more intense and of longer duration than in the RMSP, thus justifying the differentiation between the MSP and the Metropolitan Beltway.

Now, the category of the Metropolitan Beltway is still a regional category that is relatively aggregated. We highlight that a more sensitive analysis can be conducted by differentiating the Metropolitan Beltway at the local level, subdividing it into smaller territories, and paying greater attention to sectoral aspects. For instance, what is the specific impact of the current movement of the automotive sector (automakers and auto parts) leaving the ABC region of São Paulo, as represented so far by the transfer of activities from Toyota and Bridgestone, as well as the closure of Ford?

Figure 6 – Participation of the MSP, Metropolitan Beltway, Macro Beltway and the Western São Paulo region in the total VTI of the ESP (2003 and 2021)

	MSP	Metro Beltway	Macro Beltway	Western Region	ESP
2003	13.7%	24.7%	45.0%	16.7%	100%
2021	6.5%	21.9%	50.2%	21.3%	100%
Variação (p.p.)	-7.1	-2.8	5.2	4.7	–
Average (annual growth %)	-4.0%	-0.6%	0.6%	1.4%	–

Source: authors' elaboration based on IBGE; Seade Foundation.

National-level deindustrialization helps explain the difficulties faced by the manufacturing industry, but it does not account for all the challenges this industry faces in the RMSP. In addition to this, there are at least two other causal factors, referred to as pressures 2 and 3. While pressure 3 was discussed in the previous section, pressure 2 will be detailed in the following section. This will help explain, for example, the differential performances among the MSP, the Metropolitan Beltway, and the Macro Beltway.

Horizontal pressure: macrometropolization at the regional scale

From a regional perspective, Brazil's development trajectory has been hyper-concentrated in production and, above all, in the manufacturing industry within the RMSP (Cano, 1998). Initially, this involved a lighter industry in the MSP, and later transitioned to the so-called phase of heavy industrialization when the country internalized the sectors producing capital goods and durable consumer goods in the Metro Beltway (Meyer, Grostein e Biderman, 2004; Pasternak et al., 2023). In this sense, it can be asserted that the region currently comprising the RMSP was the epicenter of the Brazilian industrialization process, encompassing its contradictions, limitations, and successes. (Comin, 2003).

This increasing concentration of industrial production in the RMSP until 1970 is well documented in Brazilian literature, notably by Azzoni Azzoni (1986), Diniz (1993), Pacheco (1998), Cano (1998), Tinoco (2003), Comin and Amitrano (2003) and Abdal (2009). In general terms, there is consensus[2] regarding the process of productive concentration in the RMSP until 1970, as well as regarding the beginning of a deconcentration process from that decade onwards, either due to the emergence of agglomeration diseconomies in the RMSP or through a robust intervention by the Brazilian state at various levels of government[3] from the 1960s onward.

The fact is that the first two decades of the deconcentration movement still took place within the framework of national developmentalism, where the primary political-economic objective was regional integration in the context of unifying the national market (Abdal et al., 2019; Pacheco, 1998; Tinoco, 2003). This movement minimally benefited the entire national territory, providing a trajectory of regional development anchored in São Paulo (Cano, 1998). In other words, despite the relative loss of industrial dynamism in the RMSP, it continued to anchor national industrial development and serve as the nucleus for the main national productive chains.

The territorial effect of the semi-stagnation that began in the 1980s, and especially the liberalizing economic reforms of the 1980s and 1990s, was territorial fragmentation (Araújo, 2000; Pacheco, 1998). This meant that, from a territorial perspective, such economic reforms and the change in Brazil's international economic insertion they engendered introduced a second horizon, simultaneously superimposed upon and contradictory to the previous objective of national integration, namely, the horizon of international integration (Abdal, 2015; Tinoco, 2003). From this point forward, regional disintegration became possible through a direct connection to international markets, the outcome of which, in a context of economic semi-stagnation and the onset of deindustrialization, was the maintenance of dynamism only in territories and sectors that, for various reasons, held competitiveness in light of international markets. Notable examples here include sectors and territories linked to export agriculture, the mineral extraction industry, and certain industrial segments characterized, in general, by being more intensive in natural resources or labor (Abdal, 2015).

The RMSP, therefore, continued to lose its share of national industry during the period of territorial fragmentation, while simultaneously beginning to lose its characteristic role as an anchor and nucleus of national production. Although it contained the most diverse and complex industry in the national territory, this production was primarily oriented towards the domestic market and had less potential for direct connection to international markets. At the same time, parallel to the deconcentration movement that began in the 1970s, the metropolitan manufacturing industry started to experience territorial sprawl, resulting in the formation of the MMP (Abdal, 2009; Abdal et al., 2019; Azzoni, 1986; Emplasa, 2019; Matteo e Tapia, 2002; Tavares, 2018a). The MMP, understood as a broad, relatively integrated productive territory characterized by a specific spatial division of labor and formed through the productive deconcentration process of the RMSP, can be summarized in the theses of concentrated deconcentration (Azzoni, 1986) and the hierarchy of deconcentration (Abdal, 2009; Abdal et al., 2019; Abdal, Torres-Freire e Callil, 2014).

While the first thesis diagnoses a reconcentration of a significant portion of the industrial deconcentration of the RMSP in its macrometropolitan surroundings, the second thesis posits that there is a privileging of activities that are more intensive in technology, innovation, and/or capital in the metropolitan and macrometropolitan environments, as opposed to an industrial hollowing out in the city of São Paulo, which has tended to become

a hub for specialized productive services. Concentrated deconcentration occurs because, in light of the increase in negative externalities in the capital and the Metro Beltway,[4] the location (or relocation) in the Macro Beltway allows, simultaneously, for the escape from these negative externalities of the central city while maintaining access to the positive externalities of the metropolis, particularly regarding the expansion of the consumer market and income concentration, as well as access to infrastructure, logistics networks, supplier networks, specialized services, and knowledge infrastructure (CT&I institutions, laboratories, universities, etc.).

This concentrated deconcentration, however, is hierarchical, as the decision to maintain a location in the RMSP or to relocate to the Macro Beltway at the expense of other regions in the national territory was influenced by the degree of intensity of technology, innovation, and/or capital density of the sector, activity, and company. The less dependent a sector is on technology, innovation, and capital, the greater the propensity for relocation, including from the MMP; conversely, the more dependent a sector is on technology, innovation, and capital, the greater the propensity to maintain a location in the RMSP or to relocate to the Macro Beltway.

The net result of this process of forming the MMP (deconcentrated and hierarchical deconcentration) was: (1) a long-term industrial hollowing out in the MSP *vis-à-vis* specialization in specialized productive services; (2) a relative maintenance of industrial specialization in the Metro Beltway, particularly in high-technology industries; and (3) a significant movement of industrial expansion and specialization in the Macro Beltway across all industrial segments, with greater importance in the segments of higher technology intensity.

Figure 7 provides evidence and a numerical expression for the net result of this process, amounting to approximately 50 of concentrated and hierarchical deconcentration. Constructed with formal employment information from Rais, it presents the Location Quotients (LQs)[5] for each activity segment according to technology and knowledge intensity[6] for the territories of interest in the ESP. LQs above 1.0 indicate overconcentration of employment in the sector in question when compared to the reference economy (ESP, in our case), while LQs below 1.0 indicate under-representation. In this sense, LQs greater than 1.0 can be interpreted as indicators of productive specialization processes, whereas LQs less than 1.0 can be seen as indicators of productive despecialization processes.

Figure 7 – Degree of productive specialization, measured by the LQs of the formal employed population across activity segments according to technology and knowledge intensity for the ESP (MSP, Metro Beltway, Macro Beltway, MMP, and Western Region), 2006-2021

	Industry				Services				
	High	Medium--High	Medium--Low	Low	KIS-T	KIS-P	KIS-F	KIS-S	KIS-MC
	MSP				MSP				
2006	0.65	0.55	0.46	0.58	1.41	1.47	1.51	1.11	1.30
2021	0.49	0.32	0.31	0.40	1.47	1.39	1.74	1.17	1.56
	Metro Beltway				Metro Beltway				
2006	1.66	1.82	1.34	0.82	1.34	1.10	0.85	0.66	1.17
2021	1.63	1.56	1.32	0.76	0.99	1.12	0.71	0.72	0.89
	Macro Beltway				Macro Beltway				
2006	1.54	1.37	1.22	1.13	0.73	0.62	0.59	0.97	0.76
2021	1.55	1.62	1.44	1.16	0.78	0.64	0.48	0.90	0.62
	MMP				MMP				
2006	1.14	1.08	0.88	0.80	1.19	1.13	1.09	0.97	1.11
2021	1.08	1.00	0.89	0.72	1.15	1.09	1.12	0.98	1.12
	Western Region				Western Region				
2006	0.48	0.71	1.44	1.77	0.29	0.50	0.67	1.12	0.59
2021	0.71	1.00	1.42	2.04	0.45	0.65	0.55	1.06	0.56

Source: authors' elaboration based on Rais/MTE.

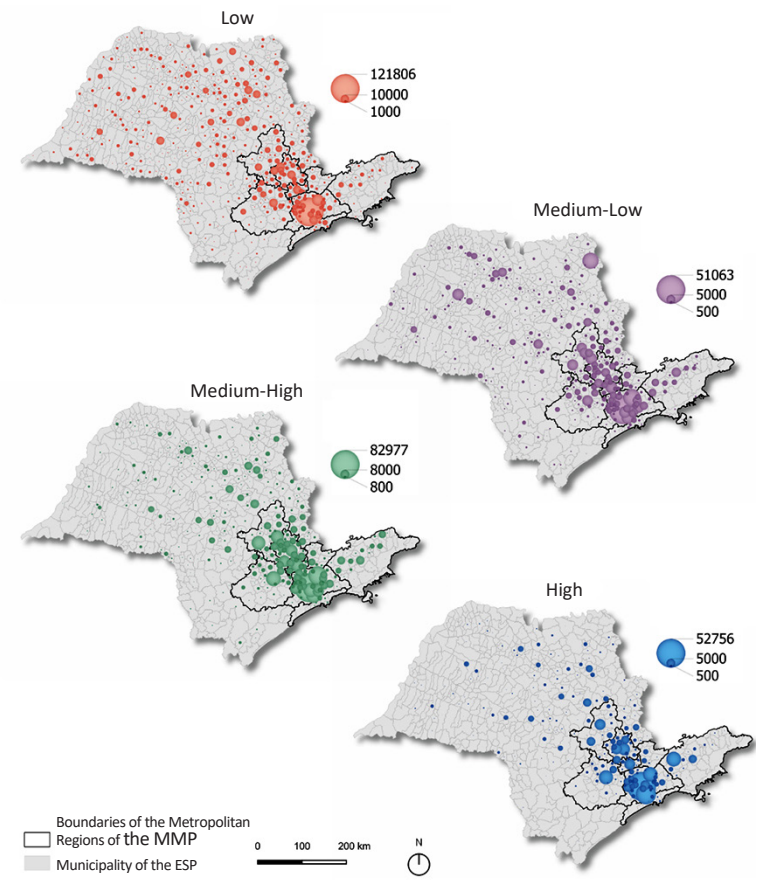
In examining Figure 7, we highlight three sets of evidence (see the highlights in red). First, there is a significant de-specialization in the MSP across all four industrial segments, which is compensated by a notable specialization in the five segments representing specialized productive services. Furthermore, between 2006 and 2021, both de-specialization in industry and specialization in such services increased. Second, the Metro Beltway maintains significant specialization in medium-low, medium-high, and high technological intensity industries, although there is a gradual decline in this specialization over the analyzed period, particularly pronounced in the medium-high intensity industry. The Macro Beltway continues to maintain and expand its specialization in all four industrial segments, with this specialization being strongest in the sectors of highest intensity. Finally, the Western Region also observes growth in its industry, predominantly concentrated in the lower technological intensity industry (both low and medium-low).

The two sets of maps (Figures 8 and 9) spatially represent the same information as Figure 7: while the first map depicts the distribution of formal employment in industry according to technological intensity for the ESP, the second map illustrates the distribution of the Location Quotients (QLs) for that industry. We consider these two sets of cartographies particularly valuable for visualizing the

phenomenon of concentrated and hierarchical deconcentration within a spatial and synchronic framework.

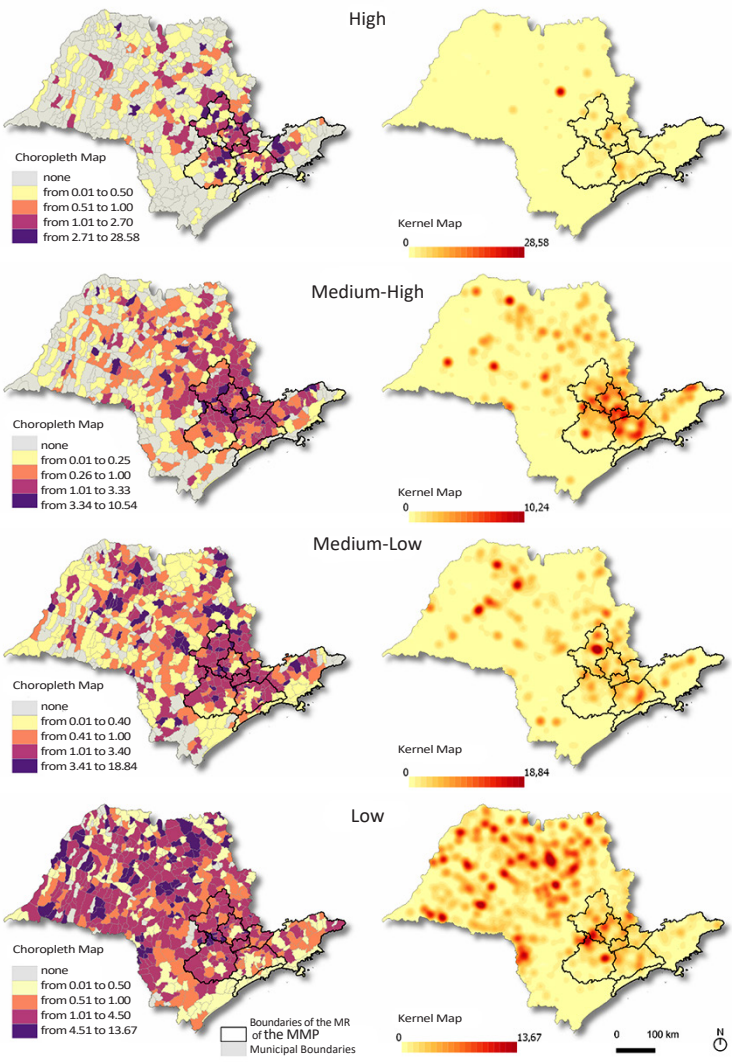
The differences in spatial patterns are evident, notably the more concentrated and less dispersed nature of the high-tech segments compared to the less concentrated and more dispersed nature of the low-tech segments. Such differences are also reflected in the capacity of the MMP to concentrate the majority of employment and specializations in industries of higher technological intensity — for example, compare the spatial distributions of the QLs of low-tech industries with those of medium-high and, especially, high-tech industries (Figure 9).

Figure 8 – Distribution of Formal Employment in the São Paulo Industry according to Technological Intensity, 2021



Source: authors' elaboration based on Rais/MTE.

Figure 9 – Distribution of the LQs of Formal Employment in the São Paulo Industry according to Technological Intensity, 2021



Source: authors' elaboration based on Rais/MTE.

Final considerations: research agenda and future trends

In this article, we proposed and discussed the hypothesis of triple pressure on the manufacturing industry of the RMSP. This framework organizes the pressure factors affecting the metropolitan industry, namely: (1) semi-stagnation of the economy and deindustrialization at the national level; (2) the spread of the metropolitan industry and the formation of the MMP at the regional level; and (3) real estate pressures on traditionally industrial areas at the local level. Furthermore, it elucidates the long-term outcome of industrial hollowing in the MSP, as well as indicating a potential extension of this hollowing effect to the Metro Beltway.

Our diagnosis of the potential spread of industrial hollowing to the Metro Beltway should be understood on a regional scale, in the sense that we are considering the set of municipalities that comprise the metropolitan surrounding areas of the MSP, rather than local territorial or municipal trajectories. Strictly speaking, and considering the data we presented throughout the article, the Metro Beltway has demonstrated remarkable resilience over the past 20 years, although a decline in its level of productive specialization in the highest technology industries (high, medium-high, and medium-low) can be observed. Beyond our data, from a more qualitative perspective, in the last five years, the closure of significant companies in the automotive sector has been announced, particularly the factories of Ford and Toyota, the full impact of which has yet to be realized.

Should this spread to the Metro Beltway be confirmed, we emphasize that it would represent a significant economic, productive, and labor market challenge for a region whose development has been closely linked to industrial dynamics over the past 70 years. In comparison, the Metro Beltway's position is relatively worse, as the MSP has been able to compensate for the loss of industrial dynamism with the development of a robust sector of specialized productive services. We did not identify a similar movement for the Metro Beltway. Considering the internal territorial heterogeneity within the Metro Beltway, we note that this presents an important and interesting research agenda, which involves investigating the impacts of these three pressures at the local level.

Considering the future of the RMSP in light of the persistence of the three pressures, our results indicate a lack of optimism regarding the prospects for reindustrialization, defined as a reversal of the long-standing trend of industrial decline. From an international perspective, the current context of the global economy remains unfavorable, characterized by the consolidation of the Asian-Chinese axis as a manufacturing hub and the continuation of conflicts and mistrust in the global market. Nevertheless, the resumption of pro-industry policies by the USA may have some emulative effect on developing countries.

From a national perspective, despite the announcement of a new industrial policy called New Industry Brazil (NIB), which acknowledges deindustrialization as a problem, nothing to date ensures that it will not once again be undermined by a restrictive macroeconomic policy. Even in the event of a nationalistic shift

in macroeconomic policy, it is more likely to benefit other industrial hubs rather than the RMSP, particularly the Macro Beltway and other medium-sized Brazilian cities. Thus, assuming a new sustained cycle of industrial investments occurs in a situation of convergence and complementarity between industrial and macroeconomic policies, it is highly probable that the RMSP would only be favored in the case of an active regional policy in its favor. However, given the trajectory of regional Brazil, characterized by extremely high regional disparities, a pro-São Paulo policy represents an anti-regional policy and is a significant misstep.

Local governments would then remain. Although there is a significant discussion on local development,[7] they have limited capacity to attract new industries, as they possess little leeway for tax exemptions that impact the manufacturing industry. Additionally, the use of urban planning instruments tends to be ineffective – zoning, for example, has an effect on the retention of industrial firms but not on their attraction.

Now, little is nothing. In addition to the already traditional practice of donating land, municipalities can implement face-to-face strategies to attract industrial investments. They can also invest in factors that generate positive externalities for industry, such as basic and transportation infrastructure, workforce training and qualification institutions, and institutions related to knowledge infrastructure, highlighting applied research on one hand and the interconnection between universities and businesses on the other. The municipalities of the Metropolitan Beltway can also strengthen joint action within the existing consortia while seeking the collaboration of the MSP (traditionally resistant to metropolitan cooperation), integrating inter-consortium actions and engaging with the state government.

[I] https://orcid.org/0000-0003-3577-1238
Fundação Getulio Vargas, Escola de Administração de Empresas de São Paulo. São Paulo SP/Brasil.
alexandre.abdal@fgv.br

[II] https://orcid.org/0009-0000-2167-7684
Fundação Getulio Vargas, Escola de Administração de Empresas de São Paulo. São Paulo SP/Brasil.
felipemadio@gmail.com

Notes

(1) An initial version of this article was presented at the panel “Deindustrialization and Workers' Memory” during the International Seminar “Deindustrialization and Refunctionalization of Industrial Heritage”, held in May 2023 at the School of Communications and Arts of the University of São Paulo (ECA-USP). The seminar proceedings can be accessed in the digital book *Deindustrialization and refunctionalization of industrial heritage: a discussion on local and international experiences*, edited by Clarissa Gagliardi and Mônica Carvalho and published in 2024.

(2) The disagreements, which will not be discussed in this article, pertain to how to interpret this loss of participation; for instance, whether we are witnessing a process of deindustrialization in the RMSP, a reversal of the polarization of the RMSP, or whether the RMSP would remain industrial and/or a polarizing force in national production.

(3) For a discussion on the specific planning actions of the São Paulo state government, see Tavares (2018b).

(4) With emphasis on land costs and labor costs, but also on environmental legislation, the organization of the working class, violence, traffic congestion, etc. (Negri, 1996).

(5) The location quotient (LQ) is calculated as follows: LQ = (Eaj/Eaesp) / (Eatvj/Eatvesp), where: Eaj represents the employment of the specific activity in the specific region; Eaesp is the employment of the specific activity in the total region (ESP); Eatvj is the overall employment in the specific region; and Eatvesp is the overall employment in the total region (ESP).

(6) This classification, developed by Abdal, Torres-Freire, and Callil (2016), subdivides the manufacturing industry based on its technological intensity, measured by direct and indirect spending on Research and Development (R&D), as well as services, according to the nature of the service provided and the degree to which it incorporates knowledge. Both are evaluated based on the activity description in the CNAE 2.0. The result is four industrial segments (high, medium-high, medium-low, and low technological intensity) and seven service segments (Knowledge-Intensive Services [KIS], technological KIS, financial KIS, social KIS, media and culture KIS, knowledge non-intensive productive services, and other services).

(7) See, for example, Comin and Torres-Freire (2009) and Santos (2013).

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Translation: this article was translated from Portuguese into English by Daniela Almeida, email: almeida.daniela.n@gmail.com

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