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Brazilian Manufacturing in the Global Economy: Has Relative Deindustrialization Deepened in the 2010s?

A manufatura brasileira diante do cenário internacional: avanços da desindustrialização relativa na década de 2010?

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Abstract: Drawing on data on production structure and foreign trade, this article examines the continuity and intensification of the process of relative international deindustrialization of the Brazilian economy throughout the 2010s. The evidence points to a continued erosion of Brazil's position in global manufacturing.

Keywords: Deindustrialization; Globalization; Brazilian economy.
JEL Classification: F63, I69, O00.

Resumo: A partir dos dados de estrutura produtiva e comércio exterior, o artigo avalia a continuidade e aprofundamento do processo de desindustrialização relativa internacional da economia brasileira na década de 2010. Os dados apontam para continuidade do aprofundamento da perda de importância da manufatura brasileira no cenário internacional.

Palavras-chave: Desindustrialização; Globalização; Economia brasileira.
Classificação JEL: F63, I69, O00.

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1. Introduction

The process of industrialization traces its origins to the English Industrial Revolution of the mid-eighteenth century and can be understood as the incorporation of the capital goods sector into economic production (Oliveira, 2003). It has long been regarded as the main driver of a country's economic and social transformations, typically displaying robust growth rates above those of Gross Domestic Product (GDP) and leading to the formation of a national economic system (Furtado, 1992). As emphasized by Cano (2017), national states have historically played a central role in guiding and fostering industrialization. Industrialization has been a fundamental vector in shaping the international division of labor under capitalism, with a significant role in both developed and underdeveloped nations (Rodríguez, 2009).

According to Cano (2014), the national accounts define industry as comprising four segments: mining, construction, utilities, and manufacturing. Among these, the manufacturing industry has the greatest capacity to generate and diffuse technological progress and to enhance productivity across the economy. Cano (2014) also lists several reasons that underscore the importance of manufacturing in the economic and social transformations of capitalism: a) it transforms natural resources by adding value and expanding their usefulness; b) it has been crucial for the advancement of modern science and technology; c) it has accelerated urbanization and expanded the demand for goods and services; d) it has enabled countries to achieve significant gains in productivity and competitiveness, boosting output and export diversification while improving balance-of-payments financing; e) it has modernized productive and employment structures, broadening the wage spectrum; f) the concentration and centralization of capital it promotes have been key to the expansion of infrastructure—especially in urban areas—by facilitating access to energy, telecommunications, transport, and sanitation; and g) ultimately, it has been a decisive force behind the emergence and consolidation of the modern State. Together, these factors underscore the undeniable importance of manufacturing for economic development.

Deindustrialization, in turn, can be defined as the reduction in the share of manufacturing value added or employment in total economic activity (Tregenna, 2009; Oreiro and Feijó, 2010). The United Nations Conference on Trade and Development (UNCTAD, 2003) classifies deindustrialization into two categories: normal (or positive) and premature (or negative). Normal or positive deindustrialization occurs in developed economies with mature industries and high per capita income (GDP per capita). These countries typically display greater investment in research, technology, and innovation, as well as more diversified service sectors with significant participation in high-value-added activities. They thus specialize in producing higher value-added goods and services while outsourcing or relocating production—particularly to Asian economies (Akyuz, 2005; Arend, 2014; Cano, 2014). Even without producing the entire range of goods domestically, such countries occupy the stages of global value chains (GVCs) that capture the highest value-added (Reis; Sampaio, 2019). In short, so-called natural or positive

deindustrialization results from the transition from an industrial to a technologically advanced service economy, a process associated with the maturation of the industrial sector in developed countries (Rowthorn; Coutts, 2004).

In contrast, many peripheral economies, including Brazil, have undergone premature or negative deindustrialization since the 1990s, marked by a sharp decline in the manufacturing sector's share of GDP and employment before reaching high income levels (Sampaio, 2015; Rodrik, 2016). In other words, premature deindustrialization occurs when an economy loses industrial capacity before fully internalizing capital goods production or developing an endogenous core of technological innovation—thus, before achieving industrial maturity.

Unlike the positive pattern, Sampaio (2015) emphasizes that although developed countries are also experiencing deindustrialization and losing manufacturing share to Asian economies, they remain among the world's largest producers and exporters of manufactured goods. Their productive structures are diversified, with a high proportion of capital goods, and they continue to command technological trajectories as well as the composition of global production and trade.

Against this background, the general objective of this article is to examine the role of Brazilian manufacturing within the current configuration of the international division of labor, focusing on the transformations that took place during the 2010s (2011–2020). The analysis compares the performance of Brazilian manufacturing with that of the fifteen largest manufacturing economies worldwide over this period. The specific objectives include assessing changes in the share of Brazil's manufacturing value added, its production structure, and its foreign trade performance in the context of intensified global competition.

Beyond the literature review, the study draws on international databases and indicators of deindustrialization from the United Nations Conference on Trade and Development (UNCTAD), the United Nations Industrial Development Organization (UNIDO), and the World Trade Organization (WTO), concerning national accounts, productive structure, and foreign trade, respectively. Based on these sources, the analysis highlights the position of Brazilian industry amid the intense transformations in the global production structure during the past decade. The considered context includes the lingering effects of the 2008 global financial crisis, the 2011 international crisis, the Brazilian recession of 2014–2016, and, finally, the COVID-19 pandemic.

Few studies have employed a methodology similar to that adopted here—namely, an analysis of Brazilian deindustrialization within the framework of the international division of labor. Among the most relevant references are UNCTAD (2003), Akyuz (2005), Nassif, Feijó, and Araújo (2013), Arend (2014), Sampaio (2015), Morceiro (2018), and Araújo and Feijó (Org., 2023). This study contributes to the ongoing discussion on deindustrialization by examining Brazil's recent performance relative to the world's fifteen largest manufacturing economies.

The article has been divided into three sections, in addition to this introduction and the concluding remarks, in order to achieve its objectives. Section 2 presents a brief

overview of the Brazilian economy as context. Section 3 examines the structure of Brazilian manufacturing in comparison with the fifteen largest manufacturing economies in terms of value added. Section 4 discusses trade indicators and foreign trade data. Overall, the article concludes that the Brazilian economy continued to experience structural regression during the 2010s through the process of relative international deindustrialization—a trend that raises serious concerns regarding the country's prospects for economic development, which necessarily depend on the manufacturing sector.

2. Brazilian Economy in the 2010s: A New Lost Decade?

During Brazil's industrialization period, which took shape between the 1930s and the 1980s, development plans were generally linked to industrialization projects. These industrialization projects envisaged an active role for the State in the economy—at times as an inducing agent, at others as a coordinator, an entrepreneur, or a financier—driving the advance of typically capitalist productive forces through the incorporation of new goods and services into the economy (Carneiro, 2002).

Development itself was often mistaken for the industrialization process, marked by the emergence of new sectors, increased productive diversification, urbanization, and labor market expansion, with a broader wage spectrum and internal population mobility driven by intense domestic migration flows. This process also fostered the creation of linkages within production chains, generating macroeconomic connections capable of producing income and employment multiplier effects across the country. By the end of the Second National Development Plan (PND – *Plano Nacional de Desenvolvimento*, 1974-1979), Brazil had established a consolidated industrial base aligned with the patterns of the second industrial and technological revolution, positioning itself as one of the world's leading industrial producers.

Clearly, the process of industrialization in Brazil had contradictory effects on the economy and society, which became more apparent during the authoritarian period. Despite the advances of capitalist productive forces and their expansion throughout the national territory, these developments occurred in ways that intensified social inequality, increased territorial exploitation, and caused environmental degradation. They also failed to deliver agrarian reform, led to explosive urbanization, resulted in the State's excessive indebtedness, and did not succeed in "opening the black box" of technological progress. The attempt to build an industrial civilization in the tropics encountered structural limitations within the economy itself—limitations that the prevailing developmentalist ideology of the industrialization era was unable to overcome.

The origins of Brazil's deindustrialization process date back to the mid-1980s and are directly associated with the State's fiscal and financial crisis and the exhaustion of the import substitution model. Since then, there has been a persistent decline in the share of the manufacturing industry in Brazil's GDP, accompanied by relatively low economic growth rates, weak technological dynamism, reduced productive diversification, and a tendency toward export reprimarization (Oreiro; Feijó, 2010; Cano, 2014; Sampaio, 2015).

While developed countries are moving toward the consolidation and diffusion of sectors associated with Industry 4.0, Brazil has yet to complete the third industrial and technological revolution, a lag that reinforces its falling behind trajectory (Arend; Fonseca, 2012), especially amid the intense process of industrial denationalization and growing technological dependence. In this context, "due to their extreme technological dependence and need for external resources, these countries found themselves technologically backward and compelled to undertake institutional changes to attract foreign investment" (Arend, 2014, p. 418). Accordingly, these authors suggest that this has been the path followed by Brazil and several Latin American countries, particularly given the weakness of industrial policy and the flawed management of the industrialization process—especially after the 1990s.

Cano (2014) argues that Brazil faces a premature and harmful process of deindustrialization, which hinders its development trajectory and reflects a manifestation of its structural underdevelopment. The author also identifies specific determinants that make this phenomenon particularly distinctive in the Brazilian case. Among these factors, he highlights the country's economic policy—what he calls the "insane trilogy," composed of high interest rates, an overvalued exchange rate, and a stringent primary surplus target. Since the 1980s, economic policy has been primarily oriented toward short-term objectives, such as controlling inflation and managing public debt (both external and domestic), rather than ensuring the continuity of industrialization.

According to Cano (2014), the persistently high interest rates discourage resource allocation to productive investment, as the financial sector becomes comparatively more attractive—illustrating the dominance of financial and speculative capital in the national economy. The exchange-rate policy, marked by the persistent appreciation of the real since the Plano Real, has negatively affected domestic industry by encouraging high import volumes and reducing the competitiveness of national products, particularly manufactured goods, both in domestic and foreign markets. Moreover, the government's strict commitment to primary surplus targets constrains the State's investment capacity, limiting its ability to foster conditions for industrial competitiveness. The resulting "straitjacket" of economic policy thus emerges as a major obstacle to productive development.

Additionally, it is necessary to consider the economic deregulation promoted by the reforms associated with the Washington Consensus[1]. Among these reforms, trade liberalization stands out, as it reduced import protection and was accompanied by Brazil's accession to the WTO. The WTO advocates free trade, condemns protectionism, and oversees member countries' economic policies, paying particular attention to restrictions imposed on protectionist measures. In Brazil, the liberalizing reforms also included

[1] "The expression 'Washington Consensus' was coined by John Williamson, an economist and researcher at the Institute of International Economics, based in Washington, to describe the convergence of thinking on public policies during the 1980s, beginning with the administrations of Ronald Reagan and George Bush. It referred to the ideas of the leading authorities in global economic policymaking: the senior bureaucracy of U.S. government economic agencies, the Federal Reserve Board, international financial institutions, members of the U.S. Congress, and economic advisers holding significant symbolic influence worldwide" (Martins, n.d.).

financial deregulation and privatization, which facilitated the entry of speculative capital and foreign direct investment (FDI). The growing presence of the latter, however, weakened domestic decision-making centers. In this regard, Oliveira (2021) notes that the country was unsuccessful in pursuing a process of reindustrialization in the following decades and continues to face deindustrialization, steadily losing ground on the international stage.

The supremacy of the markets, consolidated with the adoption of the Washington Consensus measures, made it impossible to promote industrial development; on the contrary, it contributed to its regression. The weak performance of industry, stemming from its exposure to international competition, undermined technologically intensive sectors, increased structural heterogeneity, and was accompanied by intra- and intersectoral reconfigurations that weakened the productive linkages within the national territory, thereby reducing the multiplier effects of income and employment in the domestic market.

Despite the general characteristics that marked the 1980s and 1990s, the Brazilian economy experienced a return to economic growth in the first decade of the twenty-first century. This recovery can be explained by external factors—such as global expansion driven by the China effect—and by internal factors, notably the strengthening of the domestic market. Bielschowsky (2014) suggests that such growth can be explained by three fronts of expansion: i) the domestic mass-consumption market, driven by real increases in the minimum wage, social benefits granted by the government (such as the Bolsa Família program), low unemployment, and easier access to credit, among other factors; ii) the export of abundant natural resources, particularly due to the rising Chinese demand for agricultural and mineral products, which led to a sharp increase in both prices and export volumes from Brazil; iii) investment in physical and social infrastructure, made possible by the State's renewed fiscal capacity to expand public investment in roads, ports, airports, and major sporting events (the 2014 World Cup and the 2016 Olympic Games), among others. These expansion fronts could have been further reinforced by two key drivers: i) the reactivation of productive linkages; and ii) technological innovation.

Following the 2008 global financial crisis, the Brazilian government implemented a set of countercyclical measures to prevent the economy and society from suffering the effects of one of the most severe crises in the history of capitalism. These measures included a more flexible approach to the macroeconomic tripod: allowing inflation to remain closer to the upper limit of the target range, reducing the fiscal surplus (thus stimulating the economy through lower revenues and higher expenditures), and promoting some degree of exchange-rate depreciation. Although the country faced a crisis of major proportions without experiencing a currency collapse, the policies adopted to sustain domestic demand gradually lost effectiveness, leading to an economic slowdown beginning in 2011 (Sampaio, 2019).

Between 2011 and 2014, the Brazilian economy entered a phase of cyclical deceleration, which could be explained by the ongoing international financial crisis and the gradual exhaustion of domestic mechanisms designed to offset its effects. The labor market remained relatively strong despite declining growth rates; however, in 2015 and 2016 the

domestic economy entered a severe downturn, marked by stringent austerity measures, corruption scandals, and political turmoil. During this period, GDP contracted sharply, particularly in the manufacturing sector, where the capital goods and durable consumer goods industries were hit especially hard, with significant declines in physical output. The labor market subsequently deteriorated, with rising unemployment and falling real average wages. In 2016, the government enacted a fiscal reform through Constitutional Amendment No. 95/2016 (the "Public Spending Cap") and a labor reform that intensified job insecurity. Between 2017 and 2019, GDP stagnated at low growth rates, unemployment remained high, and the situation was further compounded by the pension reform. In 2020, the final year of the decade, the economy was struck by the COVID-19 pandemic, which had devastating effects on national economic activity. Overall, the 2010s proved disastrous for the Brazilian economy, society, and the manufacturing industry alike. Therefore, the 2010s can indeed be considered yet another lost decade for the Brazilian economy (Barros, 2022).

Resuming the discussion of deindustrialization in an international context, Arend (2014), through the development of the Relative International Deindustrialization Indicator (DRI), calculated that between 1980 and 2010, Brazil's industrial sector achieved only 65% of the performance of global industry. This finding indicates that Brazil's relative deindustrialization, in international comparison, was more severe than that observed in developing Africa, in advanced economies, and even in South and Central America. Hence, Brazilian deindustrialization stands out as one of the most intense in the world—a trend whose dynamics during the disastrous 2010s will be examined in the following section.

3. The Brazilian Productive Structure in the International Context in the 2010s

Examining the historical trajectory of Brazil's manufacturing industry as a share of global output is essential for understanding its role within the international division of labor. Table 1 presents the fifteen largest economies in terms of manufacturing value added between 2011 and 2020, based on national accounts data provided by the United Nations Conference on Trade and Development (UNCTAD). The table also shows that the Brazilian economy has been losing both ranking position (column P) and relative share (column %).

Table 1 – Manufacturing Value Added by Country and Decade (1971–2020)

Country	1971–1980		1981–1990		1991–2000		2001–2010		2011–2020	
	%**	P*	%**	P*	%**	P*	%**	P*	%**	P*
China* **	1.7	13	3.4	8	7.9	4	15.1	2	26.5	1
United States	26.0	1	23.3	1	23.4	1	22.4	1	17.9	2
Japan	10.6	3	12.2	2	12.1	2	9.3	3	7.5	3
Germany** **	11.3	2	9.8	3	8.1	3	6.5	4	5.6	4
South Korea	0.4	34	1.0	16	2.0	11	3.0	6	3.2	5
India	0.7	21	1.0	18	1.4	14	1.9	11	2.8	6
United Kingdom	4.2	6	3.5	6	3.2	6	2.8	7	2.2	7
Italy	4.4	4	4.7	5	4.4	5	3.2	5	2.2	8
France	4.0	7	3.5	7	3.2	7	2.7	8	2.1	9
Mexico	1.9	11	2.1	11	2.3	9	1.9	10	1.6	10
Brazil	2.8	8	2.9	9	2.5	8	2.2	9	1.6	11
Indonesia	0.2	46	0.6	26	1.3	16	1.3	15	1.5	12
Russia*** **	4.3	5	5.1	4	1.5	13	1.6	14	1.4	13
Taiwan	0.3	43	0.6	29	0.7	22	1.0	17	1.4	14
Canada	2.4	9	2.3	10	2.2	10	1.8	12	1.3	15
Total	**75.3**	**-**	**75.9**	**-**	**76.2**	**-**	**77.0**	**-**	**78.6**	**-**

Source: UNCTADStat. National Accounts – Manufacturing Industry. Data at constant 2015 prices deflated by UNCTAD under the Purchasing Power Parity (PPP) concept.
* Country's Position in world manufacturing output.
** Share of world total.
*** Estimated values for China until 2003.
**** From 1970 to 1989, refers to the Federal Republic of Germany.
***** From 1970 to 1992, refers to the USSR.

The selection of the fifteen largest manufacturing economies in 2010s decade presented in Table 1 includes countries at different stages of development. It encompasses developed economies (such as the United States, Germany, and France), Newly Industrialized Countries (NICs) (such as South Korea and China), and peripheral economies (such as Brazil and Mexico). The combined share of these fifteen economies in total global manufacturing value added has gradually increased over time: while they accounted for 75.3% of world manufacturing value added in the 1971–1980 decade, this share rose to 75.9% in 1981–1990, 76.2% in 1991–2000, 77.0% in 2001–2010, and 78.6% in 2011–2020—the decade emphasized in this article.

Table 1 highlights the remarkable growth dynamics of the Asian NICs[2] of both the first and second waves. China, for instance, expanded its share from 1.7% in the 1970s to 26.5% in the most recent decade, surpassing the United States to become the world's leading manufacturing power. South Korea's share rose from 0.4% in the 1970s to 3.2% in the 2010s; India's increased from 0.7% to 2.8%; Indonesia's from 0.2% to 1.5%; and Taiwan's from 0.3% in 1971–1980 to 1.4% in 2011–2020.

[2] The so-called first-wave NICs comprise South Korea, Taiwan, Hong Kong, and Singapore, while the second-wave NICs include India, Malaysia, Thailand, Indonesia, and China—the latter now the world's largest manufacturing power.

Developed countries exhibit the same pattern described by Arend (2014), Cano (2014), and Sampaio (2015) within the global scenario: although they remain industrial powers, they have been steadily losing ground in total world manufacturing output. For instance, the United States accounted for 26.0% of global industrial production in the 1970s, but its share declined to 17.9% in the most recent decade. A similar trajectory is observed for Japan, whose share in global manufacturing value added fell from 10.6% to 7.5% over the same period. Among other core economies of capitalism, the trend has been even more pronounced. Germany's share dropped from 11.3% in 1971–1980 to 5.6% in 2011–2020, followed by the United Kingdom, which fell from 4.2% to 2.2%; Italy, from 4.4% to 2.2%; France, from 4.0% to 2.1%; and Canada, from 2.4% to 1.3%. These results illustrate the process of normal or positive deindustrialization.

Russia, in the post-Soviet period, remained relatively stable in its share, as much of its economic activity is concentrated in natural resource extraction—particularly oil and gas. In the Americas, Mexico also maintained a relatively stable position, though its industrial base remains characterized by maquiladora-type production (export-oriented assembly plants that rely heavily on imported inputs and generate limited domestic value added). As for Brazil, the focus of this study, the country has been gradually losing ground in global manufacturing production. Brazil's manufacturing value added as a share of the world total peaked at 2.8% in the 1970s but declined to 1.6% in the 2010s. The situation worsened further when comparing the first and second decades of the twenty-first century, revealing a clear deterioration in the performance of Brazilian industry relative to the global context.

In the debate introduced by Arend (2014), a country that achieves a diversified manufacturing industry with high technological content tends to display a high per capita income, as observed in core economies—an argument consistent with Kaldor's laws (Araújo; Feijó, 2023). The modernization driven by industrialization not only increases productivity but also enhances and sophisticates the demand for industrial goods, raising it relative to primary goods. Further urbanization, conditioned by ongoing industrial expansion, tends to generate successive rounds of modernization and refinement in consumption patterns, now increasingly concentrated in services. In developed countries, deindustrialization is accompanied by the growing share of higher value-added services, which are often complementary to industry—such as design, software, and after-sales activities. For this reason, deindustrialization in such contexts can be characterized as "normal" or "positive" (Cano, 2014).

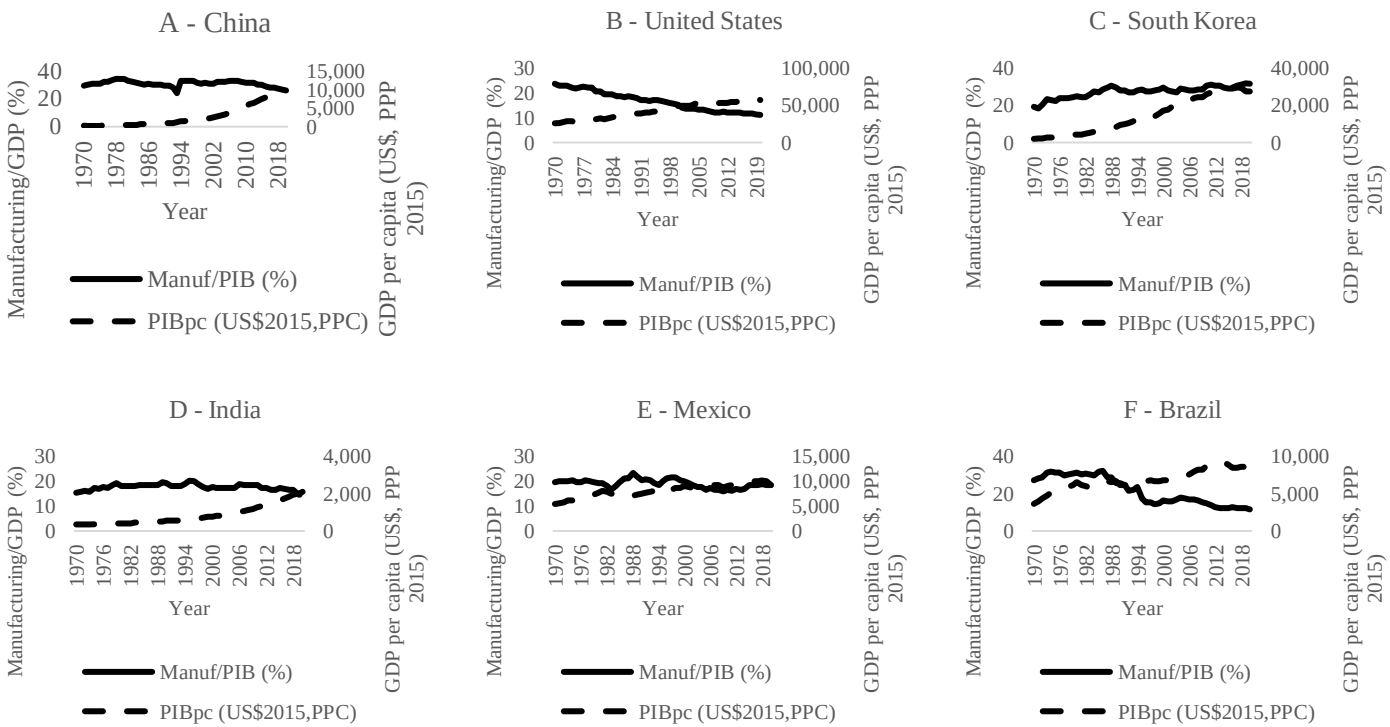
The relationship between the degree of industrialization—measured by the manufacturing share of GDP—and per capita income can be observed in six countries selected from among the world's fifteen largest manufacturing economies, as shown in Figure 1. Among the developed nations, the United States (Figure 1-B) illustrates a decline in the degree of industrialization, yet accompanied by rising per capita income, which remains at a high level—above US$55,000. China (Figure 1-A), in contrast, stands out for its consistently high share of manufacturing in GDP. Despite its accelerated per capita income growth, particularly since the 1990s, its income level still remains relatively distant

from that of developed economies, at around US$9,500. Also in Asia, South Korea (Figure 1-C) exemplifies the group of Asian NICs, which underwent a vigorous industrialization process beginning in the 1970s, resulting in a significant rise in per capita income—currently close to US$31,000—and a sustained process of capital accumulation.

In contrast, India represents a singular case: although it remains a caste-based society with a relatively low per capita income—around US$1,800—the country exhibits a higher degree of industrialization than Brazil and Mexico, for example. Mexico, in turn, is another exception due to the presence of the maquiladora industry, which tends to inflate its degree of industrialization. According to Palma (2004), maquilas allow the country to display a productive structure and export composition in sectors theoretically classified as high value added; however, these activities lack domestic technological control and depend heavily on imported inputs, with a per capita income of approximately US$10,000.

Brazil experienced rapid industrial growth during the 1970s. From the mid-1980s onward, however—amid the fiscal and financial crisis and the exhaustion of the import substitution industrialization model—the country entered a process of deindustrialization while still maintaining a relatively low per capita income, around US$8,000. This pattern characterizes a process of premature deindustrialization, as discussed by Oreiro and Feijó (2010), Arend (2014), Cano (2014), Sampaio (2015), Morceiro (2018), and Araújo and Feijó (2023).

Figure 1 – Degree of Industrialization and Per Capita Income in Selected Countries (1970–2020)*



Source: UNCTADStat. Authors' elaboration.
* Per capita GDP at constant 2015 prices deflated by UNCTAD under the Purchasing Power Parity (PPP) concept.
** Estimated values for China up to 2003.

An analysis of the composition of Brazil's manufacturing structure between 2011 and 2019 (the most recent year available) reveals that the country experienced a total decline of 2 percentage points (p.p.) over the decade, with its share falling from 4.3% to 2.3%. The decrease in relative participation occurred across all industrial sectors, regardless of technological intensity (Table 2). This result demonstrates the regression of Brazil's productive structure in comparison with the rest of the world.

Specifically, the automotive sector saw its global share drop from 6.6% at the beginning of the decade to 2.1% in 2019, highlighting the country's substantial loss of prominence in an industry that depends primarily on the strategic decisions of large multinational corporations. Petroleum derivatives—whose production in Brazil is largely concentrated in Petrobras—also registered a decline, falling from 10.1% of global output in 2011 to 8.8% in 2019. The food and beverage sector, which plays a significant role in the domestic productive structure, likewise experienced a sharp decrease, with its global share falling from 6.7% to 3.6%. When these results are compared with export performance, a clear tendency toward reprimarization emerges, as exports of primary commodities have expanded while those of manufactured goods have lost ground—indicating a reduction in industrial processing depth. In the wood products sector (excluding furniture), Brazil's share fell from 4.4% at the beginning of the series to 2.1% in 2019. The same downward trend is observed in other segments, such as fabricated metal products, which declined from 3.2% to 1.4%; machinery and equipment, from 3.6% to 1.7%; and electrical machinery, apparatus, and materials, from 3.2% to 1.6%.

On the other hand, China's performance[3] is noteworthy: its share of global industrial production rose from 29.9% in 2011 to 36.1% in 2019, consolidating its position as the world's leading manufacturing economy. The country's productive structure is highly diversified, with strong participation across all technological intensities. In 2019, China accounted for 25.0% of global motor vehicle production, 33.6% of machinery and equipment, 42.2% of electrical materials, and 64.2% of basic metallurgy, demonstrating its technological and industrial strength.

In contrast, the United States experienced a slight decline in its share of global industrial production, falling from 27.9% to 26.8%—a reflection of the natural deindustrialization process observed in developed countries. In 2019, however, U.S. production still surpassed China's in several sectors, such as other transport equipment (43.1%), motor vehicles (25.3%), office machinery and computer equipment (31.4%), and chemical products (34.6%), among others.

[3] Table 2 also shows that 100% of global production in the sectors of radio, television, and communication equipment, as well as in medical-hospital instruments, precision and optical equipment, industrial automation devices, chronometers, and watches, was concentrated in China in both 2011 and 2019. However, these values correspond to the data reported by the source itself, the UNIDO.

Table 2 – Manufacturing Structure of Selected Countries (Share of World Total, %)

Industrial Sector	China		US		South Korea		India		Mexico		Brazil	
	2011	2019	2011	2019	2011	2019	2011	2019	2011	2019	2011	2019
Food and Beverages	22.6	27.2	33.0	33.1	2.3	2.7	1.8	1.7	3.1	3.2	6.7	3.6
Tobacco Products	57.6	61.3	26.6	24.0	1.2	1.2	1.8	1.6	2.1	0.3	1.9	0.6
Textiles	61.0	69.7	11.1	8.7	3.3	2.3	4.4	4.0	0.8	0.6	3.4	1.4
Wearing Apparel and Accessories	57.3	65.4	4.6	3.3	5.7	3.6	2.6	3.3	1.4	1.0	7.9	3.2
Leather, Leather Products, and Footwear	54.0	59.8	3.7	2.8	2.5	2.0	2.1	2.3	1.3	1.2	9.3	4.2
Wood Products (except furniture)	27.7	30.4	27.9	34.8	1.3	1.4	0.5	0.6	0.2	0.2	4.4	2.1
Pulp, Paper, and Paper Products	29.3	36.1	35.7	32.7	2.4	2.6	1.0	1.4	1.3	1.4	4.9	3.2
Publishing, Printing, and Reproduction of Recorded Media	14.2	22.0	40.9	43.3	1.5	1.6	1.6	1.6	0.6	0.6	3.6	1.4
Coke, Refined Petroleum, and Nuclear Fuel	20.6	28.1	35.0	32.8	4.7	5.4	3.8	1.8	3.7	3.5	10.1	8.8
Chemical Products	25.8	31.4	36.6	34.6	4.5	4.4	3.5	3.4	1.6	1.1	3.6	2.7
Rubber and Plastic Products	23.3	26.8	29.3	32.5	5.5	5.8	2.1	2.5	1.5	1.6	4.5	2.1
Non-Metallic Mineral Products	39.7	46.4	16.7	20.4	4.2	3.4	3.7	3.2	1.8	1.7	5.1	1.8
Basic Metallurgy	52.5	64.2	13.8	11.1	4.8	3.4	5.3	2.8	1.6	1.2	3.0	1.7
Fabricated Metal Products	20.9	25.6	32.8	33.5	4.6	4.2	1.4	1.1	0.9	1.0	3.2	1.4
Machinery and Equipment	27.2	33.6	22.3	21.7	4.3	4.6	1.8	1.6	0.5	0.5	3.6	1.7
Office Machinery and Computer Equipment	10.5	13.3	38.2	31.4	21.2	21.5	0.8	0.8	0.8	1.0	1.7	0.8
Electrical Machinery, Apparatus, and Materials	36.1	42.8	18.0	16.9	5.3	6.5	2.6	2.0	1.5	1.3	3.2	1.6
Radio, Television, and Communication Equipment	100.0	100.0	-	-	-	-	-	-	-	-	-	-
Medical, Optical, and Industrial Automation Equipment	87.8	100.0	-	-	-	-	-	-	-	-	-	-
Motor Vehicles, Trailers, and Bodies	21.6	25.0	22.2	25.3	7.9	6.4	2.3	2.1	3.8	6.2	6.6	2.1
Other Transport Equipment	15.7	18.7	46.2	43.1	8.9	4.1	1.7	2.1	0.4	0.7	2.1	0.9
Furniture and Miscellaneous Manufacturing	17.2	21.6	44.7	42.4	1.9	2.6	1.0	1.4	1.0	1.3	3.3	1.8
Recycling	-	-	-	-	-	-	-	-	-	-	-	-
Share of World Total	29.9	36.1	27.9	26.8	5.3	5.0	2.4	2.1	1.7	1.7	4.3	2.3

Source: UNIDO (classified according to ISIC Revision 3). Authors' elaboration.

Regarding the other countries, India's share decreased slightly from 2.4% to 2.1%. Mexico remained stagnant at 1.7%, though it is noteworthy that its share of motor vehicle production rose to 6.2% in 2019. Finally, representing the group of NICs, South Korea registered a mild decline from 5.3% to 5.0%, thus maintaining relatively stable participation levels. The country's main highlight in 2019 was the office machinery and computer equipment sector, which accounted for 21.5% of global production.

4. Brazilian Foreign Trade in the International Context in the 2010s

Beyond the transformations in the productive structure, it is also necessary to examine Brazil's foreign trade in comparison with other economies over the last decade, according to the scope of this study. Table 3 presents export data organized according to Lall's classification, as reported in the UNCTAD database. This taxonomy categorizes exports into five major groups: primary products (PP), resource-based manufactures (RB), low-technology manufactures (LT), medium-technology manufactures (MT), and high-technology manufactures (HT). Based on this framework, it is possible to observe the aggregate behavior of foreign trade across selected countries during the 2010s[4].

Among developed nations, there has generally been a decline in the share of exports of low-, medium-, and high-technology manufactures—a phenomenon that can be interpreted as part of the natural deindustrialization process, often associated with the geographic relocation of production, particularly toward Asia. Despite this decline, these countries continue to hold a significant share of world exports, especially in higher-technology segments. In 2019, for example, the United States accounted for 9.42% and 7.52% of global exports of medium- and high-technology manufactures, respectively, while Germany represented 12.63% and 8.01% in the same categories (Table 3).

[4] Because 2020 was an atypical year due to the COVID-19 pandemic, 2019 was selected as the reference year for comparing export performance across economies, particularly given the restrictions imposed on international trade during the pandemic.

Table 3 – Total Exports of Selected Countries as a Share of World Total, According to Lall's Taxonomy (%)

Country	Primary Products		Resource-Based Manufactures		Low-Technology Manufactures		Resource-Based Manufactures		Low-Technology Manufactures		Unclassified		Total	
	2011	2019	2011	2019	2011	2019	2011	2019	2011	2019	2011	2019	2011	2019
China	1.82	2.62	4.97	7.21	24.76	27.93	9.48	11.76	19.62	21.00	0.79	2.33	10.43	13.28
United States	4.63	8.49	8.90	8.93	5.01	4.69	9.61	9.42	8.52	7.52	17.42	19.60	8.14	8.74
Japan	0.50	0.54	2.46	2.17	3.16	2.10	9.05	7.16	4.90	3.34	5.25	4.89	4.52	3.75
Germany	2.41	2.84	5.45	5.35	7.86	7.00	13.82	12.63	8.65	8.01	8.40	6.55	8.14	7.92
South Korea	0.40	0.52	2.80	2.74	2.44	2.00	4.91	4.06	4.64	4.37	0.38	0.12	3.05	2.88
India	0.99	1.33	3.57	3.49	2.74	2.78	0.99	1.35	0.71	0.85	1.56	0.14	1.66	1.72
United Kingdom	1.72	1.79	2.89	2.06	1.99	1.90	3.14	2.99	2.57	2.23	8.33	5.32	2.84	2.49
Italy	0.72	0.93	2.58	2.68	5.52	5.09	4.26	3.96	1.67	1.63	2.31	1.93	2.88	2.86
France	1.42	1.48	3.11	2.71	3.29	3.16	3.97	3.65	4.29	3.42	2.70	1.76	3.22	2.95
Mexico	1.97	1.71	0.87	1.03	1.28	1.49	2.69	4.13	2.45	2.45	0.65	0.77	0.06	0.12
Brazil	2.30	3.43	2.88	2.15	0.53	0.35	0.95	0.71	0.34	0.22	0.84	0.38	1.39	1.18
Indonesia	2.52	1.67	1.71	1.69	0.97	1.13	0.48	0.53	0.31	0.21	0.24	0.34	1.12	0.89
Russia	7.88	6.59	3.90	3.76	0.48	0.53	0.72	0.77	0.18	0.26	5.98	5.84	2.84	2.27
Taiwan	0.26	0.30	1.04	1.00	2.09	1.51	1.73	1.51	3.95	4.26	0.48	0.28	1.69	1.75
Canada	4.14	4.63	2.76	2.74	1.09	1.09	2.33	2.31	1.21	0.99	3.61	3.83	2.48	2.37
Total	**33.66**	**38.87**	**49.88**	**49.72**	**63.22**	**62.76**	**68.13**	**66.94**	**64.03**	**60.77**	**58.94**	**54.07**	**54.47**	**55.16**

Source: UNCTADStat. Authors' elaboration.

The Asian NICs, such as India (0.06 p.p.) and Taiwan (0.06 p.p.), recorded growth, whereas others, including South Korea (−0.17 p.p.) and Indonesia (−0.23 p.p.), experienced a slight decline. China, in turn, stands out as a singular case, showing increases across all major categories in the classification. In 2019, China ranked as the world's leading exporter among the economies analyzed in the groups of Resource-Based Manufactures, Low-Technology Manufactures, and High-Technology Manufactures, ranking second only to Germany in the Medium-Technology category. Mexico, owing to the specific characteristics of its maquiladora industry, displayed growth in exports of Low- and Medium-Technology Manufactures and stability in the High-Technology category. Overall, among the examined countries, exports are increasingly concentrated in higher-technology categories, with the combined share of Low-, Medium-, and High-Technology Manufactures exceeding 60%.

The data for Brazil indicate that the country reduced its share of global exports by 0.21 p.p., closing 2019 with 1.18% of the total (Table 3). Brazil increased its share only in primary products, rising from 2.30% in 2011 to 3.43% in 2019, suggesting a strengthening of the country's agro-exporting profile and clear signs of reprimarization. Even in resource-based manufactures—such as petroleum refining, processed foods, and iron ore—the share fell from 2.88% in 2011 to 2.15% in 2019, indicating weakening even among goods with low industrial processing. In 2019, Low-Technology Manufactures accounted for 0.35%, Medium-Technology Manufactures for 0.71%, and High-Technology Manufactures for only 0.22% of total global exports. These figures corroborate the ongoing process of deindustrialization, as identified by Arend (2014), Cano (2014), Sampaio (2015), Morceiro (2018), and Araújo and Feijó (2023), and of reprimarization, as discussed by Sampaio and Pereira (2021).

Furthermore, these findings are consistent with the objectives of this study, which seeks to examine the international integration of the world's main manufacturing economies in terms of their participation in GVCs. Participation in GVCs can be assessed in three distinct ways: i) forward participation, which refers to a country's exports that are incorporated into another country's production within a GVC—thus reflecting its role as a supplier in the global context; ii) backward participation, which corresponds to a country's imports of inputs originating from GVCs, indicating that it relies on foreign components to add value to its final products; and iii) total participation, which represents the sum of forward and backward participation.

In general, developed nations continue to maintain relatively high levels of participation in GVCs, both in forward and backward linkages. The United States, Japan, the United Kingdom, and Russia, for instance, exhibit stronger forward participation, whereas countries such as South Korea and Italy have greater weight in backward participation. These economies are typically positioned in the stages of production where value appropriation is highest—namely, at the initial (e.g., R&D) and final (e.g., after-sales services) phases of the production process. This phenomenon occurs because such

economies tend to concentrate their activities in the early stages of the production chain, as illustrated by the well-known "smile curve[5]."

Table 4 – Integration into Global Value Chains of the 15 Largest Manufacturing Economies in 2010 and 2018 (%)

Country	Backward Participation (A)		Forward Participation (B)		Total Participation (A + B)	
	2010.0	2018.0	2010.0	2018.0	2010.0	2018.0
China	19.2	17.2	17.5	19.3	36.7	36.6
United States	10.9	9.5	22.8	26.1	33.7	35.6
Japan	13.3	17.2	27.4	25.5	40.7	42.7
Germany	22.7	22.9	21.4	23.4	44.1	46.2
South Korea	36.8	32.0	18.0	21.5	54.8	53.5
India	20.9	19.8	15.9	16.5	36.8	36.4
United Kingdom	18.1	17.8	22.1	24.0	40.2	41.9
Italy	23.2	23.8	16.9	18.6	40.1	42.4
France	22.8	24.3	19.6	22.0	42.4	46.3
Mexico	34.2	35.9	10.7	10.5	44.9	46.4
Brazil	10.3	13.0	23.1	22.0	33.4	35.0
Indonesia	14.3	14.4	27.1	24.8	41.4	39.2
Russia	8.5	9.0	36.3	37.1	44.8	45.6
Taiwan	44.6	39.8	18.7	20.9	63.3	60.8
Canada	22.4	24.9	14.9	14.6	37.3	39.5

Source: WTO (2024), based on the OECD TiVA database. Authors' elaboration.

According to Reis and Sampaio (2017), Brazil shows a low level of participation in GVCs, as most of the capital goods incorporated into forward participation originate from the mineral and agricultural sectors and consist of low-complexity, labor-intensive products, which tend to contribute little value to the national economy and to exports. It is worth noting that, in 2019, among the selected economies, Brazil displayed the lowest total participation (35.0%) among the fifteen countries with the highest manufacturing value

[5] The smile curve encompasses the production process within GVCs. The stages of production along the value chain are represented on the horizontal axis, while the vertical axis indicates the level of value-added appropriation. At the left end of the "smile" lie research and development (R&D) activities; at the right end are sales and after-sales services; and at the center is the actual manufacturing stage. Since value-added appropriation tends to concentrate in the initial and final stages of the production process, the resulting curve takes on a "U" shape—hence its depiction as a smile.

added, with greater relevance in forward participation (22.0%) compared with backward participation (13.0%).

Brazil's pattern of integration into international trade—particularly within GVCs—is directly related to different manifestations of deindustrialization in the Brazilian economy. As highlighted by Paulo Morceiro:

> when the coefficient of imported inputs and components increases without a corresponding rise in exports, productive linkages may weaken, intersectoral connections may shrink, and technological development, increasingly driven by suppliers of core components, becomes limited. This can exacerbate deindustrialization by reducing industrial transformation and expanding assembly stages that rely on low-skilled and low-wage labor, thereby generating less value added (Morceiro, 2018, p. 44).

Countries such as China, South Korea, and Taiwan channel their imports and exports toward sectors like trade, financial services, scientific and technical activities, chemicals, and electronics, demonstrating the strength of Southeast Asian economies in GVC integration. Mexico, with its maquiladora industry, shows very high levels of participation—particularly in backward participation—yet contributes relatively little value to its domestic economy. Russia, in turn, directs most of its exports to natural resources such as oil and gas, remaining highly engaged in the forward participation of GVCs but facing challenges similar to those of Brazil and Mexico, namely, adding little value to its economy.

Overall, Brazil displayed clear signs of deindustrialization across all indicators analyzed in this study. The country lost relative position within the ranking of the fifteen largest manufacturing economies, registered contraction across all sectors of its industry, and simultaneously expanded its exports of primary products and its forward participation in GVCs—thereby also revealing a process of reprimarization.

Final Considerations

This study examined Brazil's manufacturing performance in the global economy during the 2010s (2011–2020), highlighting evidence of premature and deepening deindustrialization alongside a concurrent process of reprimarization. The analysis focused on the fifteen largest manufacturing economies worldwide.

An examination of Brazil's economic trajectory reveals that the national industry has gradually lost ground in the international arena—a process that began to intensify in the mid-1980s and deepened further during the past decade. In terms of productive structure, the Brazilian manufacturing industry has shown limited diversification, a pattern reflected both in its export composition (as classified by Lall) and in its participation in GVCs. These indicators converge toward the diagnosis of a continued and deepening process of deindustrialization in Brazil.

The displacement of manufacturing by the agricultural sector suggests a process of relative deindustrialization and reprimarization, which further constrains the diffusion of technical progress and the generation of value added traditionally driven by manufacturing—historically the engine of development in advanced economies, China, and the NICs. The challenges to resuming a sustainable development path for the Brazilian economy have thus become more complex, as the deepening deindustrialization observed over the past decade stands as a major obstacle—one that can only be overcome through a comprehensive and coordinated national development strategy.

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