Check for updates

Article

The Industrial Front and the Pandemic Crisis in Brazil: The Missing Agenda

Journal of Health Management
1–7
© 2022 Indian Institute of
Health Management Research
Reprints and permissions:
in.sagepub.com/journals-permissions-india
DOI: 10.1177/09720634221128709
journals.sagepub.com/home/jhm
SAGE

Anapatricia Morales Vilha[1], Luis Paulo Bresciani[2] and Guilherme Arevalo[2]

Abstract

The article seeks to identify the government initiatives to mobilise the Brazilian industry during the pandemic crisis. The motivation for the work stems from evidence showing the omissions at the federal level, with relevant implications for the death figures in Brazil. Public policies agenda and a conceptual review was carried out on industrial reconversion in severe emergency conditions, including international experiences in the current scenario. A documental survey was conducted with the federal government and selected state governments. The survey was carried out on the official portals of governments, related agencies and business entities representing the industrial sector. Lack of industry-coordinated mobilisation is given by the combination of intrinsic and extrinsic factors concerning the pandemic crisis, industrial reconversion is another relevant absence at the public agenda. Weak answers of Brazilian government regarding the industrial mobilisation for fighting the pandemic crisis, leading to further hypotheses on the structured agenda of possible effects. The study shows weakness of federal measures coming from the Brazilian government also in the economic front, adding the industrial reconversion absence in the policies agenda as another remarkable feature on the health impacts of COVID-19 pandemics.

Keywords

Industrial policy, medical–industrial complex, economic crisis, COVID-19, Brazilian government

Introduction

This article addresses a little discussed topic regarding the profile of the Brazilian government's response to the spread of the COVID-19 virus. More than that, we emphasise that the use of industrial reconversion—or the mobilisation of the installed industrial park—is characterised as a relevant absence at the public policy agenda facing the pandemic. This fact is also explained as a result of the weakening process of Brazilian industry as an object of public policy, particularly since 2016. This absence goes beyond the federal sphere of the government, and also extends to state governments.

The initial months of 2020 are characterised on a global scale by the phenomenon of the pandemic COVID-19, with significant impacts on health and economy. Countries with large territorial dimensions and large populations present an amplified challenge, given the potential for large-scale contamination and the risk of saturation of hospital systems. Brazil is emerging as one of the most affected countries, quickly reaching the highest levels in the ranking of contamination and deaths.

Wilson (2020) retrieves five elements of learning about the North American industrial reconversion in the Second World War—the commitment to public purchase of the equipment demanded, the imperative of business cooperation, the state investment in industrial units, the mobilisation of industrial capacity in the country, and raising corporate taxes to finance the conversion.

Abrucio (2020) summarises the Brazilian condition as the antithesis of international learning in the pandemic—the Brazilian government does not combine science and humanism, it does not aggregate different actors against the pandemic, it does not treat the subject as an intersectoral problem, it does not present a consistent economic response, it has no plans for the exit of social isolation. The Brazilian

[1] Engineering Center, Modeling and Applied Social Sciences, UFABC-Universidade Federal do ABC, Santo André, State of São Paulo, Brazil

[2] Administration Department, USCS-Universidade Municipal de São Caetano do Sul, State of São Paulo, Brazil

Corresponding author:
Anapatricia Morales Vilha, Engineering Center, Modeling and Applied Social Sciences, UFABC-Universidade Federal do ABC, Santo André, State of São Paulo 09210-170, Brazil.
E-mail: anapatricia.vilha@ufabc.edu.br

government does not, therefore, exercise its primary role of federative coordination within public health policy.[1]

Our purpose is to analyse 'the government in action' (Souza, 2006), and to emphasise an element that is barely visible in the study of the governmental response in Brazil—the fragile mobilisation of the Brazilian industry in facing the pandemic COVID-19. This characteristic adds to the shortcomings and omissions of the federal sphere, reducing the response of the Unified Health System to the flow of hospital admissions in the Brazilian territory, with serious implications for the preservation of lives; Brazil is among the largest industrial economies on the planet, with great productive diversification, indicating potential capacity for industrial reconversion.

In the next sections, we bring a conceptual rescue on industrial reconversion in severe emergency scenarios, including international experiences from the current context, presenting the documentary survey of industrial reconversion initiatives in Brazil, involving the federal government and selected state governments. We conclude with an analysis of the factors intrinsic to the context of the pandemic in Brazil, and the extrinsic factors beyond that context, showing that the explanation for the absence of coordinated mobilisation of the industry is given by the combination of these factors.

Conceptual Notes: Industrial Reconversion, the Industrial Health Complex and the International Perspective in the Face of COVID-19

The industrial reconversion debate points to a transition path towards the redefinition of industrial structures. In this context, the efforts combining technical changes in companies and government industrial policies can be a cornerstone in the debate on industrial reconversion, involving themes such as protection and opening of markets, financing, technological change and new organisational formats (Bernal et al., 2014).

In order to structure actions related to industrial reconversion, it is necessary to take into account the specificities of the countries where this strategy is formulated, taking into account the economic, technological and social differences of developing countries (Rodríguez, 2017). According to Bernal et al. (2014), industrial reconversion projects must include initiatives in the public and private spheres, namely in public policies, technological innovation, industrial modernisation and adaptation of legal measures.

For Rodríguez (2017), the process of industrial reconversion in European countries allowed the region to a better insertion in the global economic context. In these countries, the model follows the understanding of political supremacy in the public sector, where the role of government is significant and the free market concept takes on distinct features from the American outlines (Woodrown Jr, 1995). In fact, the European experience includes an interactive perspective for innovation, based on companies, governments and research institutions, also seeking to scale and decentralise production and sectorial reconversion initiatives (Rodríguez, 2017).

In China, industrial reconversion was guided by state goals and includes the restructuring of Chinese industrial districts, the emergence of technological clusters and the international insertion of companies in global production chains (Rodríguez, 2017). In the health sector, significant investments in research and development, import substitution and industrial consolidation are pillars of the Chinese governmental movement, in its current five-year plan; biopharmaceutical products and medical equipment of high technological intensity constitute priority sectors of the 'Made in China 2025' program (IEDI, 2018).

In the USA, industry structuring programs were coordinated at the federal and state levels, with emphasis on the creation of support centres for industry in the 1970s. Linked to local universities, these centres aimed to stimulate new businesses and leverage technological research, with medium and long-term effects (Woodrown Jr, 1995). In other way, Latin American countries concentrated on containing inflationary effects from their economies, giving less emphasis to economic policies anchored in the industrial sector (Rodríguez, 2017).

The reconversion experiences in different countries highlight the importance of expanding the industry's capacities through the mobilisation of institutions and the formulation of industrial and technological development policies to increase the competitiveness of companies. This capacity for articulation is a current imperative for the challenges arising from the COVID-19 pandemic, especially in the health industrial complex (Bonilla-Aldana et al., 2020; Skariyachan et al., 2019).

In Brazil, the health sector accounts for about 9% of the Brazilian GDP (IBGE, 2020), and is also known for its restrictions in scientific and technological research. For Massuda (2020), 'the technological dependence in the production of health products, from PPE to respirators' is among the critical problems of the public system in Brazil, corroborating the perspective of Gadelha and Temporão (2018) about the centrality of the Industrial Health Complex in the structuring of SUS.

According to Ruiz and Martich (2020), the current crisis reflects one of the greatest deficiencies in meeting the global health needs, given that most of the solutions for diagnosis, treatment and vaccine for COVID-19 are in the early stages of development. In the same direction, Mazzucato and Torreele (2020) show that the protection of societies against COVID-19 necessarily involves the strengthening of public health systems and a different approach from national states to face economic and health challenges.

For Azoulay and Jones (2020), technological innovation seems to be the key in the equation that involves public health and economic well-being. This means that overt innovation policies must be combined with the mitigation of economic effects, which seems to concentrate a large part of government and business attention. Given this perspective, Mazzucato and Torreele (2020) recommend a coping approach focusing public and private investments on clear objectives, with firm rules on intellectual property, manufacturing and pricing solutions to combat the pandemic, using technological knowledge in a shared way. Stiglitz et al. (2020) signal the importance of international cooperation and reinforce the necessary public intervention to face the power of large corporations that produce medicines and equipment.

Finally, we highlight the recent perspectives put forward by Furman (2020) and Krugman (2020), including the maximum mobilisation of the productive sector and the permanent stimulus of public investment (with an emphasis on infrastructure and child development), respectively, among the public policy recommendations facing the pandemic.

In fact, Mazzucato and Quaggiotto (2020) point out that the countries successful in dealing with the crisis are those that establish productive dialogues with the private sector, investing in critical capacities and signing procurement contracts to serve the public demand. According to the same authors, the government of Vietnam assembled low-cost test kits very quickly, because it had the capacity to mobilise the academy, the private sector and civil society organisations around a common mission. To this end, it used public funds from R&D (research and development) to boost production and innovation.

The New Zealand government has become the first country in the world to focus its budget primarily on health, establishing COVID-19 contamination prevention initiatives since the beginning of the pandemic. The South Korean government has mobilised big data technology to monitor pharmacy stocks in real time, allowing companies to orient themselves to produce and distribute products more efficiently.

Regarding the more structural movement to strengthen industrial activities, as part of the confrontation or as a result of the crisis caused by the pandemic, Huang et al. (2020) highlight the Chinese emphasis on infrastructure projects (energy, transport and ICTs), with coordination between the central government and local governments to finance the initiatives. The argument also stands out in Cheong's (2020) approach to the importance of pro-industry policies oriented towards progressive industrial restructuring in South Korea.[2]

Methodology

This exploratory article uses documentary research with a focus on identifying government programs and initiatives that aim to mobilise the industry for productive reconversion actions, in order to provide solutions and materials to the public health system, especially with regard to respiratory support and personal protective equipment.

For this purpose, the survey was carried out during the year 2020, considering official portals of the municipal, state and federal spheres of the government and related agencies, such as the city government of São Paulo, the state governments of Minas Gerais and São Paulo, the Ministry of Economy, the Brazilian Company of Industrial Research and Innovation (EMBRAPII), the Studies and Projects Funding (FINEP), the São Paulo State Research Support Foundation (FAPESP), the National Bank for Economic and Social Development (BNDES), the Northeast Bank (BNB) and the Development Bank of Minas Gerais (BDMG). The study also monitored information and initiatives launched by entities and institutes of representative studies of the industrial sector, such as the Brazilian Association of Medical Equipment (ABIMO), the CNI (2020) and the Institute for Industrial Development Studies (ABDI), reaching a total of 13 institutional sources of data.

To support the analysis of the results identified, the article used the literature in the fields of Industrial and Technological Economics, notably linked to studies of the impacts of the industrial sector on the economy and the role of state policies to catalyse such advances, with a special focus on international reports regarding industrial reconversion.

Industrial Reconversion In Brazil: The Fragmented Idea

The Brazilian case has been marked by the lack of coordination by the federal government in tackling the pandemic, as we discussed from Abrucio (2020). Thus, what is seen in the industrial perspective, whether aiming at reconversion or business mobilisation, constitutes a set of fragmented initiatives, largely taken by one or more companies, without the programmatic character of articulation between the federal government, states, municipalities and the productive sector.

We address this specific characteristic of the Brazilian government's response from the balance sheets and monitoring reports published by the federal government (Ministry of Economy, BNDES, BNB, EMBRAPII, FINEP),

by the state governments of São Paulo, Rio de Janeiro, Minas Gerais, Rio Grande do Sul, and by industrial business entities.

We started with the federal government, and governmental information makes evident the absence of an industrial perspective, from the command installed in the Ministry of Economy.[3] In fact, the official reports on combating the pandemic do not present initiatives aimed at industrial mobilisation. The balance of expenses related to the federal government also does not indicate an endowment with this characteristic.

In reality, one of the measures reported by the Ministry of Economy as supporting the productive sector brings an effective counterpoint to the potential stimulus for industrial reconversion—the temporary extinction of the Import Tax for products such as alcohol gel, masks, thermometers, pharmaceuticals, protective clothing, safety glasses and breathing equipment. With that, it is stated that it intends to install 'a brake, in case the national manufacturers of these goods try to increase prices abusively'.[4] This measure was critically criticised by the Brazilian Association of Medical Equipment (ABIMO), pointing out the inconsistency in encouraging the entry of imported equipment at zero tariffs, while the Brazilian industry continued to operate under conventional tax regimes (ABIMO, 2020b).

Strictly speaking, a few initiatives can be identified as close to the productive reconversion, launched by BNDES, FINEP, EMBRAPII and the Northeast Bank. The first refers to a BNDES credit line for expanding the offer of health products. These are resources that will be paid by companies over the next few years, with non-incentive interest rates, which may reach 10% per year under current conditions.

The amount announced in the BNDES Program for emergency support to combat the coronavirus pandemic was R$ 2 billion, to expand the supply of emergency beds, materials and medical and hospital equipment. According to BNDES itself, 'companies from other sectors that seek to convert their production into equipment and supplies for health can also be contemplated' (BNDES, 2020). However, only 6 projects have been approved since its launch, with a global value of R$ 183 million, just over 9% of the expected resources, covering companies already involved in the medical hospital segment. The approved resources are intended for the delivery of 2,662 beds, as well as 500,000 rapid tests and 1,500 monitors.

The second initiative in the federal level was led by EMBRAPII (Brazilian Company for Industrial Research and Innovation), which allocated R$ 26 million to 40 R&D projects, in addition to expanding the production scales of companies in the medical hospital segment, and R$ 6 million for startups involved in the topic. The public call 'Missão COVID 19' was launched in partnership with the National Service for Industrial Learning and the Brazilian Industrial Development Agency (EMBRAPII, 2020a); its most immediate action refers to the production schedule of Constanta company, already involved in the local supply chain (EMBRAPII, 2020b).

In the case of FINEP, resources of up to R$ 5 million were announced in the public notice for innovation in individual or collective protection equipment, as a subsidy (FINEP, 2020a). This announcement attracted 81 companies, qualified 25 proposals, and approved only six projects for promotion. In mid-April, an offer of R$ 150 million was released as a credit for industrial reconversion projects, conceived as the transformation of factories to produce essential items, combining their production structure and idle capacity.[5] At the end of May, a new public notice for economic subsidy was launched, with R$ 132 million for innovation projects in ventilators, tests and protective equipment. Of this amount, R$ 80 million is foreseen for ventilators and accessories, but the final results will be announced only at the end of July.

The Northeast Bank had also offered an amount of R$ 5 million as a subsidy for projects considered innovative in the face of the pandemic. The projects should be oriented towards solutions for the rapid diagnosis of the disease, as well as products intended for treatment, solutions for care protocols, remote care tools and disinfection technologies (BNB, 2020).

In its most recent report (May 2022), the Brazilian government claimed to have committed R$ 400 billion to fight the pandemic, without any structural action aimed at promoting industrial reconversion. Even if we add the 6 contracts approved by the BNDES, the amount mobilised by FINEP, and the resources announced by EMBRAPII and BNB, we have about R$ 500 million announced for the industrial mobilisation to face the pandemic, just over 0.1% of which reported federal expenditures (Ministério da Economia, 2020b). In the legislative sphere, three bills were presented on the topic of productive conversion until the end of May, all of them submitted by deputies opposed to the government, and there does not seem to be any political articulation for them to be voted in plenary.[6]

In relation to state governments, São Paulo, as the country's largest economy, would be the subnational entity in the most favourable conditions for initiatives in the field of industrial reconversion and mobilisation. However, despite formal declarations by the first echelon of government indicating this scenario,[7] what emerged is restricted to an announcement from its São Paulo Research Foundation (FAPESP), aimed especially at small companies (PIPE modality). The notice, with resources of R$ 20 million, is already in its third extension, having approved only six companies, with only R$ 6 million committed, for companies already involved in the medical hospital segment (FAPESP, 2020).

The schedule implies the construction of projects that are not short-term, and do not meet the perspective of emergency action to face the pandemic. The state government's development agency, DesenvolveSP, did not initiate an initiative on industrial reconversion. At the municipal level, the largest Brazilian city earmarked only R$ 1 million to support

10 technology projects through ADESAMPA (São Paulo Local Development Agency), through the 'COVID-19—Cycle of Rapid Innovation' (Prefeitura de São Paulo, 2020).

As the second largest industrial economy among Brazilian states, Minas Gerais is one of the few regional territories that has a specific development bank, the BDMG. The actions of the Minas Gerais state government are limited, in the initial months of facing the pandemic, to the offer of credit oriented to the medical hospital sector, with three specific lines, aimed at the manufacture of high demand items (BDMG, 2020). In the cases of Rio de Janeiro and Rio Grande do Sul, government initiatives aimed at industrial mobilisation were not identified.

Going beyond government initiatives and programs, there is a record of some corporate actions aimed at productive conversion, always marked by a voluntary character and without connection with public policies. Sometimes, such initiatives are sponsored by business entities, linked to the National Industry Confederation (CNI, 2020). In the same sense, specific initiatives taken by public universities or federal educational institutes are presented. In more structural terms, we highlight the technical note prepared by DIEESE (2020) focused on the workers' unions, and the recent IEDI document on Brazilian industrial strategy, including among its guidelines the 'mobilization of industrial skills…to face social challenges, many of them aggravated by the coronavirus crisis, such as health security, sanitation and environmental sustainability' (IEDI, 2020, p. 9).

Conclusions

As Kingdon (1995) points out, the entry of a specific theme at the centre of the governmental agenda is not a trivial process. In the Brazilian case, the (mis)understanding of the problem, the (dis)orientation of the government nucleus and the (in) visibility of the disputed arguments have clear implications for the perception of the 'opportunities windows' in the formulation of public policies.

As we have seen, there is no declared public policy, of a federal or state character, oriented towards the conversion or industrial mobilisation. What are identified are fragmented and late initiatives, with credit and subsidy resources detached from any coordination of demands. Likewise, there is a set of voluntary actions by some companies, sometimes articulated with efforts by state governments, without a programmatic character, or even combined with the donation of the goods produced. Paradoxically, there are three bills aimed at establishing a productive conversion program, all presented by parliamentarians opposed to the government

Federal level initiatives with some degree of connection to the topic refer to lines of credit announced by the BNDES and a FINEP grant notice, with results not yet available. Such initiatives are not even mentioned in the balance sheets released by the Brazilian government. Initiatives by EMBRAPII (federal level) and FAPESP (state of São Paulo) refer to the promotion of R&D, with low availability of resources and extended deadlines for the presentation of results.

In addition to this absence, a federal decree established maximum attention to enable the expansion of imports, considering the urgency of the acquisition of equipment and supplies, but penalising national manufacturers, whose taxation remained unchanged. The direction indicated was that of the greater fragility of the health industrial complex, disregarding the opportunity to resume its strengthening.

We argue that the absence of an industrial reconversion program in the Brazilian case is due to a combination of intrinsic and extrinsic factors to the federal government's general approach to the pandemic, marked by minimising the impact on the country, denying the evidence and neglecting the potential contribution of science and technology.

From the perspective of intrinsic factors, federal measures were concentrated on the temporary suspension of payment of taxes, the emergency transfer of income to informal workers, the suspension of contracts or the reduction of working hours. From the point of view of attention to the business activities, the focus was directed to lines of credit aimed at paying the payroll of small companies. In the midst of this movement, federal public financing agencies designed a few credit solutions for industrial reconversion, with low adherence from the private sector.

With regard to extrinsic factors, there is a denial of any action related to the stimulus to local industrial content, especially marked by the former government in 2016, and even more exacerbated in the current government. Not only was industrial mobilisation disregarded as a front in the fight against the pandemic, but the priority for imports was amplified due to the dominant perspective in the Ministry of Economy, which avoids any stimulus measures in this sector.

We conclude by pointing out that a possible reorientation of the governmental stance in Brazil should consider, as the international experience points out, some central elements: the definition of economic sectors directly connected to meet emergency demands arising from the pandemic; the detection of sufficiency (or not) of national production, aiming to reduce the dependence on imports at extraordinary costs); the expansion of credit amounts and economic subsidies for productive conversion; the adaptation of regulatory arrangements for the production and commercialisation of products in the face of the pandemic; the commitment to public purchases and short, medium and long-term technological orders. None of this will happen, however, without the industrial issue moving to the centre of the public policies agenda, either in facing the pandemic or as a strategic push for Brazil.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or for the publication of this article.

Notes

1. ABIMO's note points to the dispute for equipment in the national territory, according to article 3 of Law 13979/2020, on requisition of goods and services by public sector bodies, emphasising the absence of federative coordination (ABIMO, 2020a).
2. According to Cheong (2020), 'after overcoming COVID-19, the country should establish industrial policies aimed at promoting smooth industrial restructuring'.
3. According to the Budget and Financing Committee of the National Health Council (2020), the budget dedicated to actions related to the COVID-19 pandemic until May 2020 indicated a 0.1% participation by the Ministry of Science, Technology, Innovations and Communications (MSTIC), revealing an even more expressive absence compared to the allocation of resources budgets of the respective ministry, in the order of approximately 0.2% in the 2018 and 2019 financial years, each (Conselho Nacional de Saúde, 2020).
4. Federal Decree 10.285/2020 (Presidência da República, 2020a).
5. There was no record of the contracted operation until the conclusion of this article.
6. See the Chamber of Deputies official website (2020) at https://www.camara.leg.br/noticias/657610-setores-industriais-poderao-ser-obrigados-pelo-governo-a-fabricar-itens-de-combate-ao-coronavirus/. The three bills in progress on the topic of productive conversion are PL 1759, PL 2201 and PL 2224.
7. The São Paulo government launched a channel to identify suppliers, but does not disclose the results of these contacts. There is no information on industrial mobilisation as a government action, other than the involvement of prisoners in the manufacture of fabric masks (https://www.saopaulo.sp.gov.br/spnoticias/presos-de-sp-vao-confeccionar-320-mil-mascaras-para-protecao-contra-coronavirus/). A similar initiative was identified in Espírito Santo, Rio Grande do Sul and Paraná (GOVERNMENT OF THE STATE OF SÃO PAULO SÃO PAULO, 2020). Iniciativa similar foi identificada no Espírito Santo, Rio Grande do Sul e Paraná (Governo do Estado de São Paulo, 2020).

References

Associação Brasileira da Industria de Artigos e Equipamentos Médicos (ABIMO) (2020a). *ABIMO defende centralização da gestão de recursos médico-hospitalares* [ABIMO defends centralization of the management of medical and hospital resources]. https://abimo.org.br/noticias/abimo-defende-centralizacao-da-gestao-de-recursos-medico-hospitalares-pelo-governo-federal-durante-a-crise-do-coronavirus/

Associação Brasileira da Industria de Artigos e Equipamentos Médicos (ABIMO) (2020b). *Isenção de impostos de produtos importados leva indústria nacional de equipamentos médicos para a UTI* [Tax exemption on imported products takes the national medical equipment industry to the ICU]. https://abimo.org.br/noticias/isencao-de-impostos-de-produtos-importados-levaindustria-nacional-de-equipamentos-medicos-para-a-uti/

Abrucio, F. O. (2020, May 22). O que deu certo em outros países e o nosso pesadelo. [What worked in other countries and our nightmare] *Valor Econômico*, p. 4–5.

Azoulay, P., & Jones, B. (2020). Beat COVID-19 through innovation. *Science*, *368*(6491), 553.

Banco de Desenvolvimento de Minas Gerais (BDMG) (2020). COVID-19: BDMG abre crédito acessível para empresas do setor de saúde se prepararem [Covid-19: BDMG opens affordable credit for healthcare companies to prepare]. https://www.bdmg.mg.gov.br/covid-19-bdmg-abre-credito-acessivel-para-empresas-do-setor-de-saude-se-prepararem/?sala-de-imprensa

Banco do Nordeste (BNB) (2020). Banco do Nordeste destina R$ 5 milhões para projetos de inovação no combate à COVID-19 [Banco do Nordeste allocates R$ 5 million to innovation projects in the fight against Covid-19]. https://www.bnb.gov.br/noticias/-/asset_publisher/x8xtPijhdmFZ/content/bnb-destina-r-5-milhoes-para-projetos-de-inovacao-no-combate-a-covid-19/50120

Banco Nacional de Desenvolvimento Econômico e Social (BNDES) (2020). Acompanhamento das medidas emergenciais contra o coronavírus [Monitoring emergency measures against the coronavirus]. https://www.bndes.gov.br/wps/portal/site/home/bndes-contra-coronavirus/mais-informacoes/acompanhamento-medidas-emergenciais-contra-coronavirus

Bernal, P. C. B., Molina, O. G., & Rodríguez, J. S. L. (2014). La reconversión industrial de la siderúrgica integrada en Colombia [The industrial reconversion of the integrated steel mill in Colombia]. *Estudios Gerenciales*, *30*, 451–460.

Bonilla-Aldana, D. K., Holguin-Rivera, Y., Cortes-Bonilla, I., Cardona-Trujillo, M. C., García-Barco, A., Bedoya-Arias, H. A., Rabaan, A. A., Sah, R., & Rodriguez-Morales, A. J. (2020). Coronavirus infections reported by ProMED, February 2000–January 2020. *Travel Medicine and Infectious Disease*. https://doi.org/10.1016/j.tmaid.2020.101575

Brasil (2020a). Presidência da República. *Decreto nº 10.285, de 20 de março de 2020*. http://www.planalto.gov.br/ccivil_03/_Ato2019-2022/2020/Decreto/D10285.htm

Brasil (2020b). Ministério da Economia. *Disclosure and Transparency of Actions to Combat Covid-19*. Available in https://www.gov.br/economia/pt-br/centrais-de-conteudo/apresentacoes/2020-05-22-transparencia-covid19.pdf

Cheong, Y. (2020). The experience of South Korea with COVID-19. In R. Baldwin & B. W. Di Mauro (Eds.), *Mitigating the COVID economic crisis: Act fast and do whatever it takes*. CEPR Press.

Confederação Nacional da Indústria (CNI) (2020). *Indústria x coronavírus: Como a produção brasileira se transformou para combater a pandemia* [Industry x coronavirus: how Brazilian production has changed to fight the pandemic]. https://noticias.portaldaindustria.com.br/especiais/especial-dia-da-industria-2020/

Conselho Nacional de Saúde (2020, May 28). *Boletim Cofin 2020/05/28/1-2AeB-3-4AaD*, Comissão de Orçamento e Financiamento.

Departamento Intersindical de Estatística e Estudos Socioeconômicos (DIEESE) (2020). *Reconversão industrial em tempos de COVID-19: O papel dos governos para salvar vidas* (Nota técnica 238) [Industrial conversion in times of Covid-19: the role of governments to save lives]. São Paulo.

Empresa Brasileira de Pesquisa e Inovação Industrial (EMBRAPII) (2020a). *Inovação na luta contra a COVID-19* [Innovation on fight against COVID-19]. https://embrapii.org.br/inovacao-na-luta-contra-a-covid-19/

Empresa Brasileira de Pesquisa e Inovação Industrial (EMBRAPII) (2020b). *Projeto inovador vai ampliar a capacidade produtiva de respiradores para o SUS* [Innovative project will expand the productive capacity of respirators for SUS]. https://embrapii.org.br/projeto-inovador-vai-ampliar-a-capacidade-produtiva-de-respiradores-para-o-sus/

Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) (2020). *FAPESP amplia prazo para submissão de propostas ao edital PIPE COVID-19* [FAPESP extends deadline for submission of proposals to the PIPE COVID-19 public notice]. http://www.fapesp.br/pipe/fapesp_amplia_prazo_para_submissao_de_propostas_ao_edital_pipe_covid19/132/

Financiadora de Estudos e Projetos (FINEP) (2020). *Seleção Pública MCTIC/FINEP/FNDCT Subvenção Econômica à Inovação—01/2020 EPIs e EPCs no combate do COVID-19* [Public Selection MCTIC/FINEP/FNDCT Economic Subsidy for Innovation - 01/2020 PPE and EPCs in the fight against Covid-19]. http://www.finep.gov.br/images/chamadas-publicas/2020/25_05_2020_1_Rerratificacao.pdf.

Furman, J. (2020). *Protecting people now, helping the economy rebound later*. In R. Baldwin & B. W. Di Mauro (Eds.), *Mitigating the COVID economic crisis: Act fast and do whatever it takes*. CEPR Press.

Gadelha, C. A. A., & Temporão, J. G. (2018). *Desenvolvimento, inovação e saúde: A perspectiva teórica e política do complexo econômico–industrial da saúde* [Development, Innovation and Health: the theoretical and political perspective of the Economic-Industrial Health Complex]. *Ciência e Saúde Coletiva*, *23*(6), 1891–1902.

Governo do Estado de São Paulo (2020). *Presos de SP vão confeccionar 320 mil máscaras para proteção contra coronavírus* [Prisoners in SP will make 320,000 masks to protect against coronavirus]. https://www.saopaulo.sp.gov.br/spnoticias/presos-de-sp-vao-confeccionar-320-mil-mascaras-para-protecao-contra-coronavirus/

Huang, Y., Lin, C., Wang, P., & Xu, Z. (2020). Saving China from the coronavirus and economic meltdown: Experiences and lessons. In R. Baldwin & B. W. Di Mauro (Eds.), *Mitigating the COVID economic crisis: Act fast and do whatever it takes*. CEPR Press.

Instituto Brasileiro de Geografia e Estatística (IBGE) (2020). *Despesas com saúde*. https://agenciadenoticias.ibge.gov.br/agencia-noticias/2012-agencia-de-noticias/noticias/26444-despesas-com-saude-ficam-em-9-2-do-pib-e-somam-r-608-3-bilhoes-em-2017

Instituto de Estudos do Desenvolvimento Industrial (IEDI) (2018). *Indústria 4.0—A iniciativa made in China 2025* (Carta 827). São Paulo.

Instituto de Estudos do Desenvolvimento Industrial (IEDI) (2020). *A crise do coronavírus e a estratégia industrial* [The coronavirus crisis and industrial strategy]. https://iedi.org.br/media/site/artigos/20200225_covid_estrat_indl.pdf.

Kingdon, J. W. (1995). *Agendas, alternatives, and public policies* (2nd ed). Harper Collins.

Krugman, P. (2020). *The case for permanent stimulus*. In R. Baldwin & B. W. Di Mauro (Eds.), *Mitigating the COVID economic crisis: Act fast and do whatever it takes*. CEPR Press.

Massuda, A. (2020, May 23). Fortalecer o SUS será essencial para a segurança sanitária. *Valor Econômico*, p. F6.

Mazzucato, M., & Quaggiotto, G. (2020, May 19). The big failure of small government. *The Project Syndicate*. https://www.project-syndicate.org/commentary/small-governments-big-failure-covid19-by-mariana-mazzucato-and-giulio-quaggiotto-2020-05.

Mazzucato, M., & Torreele, E. (2020, April 27). How to develop a COVID-19 vaccine for all. The Project Syndicate. https://www.project-syndicate.org/commentary/universal-free-covid19-vaccine-by-mariana-mazzucato-and-els-torreele-2020-04

Ministério da Economia. (2020b). *Divulgação e transparência das ações de enfrentamento ao COVID-19*. https://www.gov.br/economia/pt-br/centrais-de-conteudo/apresentacoes/2020-05-22-transparencia-covid19.pdf. Access in 27 May 2020b.

Prefeitura de São Paulo - Agência São Paulo de Desenvolvimento (2020). *Edital 013/2020*. http://adesampa.com.br/wp-content/uploads/2020/04/Edital-de-Concurso-npercentC2percentBA-013_2020-_-COVID-19.pdf/

Presidência da República. (2020a). *Decreto nº 10.285, de 20 de março de 2020*. http://www.planalto.gov.br/ccivil_03/_Ato2019-2022/2020/Decreto/D10285.htm. Access in 30 May 2020a.

Rodríguez, C. H. (2017). Reconversión industrial en Colombia necesaria para la adecuada inserción en el mercado internacional [Industrial reconversion in Colombia necessary for adequate insertion in the international market]. *Suma de Negocios*, *8*, 150–155.

Ruiz, A. A., & Martich, E. (2020). *La crisis, oportunidade para reformar el modelo de I+D* [The crisis, opportunity to reform the R+D model]. http://agendapublica.elpais.com/la-crisis-oportunidad-para-reformar-el-modelo-de-id/?fbclid=IwAR1UhHrbiANqaeJewpJPaB_wTeMKtozUx8CUsJm1WPzW0PoviNi0FxJflx0

Skariyachan, S., Challapilli, S. B., Packirisamy, S., Kumargowda, S. T., & Sridhar, V. S. (2019). *Recent aspects on the pathogenesis mechanism, animal models and novel therapeutic interventions for middle east respiratory syndrome coronavirus infections. Front Microbiol*, *10*, 569.

Souza, C. (2006). Políticas públicas: Uma revisão da literatura. *Sociologias, Porto Alegre*, *8*(16), 20–45.

Stiglitz, J. E., Jayadev, A., & Prabhala, A. (2020, April 23). Patents vs. the pandemic. *The Project Syndicate*. https://www.project-syndicate.org/commentary/covid19-drugs-and-vaccine-demand-patent-reform-by-joseph-e-stiglitz-et-al-2020-04

Woodrown, C. (1995). Defense conversion: The economic conversion of the American economy. *Industrial Marketing Management*, *24*, 391–409.

Wilson, M. R. (2020). The 5 WWII lessons that could help the government fight coronavirus. *Politico Magazine*. https://www.politico.com/news/magazine/2020/03/19/coronavirus-defense-production-world-war-two-lessons-135814