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The Covid-19 sanitary crisis and the productivity and technological vulnerability of the Health Economic-Industrial Complex in Brazil within the context of financialization

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Abstract

The paper analyses strategy changes in global leader firms of HEIC in order to evaluate the new accumulation dynamics and point out, in a preliminary way, the implications for the overcoming of the economic and social challenges in the health sector in Brazil. The hypothesis is that both the demand and the vulnerability of *SUS*, though having been accentuated in the sanitary crisis, had already been present due to the structural changes im- posed on HEIC with the event of this significant set of shifts in the strategies of capitalist accumulation. Understanding these changes on a global scale is crucial to evaluate the structural productive and technological vulnerability of HEIC in Brazil and to design feasible, effective public policies to consolidate *SUS* in connection with productive and technological advances, thus promoting long- term socioeconomic development.

Keywords: Covid-19. Health Economic-Industrial Complex (HEIC). Unified Health System (SUS). Industry 4.0. Production and Innovation System.

Introduction

The sanitary crisis caused by the Covid-19 pandemic heightened the extreme vulnerability of Brazil's health system. This vulnerability is an obstacle to advance the universalization of access to quality public health services and provide an inalienable right to the population. To deny this right is to move the Brazilian national pact backwards and promote the country's economic and social development. Health must be understood as a strategic, fundamental area to promote well-being for all society.

The pandemic expanded the already heightened internal demand for the public and private health services. Different subsystems of the Health Economic-Industrial Complex (HEIC) were impacted, such as the equipment industry and the health service-related subsectors. Despite being accentuated in the current scenario, both the demand for the Unified Health System (*SUS*) and its vulnerability were already visible in the face of relevant demographic and epidemiological changes, as well as the structural transformations imposed to HEIC via the emergence of the "Industry 4.0". Because of the vulnerability in the productivity and technology structure of HEIC in Brazil, efforts must be made to consolidate SUS. To do this, it must be linked to a robust productivity/technological foundation that can face Brazil's social challenges in health.

Facing this huge challenge involves articulating several dimensions that approach aspects concerning investments, employment and wealth generation, and changes in labor, technology, and innovation. That is, defining a socioeconomic development policy in the long term requires a thoroughly diagnosis to devise feasible yet effective public policies.

This study aims to investigate one of such dimensions from an exploratory standpoint: the significant changes that have been taking place in global leading companies' accumulation strategies within HEIC. The main hypothesis is that these changes have been significant both in technological strategy terms and their more general accumulation strategy. They suffered an impact of the capitalist financialization dynamic in the recent period and impose relevant impacts on the other dimensions described.

Understanding the changes HEIC has been going through globally is key to implement a strategy that will consolidate *SUS* in articulation with productivity and technological advances. This will help overcome its short and long-term vulnerabilities and promote economic and social development in Brazil.

This article is divided into three sections along with the introduction. Section 1 outlines how the pandemic outbreak exposed the productivity and technological vulnerabilities of HEIC, as well as the need to articulate the demand and offer for health goods and services. Section 2 outlines the changes in the operations logic for the global leading companies of this complex. It also emphasizes the need of high spending in research and development (R&D) and its high profitability, which is usually associated with extending the patent protection strategies. Although there is strong public participation in the innovation system where the leading companies operate, the value created for the stockholders through repurchasing stock and distributing dividends is channeled. Finally, it discusses the numerous fusions and acquisitions in the sector. The last section presents the final remarks and presents the impacts of these changes on HEIC in Brazil from an exploratory standpoint.

1. The Pandemic and The Exposed Productivity and Technological Vulnerability of HEIC in Brazil

The Brazilian productivity structure response capacity in the context of an extraordinary situation of an exponential increase in the demand for health goods and services was inefficient and inadequate. Brazil was unable to offer some essential products and services to mitigate the sanitary crisis in the demanded quantities. Some of them were ventilators and test inputs, as well as some low-complexity productivity and technological like personal protective equipment (PPEs). Responding to the urgent demand with imports was partially limited by the scarce global supplies and the restricted exports of several countries. Also, there were predatory commercialism practices such as redirecting orders for requesters who accepted paying higher prices during

the pandemic.

This vulnerability became even more visible through the hospital infrastructure, the insufficient number of hospital beds and intensive care units (ICUs). The construction of campaign hospitals that were only partially equipped and had insufficient infrastructure was more characterized by improvisation than planning. Another serious system vulnerability that was found while fighting the pandemic has been the insufficient offer of specialized professionals in the health area. The inadequate labor conditions offered for many of these professionals could be exemplified by the high number of contaminations. Also, many professionals were on medical leave and even died.

The sanitary crisis caused by Covid-19 heightened the already existing vulnerability in the whole public and private health system of HEIC. The initial scarcity of some products like alcohol and masks could have been overcome by a productivity structure able to rapidly expand its production and/or promote the productive reconversion of other sectors. Some universities and research centers were active and showed their potential, as they devised tests and ventilators in record times. However, these initiatives proved to be complex and had limited results. A country in search of economic and social development and a relative degree of sovereignty must always look to mitigate its vulnerabilities in strategic areas. Health is the textbook case.

Access and quality of health services have always been largely asymmetrical in Brazil. There was progress in the construction of *SUS* and its service network especially as of the 2000s. Nonetheless, the recent cuts in health inputs, which had already been limited, have compromised the population services, especially the percentage that depends heavily on public, free health services. The economic crisis that had begun prior to the sanitary crisis and has been moving slowly since 2015, has been increasing unemployment and hindering working conditions. This augmented the demand for public, free services.

Despite *SUS* being freely available, the Family Budget Survey conducted by the Brazilian Institute of Geography and Statistics (POF-IBGE) found that Brazilian families invested 6.5% of their monthly income in health expenses in the years 2017-2018. This amount corresponds to R$ 20.8 billion in 2018

prices. As for low-income families (income lower than three minimum wages per month), who stand for 29.8 million families, their medicine expenses alone varied between 4.2% and 4.4% of their income (more than R$ 2.3 billion). To the high-income families (ten or more minimum wages per month) who do not use *SUS* frequently, their health insurance expenses amounted to 3% of their income (more than R$ 3.4 billion). However, a considerable part of these expenses is reimbursed in their income tax.

Thus, the following question is posed: how to either reduce or eliminate the national health system vulnerability? To begin with, one must view the importance of HEIC from a systemic perspective. In a political dimension, one must acknowledge its social and strategic importance. This must be found in the sufficient fund allocation for a wide, qualified offer of health services in the budgets of the three government spheres: municipal, state, and federal. After all, centralizing funds on the federal level ignores supply and demand specificities for health services regionally and locally.

An encompassing social policy cannot be achieved if it is not founded on a productivity/technology foundation. The fact that Brazil is a country of continental dimensions cannot be forgotten. Thus, in this dimension, one must integrate the demand for health goods and services with the national productivity and technology development. Because of *SUS* and the private service demand, Brazil offers a considerable potential demand to develop HEIC. It must be considered that Brazil has a population of over 200 million people.

To transform the potential demand into effective demand, one must guarantee a continuous flow of budgetary funds to expand the access and quality of *SUS*. Using the *SUS* public purchasing power to incentivize production of goods and services is a key element for the HEIC productivity and technology policy.

The industrial and technological policy structure as from the 2000s took important steps. During that period, the Health Ministry was in charge of the articulation between public and private companies. It coordinated aspects pertaining to funding, which was associated with its high purchasing power, as well as market and regulation guarantees (Gadelha, 2016; Gadelha; Temporão, 2018). In this last case, technology transfer agreements were

foreseen so that it was possible to develop them in the country and keep it away from the exclusive role of consumer market. Finally, the proposal was that the very public sector acted as a HEIC coordinator and promoter within "Industry 4.0".

Only in this way will it be possible to further strengthen this country's productivity chain, reduce the imports content levels in several industrial segments, and increase its capacity of generating investments, innovation, employment, and wealth as HEIC represents. Moreover, training of companies and segments of HEIC in Brazil will be expanded. This will enable them to incorporate new technologies in the health complex. The sanitary crisis has clearly shown the growing use of equipment, services and products (even pharmaceutical ones) that widely use the scientific and technological developments associated with the "Industry 4.0" concept, e. g. artificial intelligence, big data, additive manufacturing, nanotechnology, biotechnology, new materials etc.

Searching for local production stimulus mechanisms is essential in a shorter-term horizon. As mentioned above, the current pandemic context cruelly exposed how dependent we are on import strategic inputs, even the less technologically sophisticated ones However, beyond the short term, one must bear in mind the underlying challenges there are in integrating the demand for health goods and services with social, productivity, and technological development nationally. As stated by Gadelha & Temporão (2018), HEIC must be founded on three pillars: consolidating *SUS* based on public funding, developing national production, and promoting the Brazilian science, technology, and innovation system (ST&I) socially and economically.

2. A Summary of the HEIC Global Dynamics

With regard to a long-term strategy, an in-depth discussion about articulating the national health system with a globally-based offer structure is essential. This framework has been undergoing significant changes in the past few years.

Even though HEIC is an extremely complex chain whose multiple actions

have different features in terms of market structure and competitive patterns, its dynamic core is formed of a set of large global companies. These enterprises have a high market price, direct technological advance, and influence their own global health spend. Therefore, their strategies directly affect access to health products and services, both directly for the end consumer and through the health systems, especially the public ones.

Their business is very lucrative both in Brazil and worldwide, especially in pharmaceutical and biotechnology. The 2019 EU Industrial R&D Investment Scoreboard, made by the European Commission's Industrial Research and Innovation Monitoring and Analysis (Irima), is a study based on a sample of the 2.5 thousand global companies with the highest spend on R&D. Their profitability (net profit margin) in the pharmaceutical and biotechnology segments were 14.1% in the years 2018-2019, as opposed to the 11.2% average of 35 sectors. They placed below financial services and information and communication technologies (ICTs).

The "Valor 1000 Maiores Empresas" list (the Brazilian magazine "Valor's 1000 Biggest Companies" list) states that the return on equity of the pharmaceutical sector (including cosmetics) in Brazil was 12%, 17.9%, and 18.1% in the years 2016-2018. This was far above the average profitability of the 1,000 biggest companies: 5.2%, 6.4% e 9.9%, respectively. The same trend was found in the medical services segment: 11.5%, 11.8% e 11%, respectively. The return indicators of "Exame Melhores e Maiores Empresas do Brasil" (Brazilian business magazine "Exame's Best and Biggest Companies in Brazil" list) go along the same lines. The return on equity of the pharmaceutical sector was 19%, 18.9%, and 13.4% in the years 2016-2018, which was above the average profitability of the 1,000 biggest companies: 10%, 10.2% e 12%, respectively. The same trend was found in the health services segment: 15.8%, 16.8% e 16.7%, respectively.

The sector companies relate their high return to large investments in R&D. These are needed to develop new medicines subject to high risks associated to long processes of discovery, development, and clinical tests with innovative products.

In fact, HEIC is a very innovative complex in advanced countries, and it presents a technological intensity (relation between R&D expenses and net

revenue). This ratio is higher than other technology-intensive economic sectors/complexes, e.g., equipment and services for information and communication technologies. The technological intensity of select HEIC sectors was 12% in 2018 (3.8% for equipment and health services, and 15.9% for the pharmaceutical and biotechnology sector), vis-à-vis the average intensity of 4% for the other sectors (Table 1).

Table 1 - Indicators for the total and for the sectors associated with the HEIC, among the 2,500 most innovative global companies – 2018 (billions €)

Setor	Nº de empresas	P&D	Vendas	P&D / Vendas	Lucro Operacional	Emprego	Valor de Mercado
Total	2,500	823	20,352	4.0	2,276	55,645	27,163
A -Farmacêutica e biotecnologia	429	154	968	15.9	130	2,631	3,451
B – Serviços e equipamentos de saúde	86	17	444	3.8	37	1,456	961
CEIS (A+B)	515	170	1,412	12.0	167	4,087	4,412

Source: The 2019 EU Industrial R&D Investment Scoreboard (2019)

The high spend on R&D is usually emphasized by large global companies to justify the high price of their products. Nevertheless, there are a few elements that could substantiate questions about the direct relation between elevated profits and R&D focused on improving the population's health.

The low elasticity-income of the demand for medicines can be easily verified. Evidently, in case there is need for health and medicine treatment, the answer logic to changes in price, in terms of consumption, occurs in a widely different way compared to other products. This gives a high monopoly power to the providers. The protection generated by the patent system is another factor that enables to increase rentability and the sector profits.

Because of the need to protect the innovative activity, the patent protection system has been suffering associated distortions. This can be exemplified in the generalized practice of releasing drugs that are structurally very similar to already-known pharmaceuticals (me-too drugs). However, there are small differences in pharmacotherapy that can result in patent protection and higher prices and profit margins (Mazzucato; Roy, 2019).

Several studies suggest that the number of approved medicines that actually represent noticeable benefits to patients is reduced. A study investigated 216 medicines introduced in Germany between 2011 and 2017 and were analyzed by the Institute for Quality and Efficiency in Health Care (IQWiG). Of these, only 25% were considered to provide large additional benefits (Wiesler; Macgauran; Kaiser, 2019). In an assessment conducted by Prescrire International, of 906 medicines released in Europe between 2010 and 2019, only 8% offered clear additional benefits. Another 52% presented no additional benefit, and 16% of them presented more contraindications than benefits (Prescrire International, 2020). The sector companies frequently make marginal improvements as a means of obtaining secondary patents and extending their protection time. This enables them to maintain their profits high (Mazzucato, 2018). The 12 best-selling medicines in the USA in 2017 had only 848 patents associated with them, which resulted in an average of 71 patents per medicine. According to the requested patents, the average increased to 125 patents. This resulted in a potential competitor blockage of 38 years on average (I-Mak, 2018).

Another aspect also highlighted by several authors is the innovative medicine development process. Not only does this result from the companies' R&D spend, but it is also backed by strong public investments. Consequently, an ecosystem is formed where the private investment is recurrently strengthened by public investments (Gotham *et al.*, 2017; Tulum; Lazonick, 2019). The analysis conducted by Cleary et al. (2018) showed that all the 210 medicines approved by the Food and Drug Administration (FDA) between 2010 and 2016 were related directly or indirectly to research financed by the National Institute of Health (NIH).

To sum up, the innovations result from companies' efforts, as well as they include significant investments made by agents, institutions, public funds, and

the society as a whole. Also, the innovation results are propelled by a small parcel of agents protected by patents and use active strategies to expand protection without necessarily add concrete benefits.

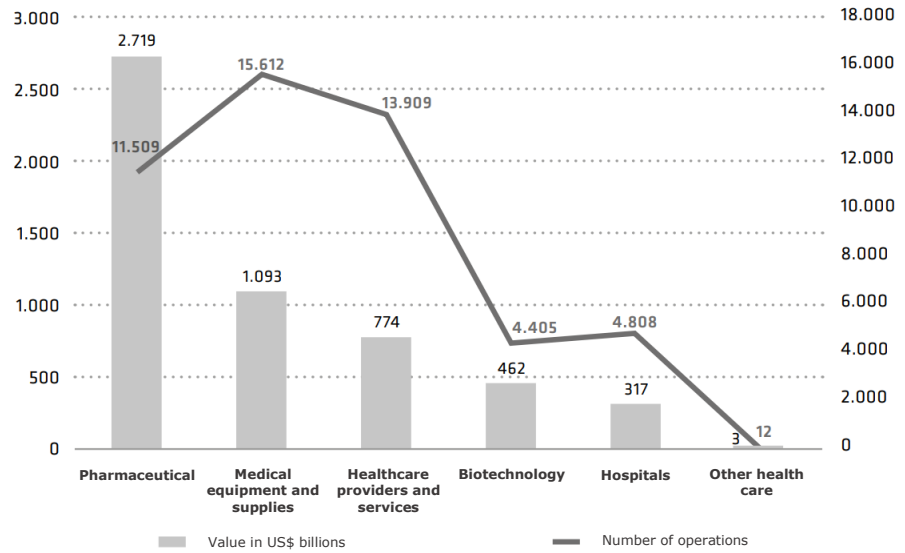
This asymmetry has been heightened in the past few decades by a company strategy financialization process. The maximization of shareholders' value (MSV) logic is generalized, and this is expressed in the distribution of high dividends and stock repurchases. According to Tulum & Lazonick (2019), of the 19 pharmaceutical companies listed in the S&P 500, the total value spent in P&D between 2007 and 2016 was US$ 488 billion. However, distributing dividends amounted to US$ 267 billion, and stock repurchases amounted to US$ 296 billion. The repurchases and dividends amounted to 18.2% of revenues, while R&D spend equaled 15.8%.

The consulting company PWC publication Global Top 100 Companies by Market Capitalization highlighted 16 health complex companies whose market value amounts to US$ 2.7 trillion. They are placed among the 100 biggest companies (financial institutions included) in the world. Their market value amounts to US$ 21.1 trillion. The health complex companies distributed US$ 324 billion in dividends to their stockholders in the years 2014-2018. In addition, they repurchased as much as US$ 201 billion in stock. On average, the relation between the distributed total (dividends and repurchases) and the market value in those years was 4.4% against the 4%-average of the 100 biggest global companies. Such strategies direct funds to add value to stock, benefiting a small parcel of investors. Moreover, the influence of these strategies on mergers and acquisitions deserves highlight. Such processes are boosted by valued stock and the participation of big institutional investors in capitalizing these operations. They strengthen the degree of global concentration and control on patent-protected commercial and technological assets. According to Busfield (2020), the institutional investors are increasingly present within the property structure of the largest pharmaceutical companies. By way of illustration, they control 75.1% of Pfizer, 76.8% of Merck, and 68.1% of Johnson & Johnson. The investments on the above mentioned segments demand high funds, whether they are on R&D or in subsequent innovation register and regulation processes. For this reason, even small companies are bought despite their potential for

developing relevant incremental stages in the innovative process. They would hardly be able to keep up with the current technology development threshold. The big companies acquire technological capacities and guarantee larger scaling and control over investment in intangible assets such as what is done for branding, marketing, and distribution. Consequently, the HEIC-related company segments are evidently valued.

The information in Graph 1 shows that the scale-up strategy and strengthening the productivity/technological capacities via mergers and acquisitions (M&A) is a global trend that is not limited to the pharmaceutical sector only. The 50,000+ M&A operations conducted in all HEIC-related segments between 1995 and 2016 amounted to US$ 5.4 trillion. The pharmaceutical sector accounted for 11.5 thousand operations with an accumulated value of US$ 2.7 trillion. This strategy strongly influences the medical equipment and inputs sector, as well as health services and hospitals. In the Brazilian case, a report by consulting company KPMG found that in the years 2015-2018, 80 M&A operations took place in Brazil in the chemical and pharmaceutical sectors. In 27 operations, national companies were sold to international ones. In the hospitals and clinical laboratory segment, 148 operations took place. Of these, 37 were national-to-international capital transfers.

Graph 1 - Value and number of M&A operations in HEIC - 1995 to 2016 (accumulated)



Source: PWC Strategy & 2018 Global Innovation 1000 (2018).

3. Final Remarks: Challenges for HEIC in Brazil

The leading global companies in the contemporary HEIC are characterized by a financialized accumulation logic. Undoubtedly, implementing an encompassing development strategy focused on the offer/demand articulation will contribute to maintaining a universal health system and promoting the productivity and technological nationally. This must include a reflection upon new ways of articulating HEIC in Brazil with such scenario to try to somehow improve the necessary degree of autonomy to overcome Brazil's structural vulnerabilities.

From the developing countries' perspective, the global concentration, the maximization of shareholders' value strategy, the control over strategic

assets, and the articulation with the R&D public support system are factors seen in the advanced countries' leading company strategies. They pose a risk of continuous increase in the imbalance between the population's needs and the State action capacity to respond to them.

The global concentration and the control over strategic assets is greatly leveraged and boosted by the M&A operations, high in number and value. Alongside the considerable distribution of dividends and stock repurchases, they form a new value generation pattern whose main aim is maximization of shareholders' value. Oftentimes, this is incompatible with long-term investments such as R&D ones, which greatly depend on a public support system.

Thus, expanding the knowledge and technological capacities in the various HEIC segments must be put in the Brazilian long-term development agenda again. This is key to *SUS* long-term sustainability. Despite its shortcomings, Brazil is one of the few countries that has a structure with public laboratories, research institutes and universities with strong training in the health area. Even though the existing productivity structure is very vulnerable in terms of production capacity and technology, it has relevant actors in numerous segments. They can be found in both transnational firm branches and national companies. In the face of the current agenda, one must highlight the learning legacy regarding public policies. The coordination views of several agents were included, such as the Ministry of Health, the Ministry of Industry and Commerce, the Brazilian Development Bank (*BNDES*), the Project and Research Funding Agency (*FINEP*), and national and international private companies. This was done to stimulate HEIC and establish partnerships for productivity development by an articulation between the public and private sectors.

Elevating the Brazilian HEIC technological capacities in the long term is also key to guaranteeing a less-dependent articulation that has a degree of sovereignty in relation to the global system. One must be watchful for the difficulties that HEIC companies and segments face in terms of training. This is due to the needed level of investment in the long term and the technology complexity the health system reached in the recent period. Evolving is essential as a mechanism of fostering more negotiation capacity due to

medical solutions and treatment costs, as well as the possibility of devising international cooperation and technological development mechanisms for basic research and devise goods and services.

Guaranteeing funding to stimulate the technological and scientific development in the health area is of utmost importance. The complementarity between the public and private sectors must be leveraged. This must be done in order to stimulate the high return of HEIC and the larger corporations and make it advance towards higher productivity investments and R&D, not towards allocating funds in the maximization of shareholders' value. Special funding must be guaranteed for small and medium HEIC companies in Brazil.

The productivity/technological advance, alongside the universalization of access to health services and the improvement in the society's general well-being, cannot be regarded as a factor of competition or exclusion of private activities in the health area. On the contrary, the economic and social development intensifies the demand for more specialized and complex health services. This could result in a "crowding in" process that will enabling the creation and exploration of business niches in both public and private contexts. The illegitimate commodification of HEIC goods and services must be prevented. The asymmetry found in the contribution towards advancing the sector and capturing value by a select group, as viewed in the international scenario, must also be restrained.

Finally, one must be mindful of the deleterious effects that concentration and globalization via M&A might have over HEIC in Brazil. In addition to promoting a higher concentration in the national market, there is a risk of Brazilian companies' being denationalized albeit their high productivity and technological potential. The main HEIC economic sectors are characterized by high technology intensity and innovation (whose core partially moved from chemistry to biotechnology and demands high investments), as well as their high return. This leads to concentration in few corporations, a process highlighted by the noticeable M&As in the sector as to number of operations and value. In this case, the risk to be avoided is an excessive denationalization of HEIC that might lead to a smaller productive/technological development. This could impact the national socioeconomic development negatively.

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