

Carlos Augusto Grabois Gadelha

Development, health-industrial complex and industrial policy

ABSTRACT

This paper puts health questions within the context of national development and industrial policy. It follows the idea of structuralist, Marxist and Schumpeterian approaches, in which industry and innovations form determining factors for the dynamism in capitalist economies and relative positions within the world economy. All countries that have developed and started to compete under better conditions with advanced countries have had an association between strong industry and an endogenous knowledge, learning and innovation base. However, in the field of health, this vision presents problems because business interests move according to the economic logic of profit rather than to meet health needs. The notion of the health-industrial complex is an attempt to provide a theoretical reference that enables linkage between two distinct types of logic: health and economic development. This study has sought to show, on the basis of foreign trade data, how disregard for the logic of health policy development has led to a situation of economic vulnerability in this sector, which may limit the objectives of universality, equality and comprehensiveness. Within this context, a cognitive and political break with these antagonistic visions that put health needs on one side and industrial needs on the other is proposed. A country that aims to reach a condition of development and independence requires strong innovative industries and an inclusive and universal health system, at the same time.

KEYWORDS: Industry, economics. Industries, trends. Health care sector. Technological development. Health sciences, technology and innovation management. National science, technology and innovation policy.

Departamento de Administração e Planejamento em Saúde. Escola Nacional de Saúde Pública. Fundação Oswaldo Cruz. Rio de Janeiro, RJ, Brasil

Correspondence:

Carlos Augusto Grabois Gadelha
Departamento de Administração e Planejamento em Saúde (DAPS)
Escola Nacional de Saúde Pública (ENSP),
Fundação Oswaldo Cruz
Rua Leopoldo Bulhões, 1480 7º andar
Manguinhos
21041-210, Rio de Janeiro, RJ, Brasil
E-mail: gadelha@ensp.fiocruz.br

Received: 6/5/2006

INTRODUCTION

This paper puts health questions within the context of national development and industrial policy. It follows the idea of structuralist, Marxist and Schumpeterian approaches, in which industry and innovations form determining factors for the dynamism in capitalist economies and relative positions within the world economy. All countries that have developed and started to compete under better conditions with advanced countries have had an association between strong industry and an endogenous base of knowledge, learning and innovation.

However, in the health field, this vision presents problems because business interests move according to the economic logic of profit rather than to meet health needs. The notion of the health-industrial complex is an attempt to provide a theoretical reference that enables linkage between two distinct types of logic: health and economic development. This arises because health is simultaneously a right within citizenship and a strategic front for development and innovation within the knowledge society.

The objective of the present study was to show, on the basis of data on innovation potential in Brazil and foreign trade data, how disregard for the logic of health policy development has led to a situation of economic vulnerability in this sector, which may limit the objectives of universality, equity and comprehensiveness.

DEVELOPMENT AND INDUSTRIAL POLICY: THE STRUCTURALIST TRADITION IN THE KNOWLEDGE SOCIETY

The question of development and industrial policy always permeates the debate around the role of the State in overcoming the backwardness in underdeveloped countries. In Brazil, this debate guided the contributions of the “classical development economics” to overcoming dependence and underdevelopment. Several authors can be cited, such as: Prebisch,¹⁹ Furtado,¹⁰ Tavares,²² Cardoso & Faletto⁴ and Cardoso de Mello,⁵ among many others within the ECLAC tradition (Economic Commission for Latin America and the Caribbean),* who were always against the idea that* natural market forces would lead to a convergence in per capita income and individuals’ standard of living. The development strategy and changes would require ruptures in the economic structure and political and institutional order.

It is within this theoretical context that developmental policies were pursued in various Latin American

countries over the period from 1930 to 1980. Industry was taken as the central core of the strategies of these countries that craved to overcome their situation of dependence and their location on the periphery of the economic system.

Industrialization would simultaneously allow the production of goods with greater added value, endogenization of the generation of technical progress, and improvement in international position – or in the language of ECLAC, there would be exchange between primary and industrial goods. This would progressively lead to development and a reduction in the dependence on developed countries. In short, the struggle for development was the struggle for industrialization. At a political level, industry would also allow a new alliance between the industrial bourgeoisie and the workers, to the detriment of the “backward” primary exporting segments. Thus, this would enable a more inclusive and egalitarian pattern of development, in conjunction with other policies such as agrarian reform.

According to Tavares²² (1979), the industrialization process was not natural and would involve qualitative leaps and ruptures in the productive structure. In its first phase, the process would involve the installation of “light” industries with lower capital and technological requirements, so that in a subsequent phase, heavy industries with inputs of basic raw materials and capital goods would come in. In this second phase, the role of the State would be seen to be central, allowing the financing of the capital accumulation and coordination of the complementary investments, including investments in economic infrastructure. The instruments utilized would go from reserving a market for the national and foreign private segment to setting up large-sized state companies.

For the purposes of the present article, it is not appropriate to make a more in-depth critique of this vision, but only to extract some of the more important ideas for the case of Brazil, from authors who at that time shared the developmental and ECLAC tradition. In brief, although the national problem was treated in depth, the questions of the development model, inequality and exclusion were incorporated according to a simplistic view of the relationship between the State and society. The internal class interests associated with international capital were not considered adequately and perpetuated the dependence and incorporation of the bottom segments in the social pyramid (Cardoso & Faletto,⁴ 1979). In fact, the endogenous reality of the development of capitalist forces in Brazil, within a national development picture that was late in the historical context of the ad-

*See review in Goldenstein¹⁴ (1994).

vanced (or oligopolistic) phase of world capitalism and the past of slavery and colonialism, was disregarded. In other words, the question of development was largely reduced to the relationship between the center and the periphery, without considering the internal capitalistic, economic, political and social dynamics of a backward and dependent country (Cardoso de Mello,⁵ 1982).

From the point of view of more recent theories, which started from the studies by Schumpeter²¹ on development centered on the process of innovation, it can be said that the typical model from ECLAC did not distinguish between production capacity incorporated in machines and equipment, and technological capacity. In other words, in more present-day terms, the knowledge and learning base form the most prominent dynamic factors in company and national competitiveness. The systemic nature of innovation, with industry as the dynamic core of the generation and dissemination of technical progress was little considered. Consequently, there was little emphasis on the competencies required for a continuous learning process and for setting up an endogenous basis for innovation that would allow the introduction of continual improvements in goods, services and production processes, thereby also raising the capacity for prospecting and absorbing technology from the international frontier. In other words, today it is clearly perceived that for economic development, it is not enough to have productive capacity but it is also essential to have a systemic and industrial base that is capacitated for generating knowledge and innovation (Kim & Nelson,¹⁶ 2005).

Independent of the criticisms and the fact that, in certain situations like the Brazilian one, the concrete process of expansion of peripheral capitalism has been extremely excluding and unequal, the growth and diversification of the manufacturing sector and industrial policy have been at the root of overcoming the dependence and changing the international division of labor. This is a point of unity among all the authors cited, who have focused their concerns on the development process, taking the basis of its role as the motor for technical progress and dissemination of innovations to the whole system, including to agriculture and services. The structuralist ECLAC perception formed a very strong reference that guided the development path pursued by Brazil between 1950 and 1980. Even as an excluding and concentrating model, particularly during the years of authoritarianism, this vision of development was behind a vigorous process of economic growth (an av-

erage of more than 8% per year), accompanied by strong changes in the production structure.

The neoliberal revolution took place at the end of the 1970s and during the 1980s, and the ideas from this are still very present in current public policies. This revolution incisively attacked the development strategy adopted, a model that was labeled as "import substitution". In these ideas, the State's role of induction and coordination was rejected and the policies adopted were accused of being inefficient and ineffective. International agencies like the International Monetary Fund (IMF) and the World Bank (IBRD) adopted a view in their norms and policies that the essential role of the State should be to create the foundations for a market economy to function well (by following a "marketing conforming approach"). This was emphasized in reference documents containing critiques and proposals for a new model (BIRD,^{1,2} 1993, 1997).

The successful experience of East Asian countries was also (re) read in a distorted and fallacious manner, as successful cases of development without selective interventionism from the State in the economic structure, thus going against all the historical evidence. In this process, the principal targets of the attack were developmental policies and industrial policy, in particular (Gadelha,¹¹ 2001). Along these lines, and as a counterpart to the successful cases, the Brazilian experience was presented as an emblematic example of the failure of the import substitution mode. It was disregarded that the material basis for a more developed form of capitalism had in fact been established between the years 1950 and 1980, despite the problems of inequality, exclusion and precarious basis for innovations that have already been mentioned. The result from this attack and the effective exhaustion of the previous model, in the face of the new challenges brought about by asymmetrical globalization and the third technological revolution, was more than two decades of macroeconomic stagnation and involution of the industrial structure implemented (Coutinho,⁸ 2005).

Within the health field, in the opposite direction to this restricted view of the State's role, the foundations for the National Health System (SUS) were launched precisely at the end of the 1980s and beginning of the 1990s. SUS was delineated by the guidelines of the Eighth National Health Conference of 1986 and was to a large extent instituted in the Brazilian Constitution of 1988 and in the Health System Law (Law 8,080 of September 19, 1990). It can be noted that the latter was approved by the Na-

*Authors like Celso Furtado, were already emphasizing at the start of the 1960s that true development only takes place when growth is associated with income distribution, endogenous technological development and autonomy in relation to foreign capital and balance-of-payments flows, and even pointed out the need to overcome cultural and consumption patterns that were incompatible with the social inclusion of great masses of the population (Furtado,¹⁰ 1961).

tional Congress, during the full force of the Collor government, which, in turn and contradictorily, represented the victory of the neoliberal paradigm in the national strategy that has been permeating successive economic policies implemented since then.

Thus, in general terms, the health sector has developed out of step with liberalizing reforms, and has been seated within a vigorous social and political movement (the health movement or "party"), thereby engendering one of the most important forms of federative alliances and participation by civil society in national public policies (Cordeiro,⁷ 2001). In conceptual terms, the perception promoted by the health movement and in academia that health could not be treated sectorally (i.e. just as the fighting of diseases) was also important. Health was seen as related to general living conditions and implying the need for integrated multisectoral treatment, involving the question of health promotion (Buss,³ 2000) and, even more comprehensively, the national development pattern itself.

However, this integral view of health and its relationship with development has never dealt with its relationship with the strategies for industrial activity and for generating and disseminating health innovations, except within the tradition of research and the actions relating to technological evaluation for health. This is from a perspective principally relating to the regulation of the process of incorporating technologies into the health system, by means of a variety of lines of economic analysis of cost-benefit type.

Although strategic for the rationale of the system and for meeting health needs, this traditional way of dealing with the question of technology and innovation in the health field does not cover health in one other dimension. That is, health as an important front for innovation, income and employment generation and development, within a context of excluding and asymmetrical globalization (Lastres et al,¹⁷ 2005), in which economic dependence appears in a variety of forms, including, importantly, in the production of health-related goods and services.

The recent literature on development shows that the health field constitutes an important front for activities relating to science and technology, innovation, employment and income generation and, therefore, economic development. It is invariably one of the leading fields in national innovation systems, together with the military-industrial complex (Rosemberg et al,²⁰ 1995). According to the internal logic of capital-

ist competition (on an oligopolistic basis), company production within health also constitutes a source of intense generation of asymmetry, private appropriability of the fruits of technical progress and exclusion of people, regions and countries. Dependence and underdevelopment therefore also leave a significant structural mark on the health field, thereby restricting the evolution of healthcare and the construction of a universal, equitable and comprehensive system.* This makes it a challenge for less developed countries to bring in new technological paradigms, by means of forming an endogenous basis for health innovation and setting up competitive industry.

In short, the development pattern in the knowledge society cannot be dealt with on one side and the health system on the other, as if they were two independent dimensions. Separate treatment solely following defensive logic aimed at protecting the interests of industry, and the pressure from industry for absorbing new products and processes in the system, has meant that social forces, which historically have struggled for a wide-ranging and inclusive health system in Brazil, have ended up acting in the same direction as the neoliberal model. In turn, this model has sought to veto the endogenous processes of development, industrialization and overcoming dependence in less developed countries, by means of denying active and selective policies for the production structure in the sectors with greatest dynamism, such as health.

Thus, a double and contradictory attack on health innovation linked to development of the productive forces of the industrial sectors can be seen. On the one hand, it comes from a neoliberal line that simply discards the role of the State in industrial policy. On the other hand, it comes from a line associated with the field of critical thought among health policymakers that has always defended the expansion of the role of the State for forming a fair and universal system, but which has hardly ever taken health to be a vital field for national development on a company basis.

The question that is posed is complex, notably in the political field, but it is absolutely necessary to face up to it. Added to the usual agenda for research and health policy, there is the need for a new agenda focusing on drawing up policies for developing production activities. It should involve science, technology and, fundamentally, industrial and innovation policies for the different sectors, including for the field of services.

To this end, it becomes necessary to incorporate the topics connected with the development of economic

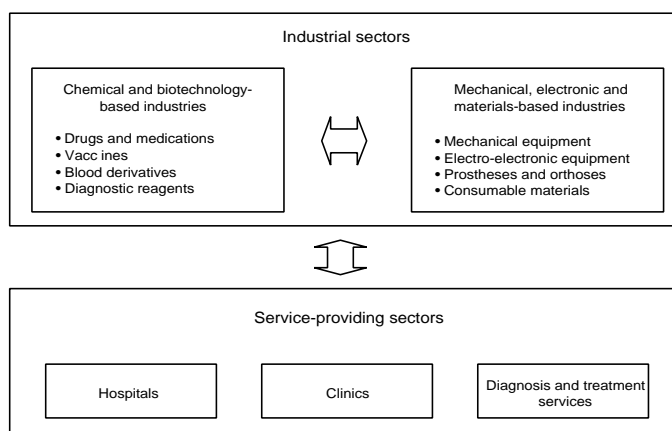
*The difficulty in accessing new medications against AIDS is illustrative: this results from asymmetry in innovation potential and from patent-based appropriability regimes.

activities and industrial policy. However, this requires updating to adapt to a society in which the competitive basis is increasingly founded on knowledge and innovation (Cassiolato,⁶ 1999). Among these topics of analytical and normative nature, the following can be highlighted:

1. Study of industrial and innovation dynamics in the health industries, and how they connect with the healthcare system;
2. analysis of how to form an endogenous knowledge base in strategic sections of the health production system, following the premise that learning takes place on the basis of local, tacit and systemic capacitation, and is thus distinguished from the simple process of access to and acquisition of information;
3. formation of technical-productive networks involving a wide combination of production, research, funding and regulation organizations;
4. analysis and promotion of locally interlinked activities that form local productive arrangements within health;
5. continual prospecting for technologies that lead to the future;
6. studies for setting up non-traditional regulatory systems in the health field, such as those connected with intellectual property;
7. efforts towards introducing institutional changes in the production sector and in support institutions, particularly within the sphere of funding and in the research and technology organizations, thus involving a major transformation of the State itself, through the flexibility, new requirements and challenges of the third industrial revolution.

THE HEALTH-INDUSTRIAL COMPLEX: IN SEARCH OF AN INTEGRATED VISION

It is within this historical, economic and political context that the concept of the health-industrial complex has been developed (Gadelha,^{*,12} 2002, 2003). It has been sought to capture the health and economic dimensions simultaneously, within a perspective of thinking out the interactions between health and development, insofar as possible. This relationship goes beyond the concept of a system for adequate care. It ultimately relates to its place within a development strategy that simultaneously emphasizes dynamism and attenuation of the economic dependence in strategic sectors, within the present historical context, as



Source: Gadelha¹² (2003)

Figure 1 - Health-industrial complex: general characterization.

exemplified by electronic equipment, biotechnology and new materials. The big challenge is to build a model that allows restructuring of the national productive base towards economic dynamism and overcoming the backwardness in critical areas, in order to attenuate the inequality and social exclusion, as seen in all segments that form part of the health complex.

The notion of the health-industrial complex is simultaneously a cognitive, analytical and political approach. As Figure 1 shows, it forms "... a selected set of productive activities that maintain intersectoral relationships of buying and selling goods and services (such that they are picked up, for example, in the input-product matrices in the national accounts) and/or knowledge and technologies..." (Gadelha,¹² 2003 p. 523). These productive activities are within a very particular political and institutional context that involves the provision of services and the economic space to which all the health production flows. Thus, this activity is completely within the complex, both because it is increasingly organized on a company basis** and because it configures the health market as a political and institutional construction. This confers an organic nature on the complex, thereby allowing connections within the same context, between the production of services and goods that are as different as medications, equipment and diverse materials or products for diagnostic purposes.

The perspective is systemic and therefore related to the concept of the national innovation system within health (Rosemberg et al,²⁰ 1995). The concept of the health-industrial complex gives emphasis to productive activity as a critical element of this system, con-

*Gadelha CAG. Health complex. Unpublished data forming part of the research report on the Project for Studying Competitiveness using Integrated Chains, from the Industrial Economy and Technology Group of the Institute of Economics, coordinated by Coutinho LG, Laplane, MF, Kupfer D, Farina E. (Accords between FECAMP/MDIC/MCT/FINEP). Campinas: 2002.

**Here, the Marxist perspective would have to be returned to, in which the development of the productive capitalist forces and their expansion across the world would tend to disseminate industrial logic to all sectors of activity, including agriculture and services.

sidering that the core of the country's economic vulnerability in the health field is the fragility of the Brazilian industrial and company system. The country's innovation capacity is determined by the potential for transforming knowledge into new goods and services, or ones that have been improved in their quality or production process. In Brazil, this capacity is detached from the national scientific and technological base and from the needs of the health system, especially because of the low capacitation among companies for carrying out research and development activities (Gadelha,¹³ 2005). From this perspective, it can be stated that the complex constitutes an effort towards restoring the structuralist perspective, thus emphasizing the questions of development, dependence, industrial policy and innovation in the health field, within the historical context of asymmetrical globalization and the technological-industrial revolution that is in progress.

Taking this theoretical reference to the health-industrial complex in the context of the national development pattern, and focusing on its potential for innovation and the profile of activities that are carried out in this country, this now has to be situated with respect to the historical question of dependence and development.

The most recent data on the company capacity for innovation were gathered by the *Pesquisa Industrial de Inovação Tecnológica 2003* (PINTEC - Industrial Survey on Technological Innovation), (IBGE,¹⁵ 2005). This recent and highly relevant initiative demonstrates the low intensity of innovation within health industry companies, with specific data for the pharmaceutical industry ("manufacture of pharmaceutical products") and the medical-hospital equipment industry, although in this latter category other products unrelated to health (precision and optical equipment, industrial automation, chronometers and clocks) were included.* The specific data are revealing, even considering that, in relation to the mean for such industrial companies, these activities are well positioned. In general terms, the innovation rate seems to be high: 50.4% of the pharmaceutical companies and 45.4% of the equipment companies had introduced some product or process innovation between 2001 and 2003. Nevertheless, the more scattered data show that these activities were largely concentrated on the acquisition of equipment for improving processes and on new products and processes for companies, but not for the national market. Only 0.53% of net income was spent on internal research and devel-

opment activities in the "innovative" pharmaceutical companies, and 1.22% in the equipment companies that introduced some innovation into the market. Other data, for which the detailing is outside of the scope of the present article, also show the low importance of relationships with science and technology institutions for carrying out research and development activities, the low level of cooperation and alliances for the development of innovations, and the low impact of government programs. Only 16% of innovative companies received any support from the State in these two sectors, and the economic market risk ("market conditions" and "economic risks") were the most critical factor that limited or even blocked the more intense innovation strategies.

Behind these indicators, there is a need to "open up" the health complex through its segments, thereby seeking to capture the profile of productive activities carried out in Brazil. For this, the best indicators are those related to the trade balance, since they mirror the segments in which this country is capacitated or dependent on imports. Since the notion of the industrial complex fundamentally relates to the productive base existing in this country, this indicator is much more relevant than others relating to scientific publications and even to patents. In Brazil, these last two indicators reflect much more the capacitation in applied research and not necessarily the potential for innovation, which should always be correlated with the company base.

SITUATION OF DEPENDENCE ON FOREIGN TRADE

On the basis of this theoretical reference, the situation of dependence was characterized by means of gathering and systematizing the foreign trade data for the health complex as a whole and for each of its segments. The information utilized was the data available in the databases of the *Secretaria de Comércio Exterior do Ministério de Desenvolvimento, Indústria e Comércio Exterior* (SECEX, Alice network - Secretariat of Foreign Trade of the Ministry of Development, Industry and Foreign Trade).

Along general lines, the following methodological procedures were adopted, in accordance with Gadelha** (2002).

- *Primary database.* This database was concentrated on the period from 1997 to 2001, since in 1997 there was a significant change in the classification of commercialized products resulting from the

*These categories were included in 'equipment', thus serving only as an approximation.

**Gadelha CAG. Health complex. Unpublished data forming part of the research report on the Project for Studying Competitiveness using Integrated Chains, from the Industrial Economy and Technology Group of the Institute of Economics, coordinated by Coutinho LG, Laplane, MF, Kupfer D, Farina E. (Accords between FECAMP/MDIC/MCT/FINEP). Campinas; 2002.

replacement of the *Nomenclatura Brasileira de Mercadorias* (NBM - Brazilian Nomenclature for Merchandise) by the *Nomenclatura Comum do Mercosul* (NCM - Common Nomenclature for Mercosul).^{*} To capture what occurred during the 1990s, the basis taken was the sectoral studies available, which have been shown to be adequate and sufficient for the intended objectives (Negri & Giovanni,¹⁸ 2001). There were difficulties in the NCM database regarding identification of the industrial segments for health, consisting of identification problems for products when they were within broader categories undefined categories such as "other items", or when the use of the product is not specific to the health field. Despite these difficulties, it was possible to work with this more homogenous primary database without losing sight of the dynamics of these segments during the initial period of commercial liberalization.

- *Pharmaceutical segment.* The usual procedure of separating medications (formulated products) and drugs (active agents) was adopted. In the medications industry, the items shown in Chapter 30 of the NCM (the chapter where pharmaceutical products are concentrated) were utilized. Medications presented in the form of doses or packs for separate sale, extracts, human or animal substances prepared for therapeutic or prophylactic purposes and medications that are not presented as doses were included. Human blood, animal blood, antiserums, other blood fractions, immunological products, vaccines, toxins and other products included in the specific analysis of the vaccine, reagent, blood derivative, serum and toxin segments were not taken into consideration because of the specific purposes of this study.
- *Drugs.* The breakdown of subitems in the chapter on organic chemical products (Chapter 29 of the NCM). This breakdown considers the drugs and the intermediate items utilized in their production. Because these intermediate items and the drugs can be used in other industries, and also because some codes may involve non-pharmaceutical substances, it is possible to obtain some overestimated values. These products can be used in the food and cosmetics industries, clinical analyses and even in the plastics industry (additives for rubber and plastics, and coloring agents). However, the risk of underestimating some values is also present because the inorganic chemical products utilized in the pharmaceutical industry and some organic products remained outside of the analysis. In any event, despite these problems that are inherent to

the classification standard adopted by the NCM, the aggregated values form a good indicator for the overall performance of the segment.

- *Equipment and materials.* According to the methodology of Furtado & Souza⁹ (2001), complemented with the breakdown utilized by the sectoral association (*Associação Brasileira da Indústria Médico-Odontológica* - ABIMO - Brazilian Association for the Medical-Dental Industry), the subitems of the NCM are classified in four groups, namely: Group 1: medical-hospital instruments; Group 2: medical, dental and laboratory electrical apparatus and equipment; Group 3: prostheses and orthoses; Group 4: consumable materials.

Support diagnostic/laboratory reagents and reagents for determining blood groups and factors were excluded from the group of consumable materials (Group 4), since these two items were included in the diagnostic reagents segment. Despite the inclusions and exclusions made, which were because of the specific needs of the study and the analytical approach adopted, the values are very close to and comparable with those presented in the literature and by the business association.

- *Blood derivatives.* Blood fractions and modified immunological products, among others related to blood and its derivatives, were aggregated.
- *Reagents for diagnosing.* The assessment over the recent period unfortunately did not allow the level of breakdown recommended for an evaluation of the competitiveness of different products, since it incorporates distinctly different technological bases. Nevertheless, the methodological approach sought to make a selection of the products, item by item, in the different chapters and positions of the NCM, including reagents for diagnosing microbe origins, reagents for determining blood factors and groups, culturing media and support diagnosis reagents.
- *Vaccines.* The basis taken for the analysis was vaccines for human medicine, which unfortunately is not broken down in the same way as in the National Immunization Program (NIP). However, it incorporates both finished goods and imported supplies, and attendance for the public and private markets.
- *Serums and toxins.* In this case, the approach was imperfect because of the diversity of use. Anti-phidic serum, anti-tetanus serum, polyvalent antiserums, toxins, antitoxins of microbial origin and other products were included, which allows an overview of the evolution of this sector.

^{*}It was only in 1997 that the conversion from NBM to NCM was fully effected, thereby providing the new basis for classifying foreign trade statistics in Brazil, following the Harmonized System for Designation and Coding of Merchandise, which forms the internationally accepted standard.

Table 1 - Evolution of the trade balance in the health complex. Brazil, 1997-2004.

Year	Exports	Imports	Trade balance
1997	612,787,671	3,869,714,328	-3,256,926,657
1998	695,854,820	4,475,195,426	-3,779,340,606
1999	669,882,828	4,402,954,388	-3,733,071,560
2000	602,594,655	4,036,686,657	-3,434,092,002
2001	590,239,217	4,289,482,785	-3,699,243,568
2002	586,202,367	3,307,215,557	-2,721,013,190
2003	668,661,566	3,113,349,015	-2,444,687,449
2004	822,166,127	3,694,107,603	-2,871,941,476

Source: Compiled by the author from data gathered from SECEX/MDIC – Alice network.

Note: Figures have been monetarily corrected to 2004 using the United States Consumer Price Index and are in United States dollars, free on board

On the basis of this methodology for dealing with the trade balance within health, the information was gathered in dollars (FOB - Free On Board) for the complex and for its segments, for the period from 1997 to 2004. The figures were monetarily corrected to the year 2004 on the basis of the United States Consumer Price Index (CPI), in order to have real values as backing for the analysis.

In general terms, analyzing the period as a whole, as shown in Table 1, it appears that there was an improvement in the external conditions of the complex with regard to the trade balance. The year 1998 presented the worst performance regarding the trade deficit, reaching a real value of US\$3.8 billion, and also presented the greatest figure for imports effected by the industrial complex (US\$4.48 billion). In 2003, these values reached a lower level than at the end of the 1990s, such that the deficit declined to less than US\$2.5 billion for the first time in the eight years analyzed, because of reductions in imports.

Nonetheless, this picture of the trade balance for the complex is not very encouraging when factors of a macroeconomic nature are taken into account and a more broken down analysis by products and groups of countries is made. From a macroeconomic point of view, there was a clear impact on the performance of the sector coming from the evolution of the exchange rate, which was a stronger impact than in the evaluation made in an earlier study (Gadelha,¹² 2003). Since there is a certain delayed reaction between the evolution of the exchange rate and its result in imports and exports, it can be inferred that the high level of imports up to 2001 partly resulted from the excessive valuation of the exchange rate up to 1999, which made imports within the complex competitive (i.e. cheaper) in relation to the local offer. In the years 2002 and 2003, the deficit reduced markedly, to reach its lowest value in 2003, as the resultant effect (with a time delay) from the large exchange rate devaluation that occurred in 1999. In 2004, imports grew again, by almost 20%, and this may have been related to the increase in the exchange rate associated with the macroeconomic

adjustment carried out on the basis of high interest rates. This picture was very attractive for the entry of capital, thereby leading to upward valuation of the exchange rate starting at the beginning of 2003.

Here, a first source of economic vulnerability in the health-industrial complex already appears: its high dependence on external conditions and macroeconomic policy. Any movement in the exchange rate may lead to an explosion in health expenditure or on imports. Under a certain economic situation, exchange rate devaluation may, at least initially, before generating its effects of reduction of external acquisitions and increase of exports, lead to pressure on health expenditure (imports becoming more expensive in Brazilian currency) that is incompatible with budget availability.* Under another macroeconomic situation, upward valuation of the exchange rate, as seen today, may lead to an explosion of imports and increased demand for foreign exchange to cover health needs.

In both situations, what is clear is that the economic model for external and internal adjustments interferes directly in health actions, thereby limiting their degree of freedom and therefore precisely the social policies relating to access and inclusion. The relationship between development pattern, industrial policy and health conditions is evident, thus showing the risk of excessive external dependence with regard to making health policies and their objectives viable.

However, there are also structural questions that can be shown by the data analysis, and these are even more relevant from a long-term development perspective. Table 2 shows, in terms of product lines, that the dependence on imports is concentrated on the products involving higher technology and knowledge. Analysis of the origins and destinations by economic blocks confirms this indication that the dependence is concentrated in the most dynamic segments. Brazilian exports relating to health are mostly destined for less developed blocks, such that Mercosul and the “Rest of the World” accounted for 61% of external sales in 2004. On the other hand, 73% of the imports came

*A very preliminary estimate shows that imports have an impact on around 25% of the health budget. (Gadelha CAG. *Op. cit.*)

from the more developed countries of the European Union and the North American Free Trade Agreement area (NAFTA, United States and Canada, especially).

There is therefore clear asymmetry in Brazilian international relations, thus demonstrating the technological dependence relating to more intensively knowledge-based products coming from the more developed countries. For such cases, there is little sensitivity in external purchases in relation to the price and exchange rate. To accomplish health actions, Brazil has ended up having to import high-technology products from the more developed countries at any cost. This is why, following the upward leap in the trade deficit at the end of the 1980s, a time when it is estimated on the basis of the existing literature that it was US\$700 million (Negri & Giovanni,¹⁸ 2001), the level of imports into this country has never been less than US\$3 billion. On the other hand, in the segments

and markets that are sensitive to price and therefore to the exchange rate, local competitiveness is connected with products and processes of lower technological level, as also shown in the data from IBGE¹⁵ (PINTEC 2003) that were analyzed earlier.

Figures 2 to 8 illustrate the evolution of the segments of the complex over the analysis period. In the pharmaceutical industry (Figures 2 and 3), in addition to the weak performance of exports, both of drugs and of medications, what is seen first is the degree of dependence that exists. Putting the two segments together, pharmaceutical care has depended very heavily and riskily on imports, and the summed value has never been less than US\$2 billion in real terms. Even when the drug segment has appeared to be evolving favorably through reducing imports, this movement has at least partially been compensated by increases in the imports of medications. This indicates a situa-

Table 2 - Trade balance for the health complex according to economic block. Brazil, 2004.

Segments	NAFTA			European Union		
	Exports	Imports	Balance	Exports	Imports	Balance
Equip./ Materials	76,372,236	313,602,771	-237,230,535	37,772,286	267,258,249	-229,485,963
Non-electronic apparatus	24,158	776,057	-751,899	30,916	741,929	-711,013
Electronic apparatus	15,688,525	183,234,508	-167,545,983	18,761,552	157,009,740	-138,248,188
Prostheses/ orthoses	1,895,217	27,771,629	-25,876,412	3,398,650	37,750,432	-34,351,782
Consumable material	58,764,336	101,820,577	-43,056,241	15,581,168	71,756,148	-56,174,980
Vaccines	1,199	5,953,270	-5,952,270	899,185	135,296,534	-134,397,349
Diagnostic reagents	1,242,700	108,509,801	-107,267,101	1,996,202	88,834,671	-86,838,469
Blood derivatives	37,402	65,802,704	-65,765,302	2,496,369	139,928,033	-137,431,664
Medications	43,429,789	311,569,827	-268,140,038	18,263,678	420,236,431	-401,972,753
Drugs	48,491,798	279,151,186	-230,659,388	84,851,575	441,701,522	-356,849,947
Other products*	1,841	12,559,816	-12,597,975	2,261,866	29,938,619	-27,676,753
Total	169,576,965	1,097,149,375	-927,612,609	148,541,161	1,523,194,059	-1,374,652,898

Segments	Mercosul			Rest of the World		
	Exports	Imports	Balance	Exports	Imports	Balance
Equip./ Materials	31,289,573	21,730,647	9,558,926	143,927,638	182,740,712	-38,813,074
Non-electronic apparatus	16,949	1,018	15,931	94,070	4,969,580	-4,875,510
Electronic apparatus	6,436,789	1,695,762	4,741,027	89,762,171	98,546,280	-8,784,109
Prostheses/ orthoses	1,207,362	7,373	1,199,989	8,785,783	9,759,282	-973,499
Consumable material	23,628,473	20,026,494	3,601,979	45,285,614	69,465,570	-24,179,956
Vaccines	521,950	0	521,950	16,291,344	2,588,973	13,702,371
Diagnostic reagents	492,470	6,833,068	-6,340,598	623,650	10,153,832	-9,530,182
Blood derivatives	615,718	7,434,775	-6,819,057	1,293,837	56,900,366	-55,606,529
Medications	64,631,339	47,365,933	17,265,406	107,037,130	363,149,943	-256,112,813
Drugs	12,967,354	4,193,547	8,773,807	123,924,556	364,390,100	-240,465,544
Other products*	295,390	5,301,800	-5,006,410	136,052	940,473	-804,421
Total	110,813,794	92,859,770	17,954,024	393,234,207	980,864,399	-587,630,192

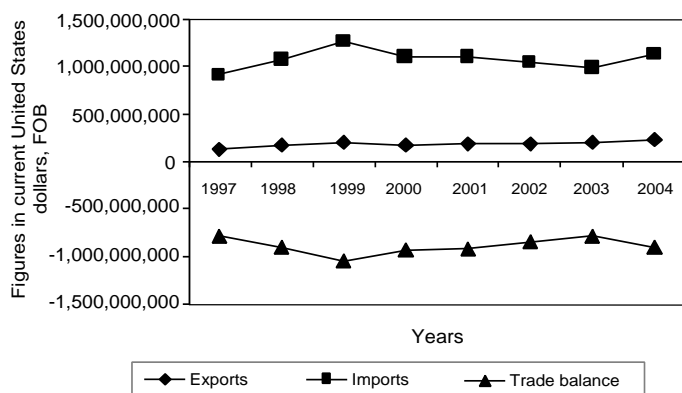
Segments	Total		Balance
	Exports	Imports	
Equip./ Materials	289,361,733	785,332,379	-495,970,646
Non-electronic apparatus	166,093	6,488,584	-6,322,491
Electronic apparatus	130,649,037	440,486,290	-309,837,253
Prostheses/ orthoses	15,287,012	75,288,716	-60,001,704
Consumable material	143,259,591	263,068,789	-119,809,198
Vaccines	17,713,678	143,838,777	-126,125,099
Diagnostic reagents	4,355,022	214,331,372	-209,976,350
Blood derivatives	4,443,326	270,065,878	-265,622,552
Medications	233,361,936	1,142,322,134	-908,960,198
Drugs	270,235,283	1,089,436,355	-819,201,072
Other products*	2,695,149	48,780,708	-46,085,559
Total	822,166,127	3,694,107,603	-2,871,941,476

NAFTA: North American Free Trade Agreement

Source: Compiled by the author from data gathered from SECEX/MDIC - Alice network.

Note: Figures have been monetarily corrected to 2004 using the United States Consumer Price Index and are in United States dollars, free on board.

*Serums and toxins



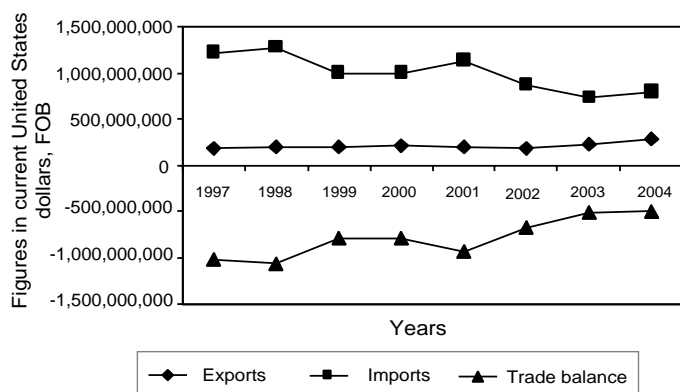
USD FOB: Dólares americanos, *Free on Board*

Figure 2 - Evolution of the foreign trade in medications. Brazil, 1997-2004.

tion that is even more unfavorable, in which instead of imports being concentrated on the active agents (as occurred during the 1980s), Brazil has also started to depend on finished products that were formulated abroad.

In the field of equipment and materials (Figure 4), which was the segment that most reduced its imports over the course of the period, the dependence is concentrated on electronic equipment, which certainly constitutes the goods of greatest complexity and innovation potential. There is a significant industry in this country that has produced good responses in relation to local demand, but in the context of the microelectronic revolution and the exchange rate conditions, its competitive capacity for the future clearly may be under threat.

Within the field of technologies based on biotechnology (blood derivatives, diverse products for diag-

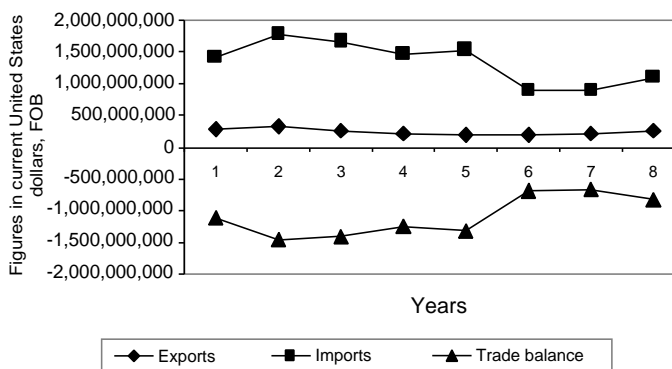


USD FOB: Dólares americanos, *Free on Board*

Figure 4 - Evolution of the foreign trade in equipment and materials. Brazil, 1997-2004.

nostic purposes, vaccines, serums and toxins), all companies are increasing their imports, and in some cases very significantly. In the case of blood derivatives (Figure 5), the situation is explosive, with imports already reaching almost US\$300 million, thus tripling in real terms over the analysis period. Unless urgent action is implemented regarding industrial development and production,* Brazil may come to have serious difficulties in its successful policy for access to these products.

In the case of reagents for diagnostic purposes (Figure 6), even though the data are very concentrated, the deficit remained chronic and there was a very large increase in the last



USD FOB: Dólares americanos, *Free on Board*

Figure 3 - Evolution of the trade balance in drugs. Brazil, 1997-2004.

year of the analysis period. This situation reflects a loss of opportunity to enter a technological segment that is promising in terms of its capacity for interaction between the science and technology system and the industry, considering that the technological leap between laboratory activities and industrial activities is relatively small in relation to other sectors.

Finally, in the fields of vaccines (Figure 7) and serums and toxins (Figure 8), there was a clear worsening in the commercial situation, with large growth in imports and trade deficit. This process may partly be the result from strategies adopted by the main national producers (Bio-Manguinhos/Fiocruz and Butantan) to establish technology transfer agreements with the major world leaders of the industry, through import commitments during the period of absorbing the technology. However, there is the risk inherent to this type of agree-

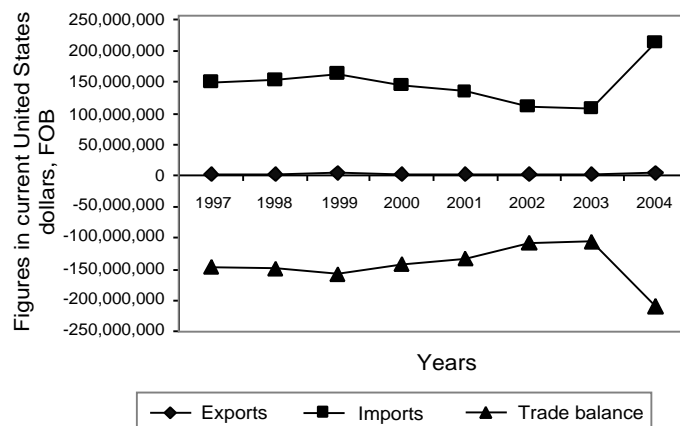
*The government's response in this case has been the creation of a national factory (Hemobrás in Pernambuco).

ment that the technological frontier may shift by the end of this period, thereby bringing back the question of dependence.

In summary, the analysis of the trade balance of the health-industrial complex reflects how the national pattern of development has induced precarious specialization in the production base and international positioning that is strongly asymmetrical, thereby making the health system vulnerable and dependent.

FINAL CONSIDERATIONS AND PERSPECTIVES

The results allow it to be demonstrated that there is a need to think of health in the general context of Brazil's strategy for development and depend-

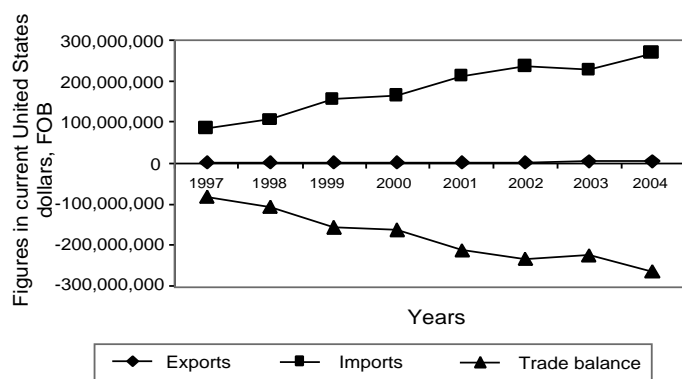


USD FOB: Dólares americanos, *Free on Board*

Figure 6 - Evolution of the foreign trade in diagnostic reagents. Brazil, 1997-2004.

ence reduction, which should be a natural consequence of a broad-based conception of health (and not a sectoral approach). The concept of the health-industrial complex has been shown to useful within this context, in that it precisely relates the need to join health care logic to economic development logic within the health field. Study of this, with emphasis on the questions of innovation and this country's specialization pattern within the world context, has demonstrated the analytical and normative disregard for the economic dynamics of the sector. This brings the consequence of extreme vulnerability for the national health policies, and may imply risks to the objectives of universality, equity and comprehensiveness.

As a political consequence, this analysis

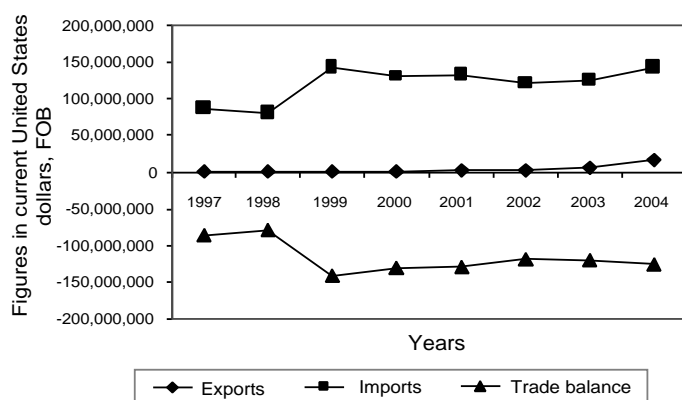


USD FOB: Dólares americanos, *Free on Board*

Figure 5 - Evolution of the foreign trade in blood derivatives. Brazil, 1997-2004.

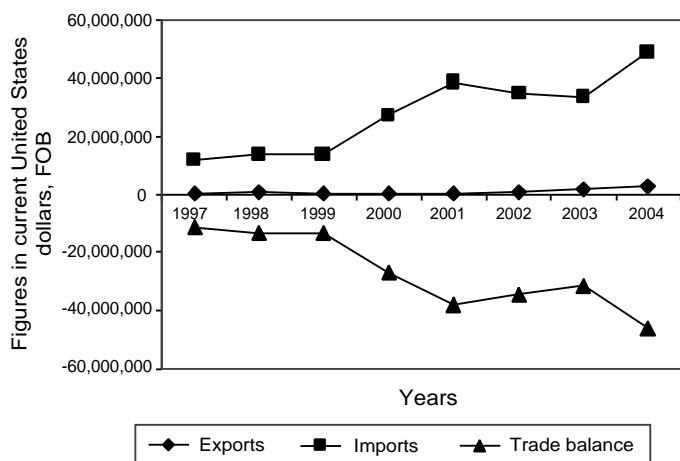
places the question of joining together industrial policy and health policy at the center of a strategy for developing the complex, with the backdrop of the debating of and prospects for a new development model for the country. This model should simultaneously give emphasis to the dynamics of innovation and development of the industry and to social inclusion, thereby again taking the structuralist perspective put forward following Furtado¹⁰ (1961), within a contemporaneous rereading.

Recently, some important steps have been taken, albeit insufficient. Within the field of industrial policy, the Industrial, Technological and Foreign Trade Policy (PITCE) that was launched in November 2004 incorporated key segments of the health-industrial complex. Taking a broad view of the pharmaceutical industry, including medications, drugs, blood derivatives and vaccines, this segment was selected as one of the four strategic options relating to fields of high dynamism and intensity of knowl-



USD FOB: Dólares americanos, *Free on Board*

Figure 7 - Evolution of the foreign trade in vaccines. Brazil, 1997-2004.



USD FOB: Dólares americanos, *Free on Board*

Figure 8 - Evolution of the foreign trade in serums and toxins. Brazil, 1997-2004.

edge. This policy then implied the mobilization of significant funding instruments (such as the Development Support Program for the Pharmaceutical Productive Chain, Profarma, from the National Bank for Economic and Social Development, BNDES) and other initiatives related to public investments in medications and blood derivatives. In addition to this, one of the other strategic options is capital goods, with linkage to prioritize medical equipment within the scope of this policy, by means of interventions by the recently created *Agência Brasileira de Desenvolvimento Industrial* (ABDI - Brazilian Agency for Industrial Development).

Moreover, some generic measures for improving the institutional environment have been facilitating and adding flexibility to the relationships between research institutions and the private productive sector (Law 10,973 of December 2, 2004, the "Innovation Law"). The conceding of fiscal incentives to companies, including investments in technology (Law 1,196 of November 21, 2005, formerly known as the Provisional Measure for tax concessions), is also acting towards creating an environment that is favorable for innovation and investments in the health industry.

Within the field of health policies, it can be stated that the question of the health-industrial complex has started to form part of large numbers of policy documents (in the form of the "Health-Productive Complex"). Directives have been established, including in the current National Health Plan, and also a set

of sectoral policies, such as for generic, strategic, exceptional and AIDS medications. Furthermore, within the Ministry of Health's own structure, the National Secretariat for Science, Technology and Strategic Supplies has been created, and thus there is now a specific *locus* focusing on scientific, technological and industrial development within health. In this way, the industrial question is no longer being dealt with independently from the question of knowledge generation.

In summary, the present context can be seen to be much more favorable than it was in the past. Nonetheless, there is a long way to go towards a cognitive and political break with the antagonistic visions that still separate health needs and the country's needs for industrial development into two hermetically sealed camps. Failure to utilize the purchasing power associated with health policies for technological and industrial development in real practice is a prominent example of how the dichotomy between the two types of logic still persists. In this respect, there is an essential need to overcome this dichotomy. A country that aims to reach a condition of development and independence requires strong and innovative industries and an inclusive and egalitarian health system, simultaneously. This is perhaps one of the most important strategic challenges within the Brazilian Health System.

ACKNOWLEDGEMENTS

To Carmen N. P. Romero Casas of the Escola Nacional de Saúde Pública - Fiocruz, for their support in gathering and systematizing the foreign trade data and organizing the information; to Militze Bortoloto Cajazeira, of the Department of Planning and Development (Depla) of the Secretariat of Foreign Trade (Secex) of the Ministry of Development, Industry and Foreign Trade (MDIC), for guidance in obtaining data from the Federal Government (Alice network); to Jorge Luís, of the Foreign Trade Group of the Secretariat of Foreign Trade (Secex) in Rio de Janeiro, for sending the codes for the items that form part of the Mercosul Common Nomenclature, with updated changes for all items within the health-industrial complex; and to Henrique Chaves for support in the final organizing of the figures and tables.

REFERENCES

1. BIRD. The East Asian miracle: economic growth and public policy. New York: Oxford University Press; 1993.
2. BIRD. World Development Report: the state in a changing world. New York: Oxford University Press; 1997.
3. Buss PM. Promoção da saúde e qualidade de vida, 2000. *Ciênc Saúde Coletiva*. 2000;5:163-77.
4. Cardoso FH, Faletto E. Dependência e desenvolvimento na América Latina: um ensaio de interpretação sociológica. 5ª ed. Rio de Janeiro: Zahar; 1979.
5. Cardoso de Mello JM. O capitalismo tardio. Rio de Janeiro: Brasiliense; 1982.
6. Cassiolato JE. A economia do conhecimento e as novas políticas industriais e tecnológicas. In: Lastres HMM, Albagli S. Informação e globalização na era do conhecimento. Rio de Janeiro: Campus; 1999. p. 164-90.
7. Cordeiro H. Descentralização, universalidade e equidade nas reformas da saúde, 2001. *Ciênc Saúde Coletiva*. 2001;6:319-28.
8. Coutinho, LG. Regimes macroeconômicos e estratégias de negócios: uma política industrial alternativa para o Brasil no século XXI. In: Lastres HMM, Cassiolato JE, Arroio A, organizadores. Conhecimento, sistemas de inovação e desenvolvimento. Rio de Janeiro: Contraponto; 2005. p. 429-48.
9. Furtado AT, Souza JH. Evolução do setor de insumos e equipamentos médico-hospitalares, laboratoriais e odontológicos no Brasil: a década de 1990. In: Negri B, Giovanni G. Brasil: radiografia da saúde. Campinas: Unicamp; 2001. p. 63-91.
10. Furtado C. Desenvolvimento e subdesenvolvimento. Rio de Janeiro: Fundo de Cultura; 1961.
11. Gadelha CAG. Política industrial: uma visão Neo-Schumpeteriana sistêmica e estrutural. *Rev Econ Pol*. 2001;21(4):149-71.
12. Gadelha CAG. O complexo industrial da saúde e a necessidade de um enfoque dinâmico na economia da saúde, 2003. *Ciênc Saúde Coletiva*. 2003;2:521-35.
13. Gadelha CAG. O complexo industrial da saúde: desafios para uma política de inovação e desenvolvimento. In: Buss PM, Temporão JG, Carvalheiro JR. Vacinas, soros e imunizações no Brasil. Rio de Janeiro: Fiocruz; 2005.
14. Goldenstein L. Repensando a dependência. Rio de Janeiro/ São Paulo: Paz & Terra; 1994.
15. Instituto Brasileiro de Geografia e Estatística - IBGE. Pesquisa Industrial de Inovação Tecnológica. Rio de Janeiro; 2005.
16. Kim L, Nelson RR, organizadores. Tecnologia, aprendizado e inovação: as experiências das economias de industrialização recente. Campinas: Editora da Unicamp; 2005.
17. Lastres HMM, Cassiolato JE, Arroio A. Sistemas de inovação e desenvolvimento: mitos e realidade da economia do conhecimento global. In: Lastres HMM, Cassiolato JE, Arroio A, organizadores. Conhecimento, sistemas de inovação e desenvolvimento. Rio de Janeiro: Contraponto; 2005. p 17-50.
18. Negri B, Giovanni G, organizadores. Brasil: radiografia da saúde. Campinas: Unicamp; 2001.
19. Prebisch, R. O desenvolvimento econômico da América Latina e seus principais problemas, 1949. *Rev Bras Economia*. 1949;3(3):47-112.
20. Rosemberg N, Gelijns AC, Dawkins H. Sources of medical technology: universities and industry. Washington (DC): National Academy Press; 1995.
21. Schumpeter J. Capitalismo, socialismo e democracia. Rio de Janeiro: Zahar; 1985.
22. Tavares MC. Auge e declínio do processo de substituição de importações como modelo de desenvolvimento na América Latina. In: Tavares MC. Da substituição de importações ao capitalismo financeiro. Rio de Janeiro: Zahar; 1979. p. 27-124.