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Effectiveness evaluation of public policy incentive R&D in technological innovation in Brazil: a focus on law of the well

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ABSTRACT

The present paper will address pharmaceutical industries that carry out research, development and innovation (RD&I) Brazil and their consequent adherence to tax incentives based on 'Law of the Well' (Brazilian, Law No. 11,196 / 2005). Our hypothesis evaluates if public policies of incentives for transformation of technological knowledge could encourage firms to invest in RD&I. Our research was based on Government Annual Reports that reported the use of tax incentives during a period between 2006 and 2012; and legal framework destined for supporting research, both provided by Ministry of Science, Technology and Innovation of Brazil. During the studied period, an increase of 800% of the participating companies of the 'Law of the Well' was observed, demonstrating a need to invest in R&D. The sum of the expenditure of defrayal for the computation of the incentives the companies that operated in real income regime and have chosen to take advantage of tax incentives 'Law of the Well' amounted to R $ 40.52 billion. Well although one of the purposes of the 'Law of the Well' is to subsidize the establishment of researchers in companies, the total value of capital expenditure does not exceed 4% of the total amount invested in R & D activities. Similarly it is observed that the percentage of encouraging the development and patenting did not exceed 1%. In spite of Good Law be used as institutional apparatus for improvement of the efficiency and competitivity of the companies for the global market, recent indicators of spending on R&D in Brazil demonstrate stagnation of investments in various sectors.

Keywords: Law of the Well. Public policy. Pharmaceutical complex. Technological innovation.

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INTRODUCTION

Currently, in order to increase the global competitiveness of a country is required a sustainable development and independence across diverse economic sectors (Prebisch, 1949; Tavares, 1979). Therefore, the intense use of its capacity scientific, technological and innovation, as benchmarks instruments for economic development is primordial. Of note, countries become more competitive due to the association of a consolidated industrial park with an endogenous base of knowledge, learning and innovation (Gadelha, 2006).

Thus, considering the technological innovation and capacity of industries to absorb skills and knowledge, the pharmaceutical industries must assess and identify which technologies are most significant to improve their performance and competitivity (Malerba, 2002; Edquist, 2001). In this sense, the search for technological transformation can be determined by two innovation strategies: leadership in technological frontier (overtaking) or by technological follow-up (catching-up) (Bessant, 2005; Nelson, 2007). Initially, some industries begin their activities operating in limited conditions, aiming to obtain knowledge in order to improve innovative capabilities such as catching-up strategy to achieve leadership in technological frontier (Ahuja, 2000; Figueiredo, 2003; Figueiredo, 2009).

However, one of the main difficulties faced by companies in emerging countries refers to its shortcomings resources or technological capabilities. In general, such deficiency occurs because these companies are not developing collaborative projects with universities, laboratories and R&D institutes. In addition, technological facilities available in pharmaceuticals industries are insufficient (Figueiredo, 2009). However, the possibilities of interaction, mobility and connectivity contribute to avoid isolation of these companies, especially when participate in supply chains and are inserted in innovation systems.

The role of the state in the Brazilian economy is preponderant to the development of the main segments

of the national industry and the main point to overcoming underdevelopment barriers (Sicsú & Castelar, 2009). The Ministry of Science, Technology and Innovation (MCTI) implemented effective policies in order to reduce the imbalance in the Brazilian innovation system. However, an incipient engagement of companies for technological activities, especially in R&D, is observed (Queiroz & Carvalho, 2005).

In the last decade, the number of companies adhering to the tax incentive program for technological research and innovation activities has grown significantly each year as shown by the latest annual report of MCTI (Brasil, 2013). Several factors contribute to explain the increasing interest of the companies for public fomentation, as follow: development of the macroeconomic scenario, perception of the entrepreneurs about the importance of investing in the innovation for business sustainability, and creation of new policies and instruments to support innovation by federal government (Lopez, 2009; Araújo, 2010; Brasil, 2013).

Currently, a more complex and diversified industrial park was developed in Brazil. Thus, allowing a more competitive scenario for national industries in the global market. In addition, the increasing of the competitiveness in the domestic industry was obtained through the human resource training and development of innovative products (Avila, 2004).

Among industrial segments, politics for pharmaceutical industry are of particular interest since Brazilian constitution recognizes full access to the health treatment. Of note, Brazil shows has an extensive biodiversity and qualified human resources to operate in this sector contributing to its development (Brasil, 2006; Villas Bôas; Gadelha, 2007; Calixto; Siqueira Junior, 2008). Moreover, the national market is controlled by a restricted number of companies resulting in a clear oligopoly in this sector (Loyola, 2008), constituting an economic barrier that contributes to a decrease in the development of Brazilian companies.

In addition, other factors that influence the pharmaceutical industry in Brazil is a low production of the active pharmaceutical ingredients (API); advanced hi-tech manufacturing facilities for scale-up process; partnership with other companies with high investment in R&D to obtaining new bioactive molecules, and overcoming technological limitations of chemical synthesis (Scherer, 2004).

The State is an important actor to transform technological knowledge into wealth through the creation of tax incentive policies to encourage companies to invest in RD&I (Garcia, 2008). In this sense, the stimulus for training qualified human resources is fundamental to promote technological innovation in the industrial sector.

The Guidelines of the Industrial, Technological and Foreign Trade (PITCE) were created in order to strengthen and expand the Brazilian industrial base by improving the innovative capacity of the firms (Brazil, 2004), resulting in a breakthrough in policy of innovation and technology. Thus, implementation of new policies induces innovation in domestic companies. In addition, other tax incentives for innovation have been established such as Innovation Law (Law nº 10.973/2004) and 'Law of the Well' (Law nº 11.196/2005).

It should be noted that new incentives for innovation represent a significant expansion of benefits for diverse businesses. Initially, the government promoted a positive agenda due to automatic application of the 'Law of the Well' (LW), i.e. companies were beneficiaries of tax incentives without submission of a previous project. Recently, changes in the procedures occurred and the companies must present their projects at the National Council for Scientific and Technological Development (CNPq of MCTI/Brazil), containing the following items:

• Tax incentives for R&D allowing deduction of 200% on the occasion of calculation of net income;

• Possibility to subvention projects that are important to technological development of the country;

• Scholarships for fixation of graduate students as researchers in companies;

• Legal framework to promote interaction and exchange of knowledge between universities and companies.

Tax incentives induced investments of the Brazilian companies in R&D. In addition, Brazilian government enlarged these incentives and improved the access mechanism to the benefits.

Analyzing the National Classification of Economic Activities (CNAE) is observed that tax incentives for R&D are distributed through the entire productive base. Seventeen sectorial branches are benefited by LW such as mechanical and transportation, electronics, chemical, metallurgical, food, consumer goods, software, pharmaceuticals, telecommunications, agribusiness, construction, furniture, pulp and paper, textile, petrochemical, mining, and others.

In addition, several initiatives have been implemented to foment the productive base in healthcare aiming to increase the access to strategic technologies and reduce the vulnerability of the Brazilian Unified Health System (SUS), where we can highlight the development of the Complex Industrial Health economic (CEIS) and the Partnership for the Productive Development (PDP) (Viana & Elias, 2007).

The objective of this study was to evaluate the results obtained by the 'Law of the Well', particularly in the pharmaceutical sector and the survey of the main points of the legal framework that contributed as an effective instrument for stimulating technological innovation in Brazilian companies.

METHODOLOGY

To assess the number of companies benefited from the tax incentive program, as an instrument for stimulating technological innovation, we performed an observational cross-sectional study, with the consolidation of information

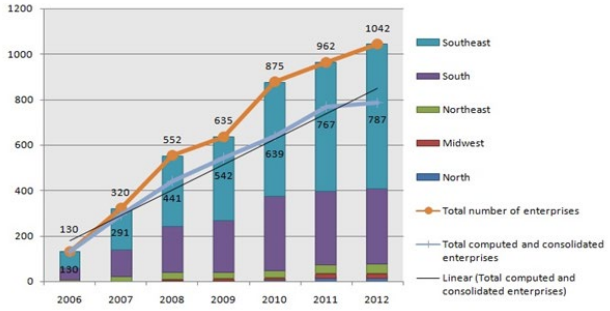
obtained from two databases: i) Annual Report of use of tax incentives use; and ii) legal framework for supporting research, both provided by MCTI (Brasil, 2012, Brasil, 2015). During the analyses, we considered the available annual reports at MCTI for incentives of the Good Law. Thus, our analysis was restricted to a period ranging from 2006 to 2012. Three analyses were carried out after data consolidation, as follows:

Initially, we analyzed the information pertaining to the number of beneficiary companies in the database and subsequently the numbers of pharmaceutical companies were classified by sector, investments and benefits of R&D by region and sector.

After sorting the data, the second analysis consisted in validating the information produced in the previous analysis. The explanatory variable was the number of patents deposited in the National Institute of Industrial Property (INPI) related to the pharmaceutical sector in the period from 2006 to 2012 (INPI, 2015).

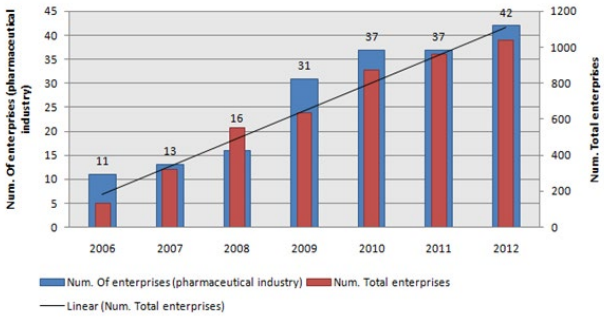
Finally, we aimed in a third analysis evaluate the legal framework of the main policy measures related to science, technology and innovation that contributed to the development of the current frame and reducing the national dependence.

Figure 1. Number of companies participating in the tax incentives of the LW per year distributed by region.



Font: MCTI. Annual report of the use of tax incentives (Brasil, 2012).

Figure 2. Distribution of the number of participating pharmaceutical industries in tax incentives.



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RESULTS AND DISCUSSION

Companies benefited from tax incentives per year and region

Figure 1 shows a continuous growth in the number of companies distributed along Brazilian regions that joined 'Law of the Well', confirming the importance of the company as a determinant of innovation. In addition, an increased gap between the total number of companies that submitted their proposal and the number of qualified companies to receive incentives was observed. Thus, this information demonstrates the need for qualification of projects and information provided by companies.

During the studied period, ranging from 2006 to 2012, an increase of 800% of the participating companies of the LW was observed, demonstrating a need to invest in R&D. Of note, R&D investments are characterized by an increased competitiveness, enhancement of knowledge and information as key factors for globalized markets. Figure 1 shows a continued growth in the number of participants benefited by 'Law of the Well'.

An evident discrepancy in the distribution of the number of companies by geographic regions is observed in Figure 1. Southern and southeastern regions stand out by focusing the greater demands of tax benefits granted by 'Law of the Well'. This fact indicates the need to raise awareness and disseminate the innovation culture among entrepreneurs from other regions. In addition, it highlights the need for disclosure of the benefits offered by tax incentives promoted by 'Law of the Well', as a stimulus to scientific and technological research.

Distribution of pharmaceutical companies in relation to the total number of companies participating of the Law of the Well

Analyzing the distribution of the number of pharmaceutical companies, we can observe an increase in the number of pharmaceutical companies in the sector benefited by LW from 2009 (Figure 2). Initiatives from federal government as development of CEIS and PDP, aimed to reduce the vulnerability of the SUS, rationalization and reduction of prices of strategic product to health, could explain the reason for the observed growth and contributed to coping with the economic crisis of 2008.

According to Gross Domestic Product (GDP) information, Brazil's economy grew 4% in 2006 and 6.1% in 2007. In 2008, despite the international economic crisis, Brazil's GDP grew 5.2% and an increase in most macroeconomic indicators was observed. In 2010, Brazilian GDP obtained a growth of 7.5% as highest rate since 1986 (IBGE, 2010).

During this period, along with the evolution of macroeconomic indicators, investment in R&D increased in Brazil rising from 0.96% of GDP in 2001 to 1.02% in 2006, reaching 1.13% in 2008 (OCDE, 2008). Thus, even considering that the macroeconomic scenario has been relatively unfavorable to investment in R&D with high interest rates, we can observe an improvement in the number of companies with investments in innovation. In

addition, the development is also driven by dynamics of competitiveness between companies.

Other instrument to corroborate to increase the number of innovative companies was financing for machinery and equipment by financial institutions (e.g. Bank of National Development) that support the national development (IBGE, 2013).

Analyzing the cohort of industrial sectors with a high percentage of spending with internal activities R&D on total net sales, we can highlight the following sectors: manufacturing of electrical equipment and other equipment for electro therapeutic and irradiation (7.03%), manufacturing of pharmaceuticals and pharmaceutical chemicals (2.39%), manufacturing of other electronic and optical products (2.19%) manufacturing and transportation equipment (1.91%) (IBGE, 2013).

Each year is observed an increase in the number of companies participating of the 'Law of the Well'. However, many companies are still unable to accede to the main instruments to support R&D activities. Among the reasons, the restriction on the use of tax incentives to companies with taxable income often excludes micro and small technology-based companies.

Funds invested in R&D activities

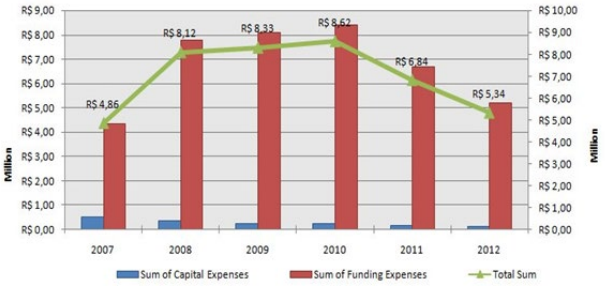
Taking into account the data obtained for the period of 2006 - 2012, we observed the highest investment for R&D activities on 2010 (R$ 8.62 million), with R$ 225 thousand related to expenditures capital and R$ 8.39 million in operating expenses. The period of highest investment in R&D is associated to the period of growth in the Brazilian economy (growth of 7.5% GDP), demonstrating the business confidence regarding the country development (IBGE, 2010).

LW and Innovation Law (IL) allowed the inclusion of the private sector as an important partner for science, technology and innovation in Brazil due to the mechanisms of economic subvention. Corroborating the data presented in Figure 3, PINTEC 2008 (IBGE, 2010) shows that the main instrument to support innovation in industry was the financing for purchase of machinery and equipment (14.2%). However, is also observed a modest result of 0.5% use of economic subsidies for R&D projects and hiring researchers. In addition, only 0.8% of financing innovation projects were carried out in partnership with universities and research centers.

The main instrument used in the period 2009-2011 by innovative companies it remained the financing for the purchase of machinery and equipment (27.4%) (PINTEC 2011). The economic subsidies for R&D projects and hiring researchers continues with low percentage of use (0.8%) and financing innovation projects carried out in partnership with universities and research centers (0.9%).

On the other hand, Brazil experienced a significant reduction in GDP (2.7% and 0.9%, respectively) in the period of 2011-2012 (IBGE, 2010). As consequence, we can observe a decrease in investments related to R&D activities (Figure 3).

Figure 3. Investment performed on R&D activities in pharmaceutical industries.



Font: MCTI. Annual report of the use of tax incentives (Brasil, 2012).

Operating expenses and reduction of the calculation basis of the Corporate Income Tax (CIT) / Social Contribution on Net Income (CSLL) by region

According to the 'Law of the Well', the federal government is authorized to grant tax incentives to firms carrying out RD&I. These activities can be the design of new products or manufacturing process, and adding new functionality or features to existing products or processes that involve incremental improvements and effective quality or productivity gains, resulting in increased market competitiveness.

The sum of expenses costing by region for purposes of calculating the incentives the companies that operated in real income regime and that have chosen tax incentives LW in 2006-2012 period amounted to R$ 40.52 billion (see summary data in Table 1). Values for additional incentives (incentive for exclusion, researchers and patent / registration), used as the basis for calculating the income tax and social contribution reached a total of R$ 23.03 billion.

According to the possibilities of incentives provided by 'Law of the Well', the benefit value by increasing the number of researchers is up to 20%. However, the percentage of investment per researcher not exceed 50%, the limit allowed in most regions (Table 1). Therefore, reinforces the need to expand the number of researchers in industries.

Although, LW aims the fixation and repatriation of researchers, the total value of capital expenditure not exceed 4% of the total amount invested in R&D. In addition, analyzing the data about the level of qualification of the persons occupying R&D activities in industry described in PINTEC 2011, we observed that 58.9% and 8% had undergraduate and 8% graduate levels, respectively.

Similar to previous results for incentives to increase the number of researchers in industries, we observed that the percentage to encourage the development and patenting is not exceed 1% in the studied regions, including Southeast region considered the most industrialized and largest beneficiary of the Law. Analyzing the number of patents

Table 1. Operating expenses and reduced income tax calculation base / social contribution by region, from 2006 to 2012 (x R$ 1.000,00).

Regions	N. Enterprise	Costing expenses	Incentive Exclusion (I)	% (I)	Incentive for Researchers (II)	% (II)	Incentive Patent Registration (III)	% (III)	Grand total (I+II+III)*
Midwest	38	165.651,72	99.096,20	60	14.469,44	9	0,00	0,00	113.565,64
Northeast	143	814.139,49	439.332,24	54	98.060,16	12	217,90	0,03	537.610,30
North	53	573.769,13	332.048,19	58	51.214,12	9	0,00	0,00	383.262,31
South-west	2043	34.024.273,43	16.102.299,39	47	2.748.190,31	8	14.525,05	0,04	18.865.014,75
South	1190	4.944.309,67	2.674.357,83	54	460.308,01	9	4.050,90	0,08	3.138.716,74
Grand total	3467	40.522.143,44	19.647.133,85	48	3.372.242,04	8	18.793,85	0,05	23.038.169,74

* tax incentives of IRPJ/CSLL

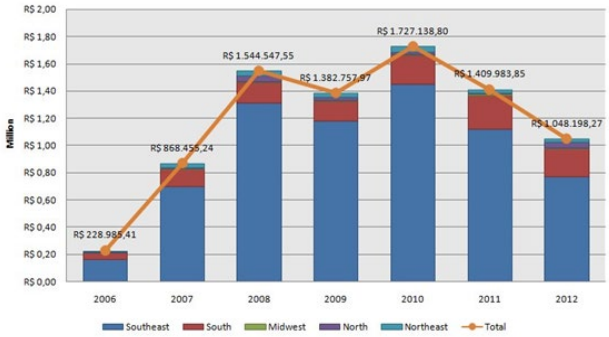
Font: MCTI. Annual report of the use of tax incentives (Brasil, 2012).

Table 2. Number relation of patents deposited and granted between 2006 to 2012.

Year	Number of patents deposited	Number of patents granted	Percentage of patents granted
2006	25789	632	2,5%
2007	25844	298	1,2%
2008	27106	105	0,4%
2009	29537	63	0,2%
2010	31798	53	0,2%
2011	31131	41	0,1%
2012	31410	32	0,1%

Font: INPI, 2015

Figure 4. Real benefits granted through tax breaks sorted by region and year.



Font: MCTI. Annual report of the use of tax incentives (Brasil, 2012).

deposited and granted by INPI in the period analyzed, it was observed an increase in the number of patents deposited. Conversely, the number of patents granted was reduced, representing on average 1% of the amount of deposited patent (Table2).

In spite of patent be considered a result of the innovation process, the IL and LW not improved the Brazilian´s technological performance compared to other developing countries. In 2012, Brazil requested a deposit of 106 patents in the US intellectual property office that represented only 0.06% of world production. In the same year, the percentage of patents filed by countries like South Korea, China, Spain and India, accounted for 5.24% of world production.

Generating real benefits for R&D investments

Operating expenses (cost) for R&D are usually already excluded from the CSLL and Income Tax (IR) calculation basis, as set forth in income tax legislation of any company. The real gain to the expenses for R&D is generated by real incentives provided for LW and tax incentives for IPI reduction in the case of purchase of machinery and equipment for R&D and IR credit withholding incident on the technology of payment abroad. Therefore, real gain with operating expenses for R&D in the period of the study is generated by applying tax incentives of income tax/social contribution. Figure 4 shows the values represented in billions of Reais vs. tax waivers granted by region and year.

A significant increase of the tax incentives granted by LW is evidenced in the first year grant (period between 2006-2008) (Fig. 4). The economic scenario shows signs of recovery with a GDP of 7.5% in 2010 (IBGE, 2010). In spite of the international crisis, another important phenomenon that marked the period from 2009 to 2011 in Brazil was the movement of currency appreciation. In addition, the average commercial exchange rate and average value were R$ 2,176 (2006) and R$ 1,675 (2011), respectively (Boletim do Banco Central do Brasil, 2011).

Of note, the Brazilian companies were exposed to an adverse scenario during the period of 2009-2011; influenced the expectations and behavior towards risk on the part of entrepreneurs. Since innovation is a phenomenon closely connected to high levels of uncertainty, decisions to invest in R&D strategies is dependent to the macroeconomic scenario and expectations. Innovative efforts performed by companies are demonstrated in Table 3 that describes the main sectors benefiting from the 'Law of the Well'.

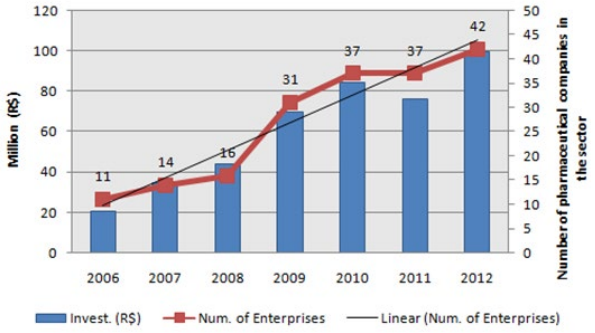
Figure 5 shows the relationship between the value amounts of tax breaks for R&D investment versus number of pharmaceutical companies in the sector benefited during the studied period. According to PINTEC 2011, the

Table 3. Relationship of the main sectors benefiting from the tax breaks for R&D (Values in R$ Million).

Sectors	2006	2007	2008	2009	2010	2011	2012
Mechanical and Transport	87,27	340,02	728,22	539,13	701,89	552,89	256,31
Metallurgical	38,01	45,23	59,77	60,82	72,64	38,86	34,40
Other Industries	34,16	32,47	25,53	57,78	158,79	190,51	187,13
Petrochemical/ Chemical	21,71	271,66	356,14	347,61	375,31	219,98	81,40
Pharmaceutical	20,65	34,79	44,18	69,57	84,15	76,39	99,24
Consumer goods	0,39	51,88	93,14	79,82	112,07	82,84	91,88
Electronics	8,03	41,19	70,20	54,61	73,98	110,71	97,29
Agrobusiness	0,00	10,96	46,65	18,90	9,06	11,61	18,11
Telecommunication	0,00	9,09	55,62	43,51	2,90	2,28	1,58

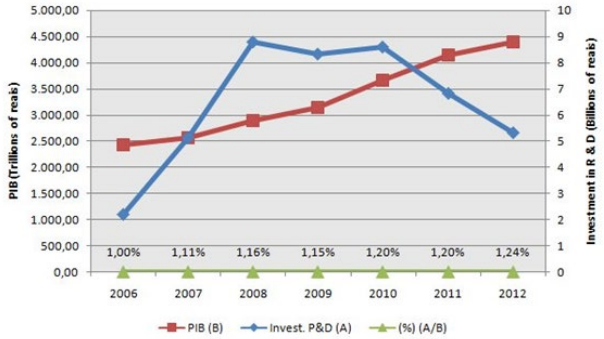
Font: MCTI. Annual report of the use of tax incentives (Brasil, 2012).

Figure 5. Value ratio of tax breaks for R&D investment vs. number of pharmaceutical companies.



Font: MCTI. Annual report of the use of tax incentives (Brasil, 2012).

Figure 6. Investment Analysis on R&D relative to GDP.



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proportion of net sales applied to internal R&D activities for manufacturing of pharmaceuticals and pharmaceutical chemicals were 2.40% and 1.42%, respectively.

The period has been marked by severe economic crises, but the pharmaceutical sector experimented a growth during this period. In spite of the adversity, industry entrepreneurs continue to invest in the innovation process as an alternative to face the changes taking place in global economic markets.

Business investment in R&D relative to GDP

One of the indicators used to measure the development of a country with regard to innovation is the competitiveness ranking of the World Competitiveness Year Book. In the last edition (released in 2014), Brazil occupies at 54° position in a ranking of 60, situated behind the United States, Switzerland, Singapore, Hong Kong, Chile, Mexico, India and Peru (IMD, 2014). Diverse reasons justify this ranking, since Brazil invests less in science and technology than other countries, discrete participation of the private sector, among other reasons. According to the Business Department, Innovation and Skills (The 2010 R&D Scoreboard, Department for Business, Innovation & Skills), the higher investments in R&D (investments of R$ 210.819 million) are applied by pharmaceutical industries with 112 companies. Five companies of the pharmaceutical sector are situated between ten private companies that most invest in R&D (BIS, 2010).

In the last seven years, Brazil maintained the proportion of R&D in relation to GDP (~ 1%) (Figure 6). In addition, according to the distribution report the percentage of national expenditure on R&D of private companies correspond to less than 1% (Brasil, 2014). Therefore, public and private investments are extremely required as a way to improve the competitiveness of Brazil.

It is important to note that the low values of investments in R&D and GDP are far from the objectives of the National Strategy for Science, Technology and Innovation (ENCTI). On the other hand, an investment of 1.8% GDP in R&D was expected in 2014, close to the average (~ 2.3%) of the Organization for Economic Cooperation and Development (OECD) (Brasil, 2012).

Legal framework undertaken to innovate

Other advance that contributed towards the consolidation of technology and innovation in Brazil was the expansion of the legal framework with state and federal innovation laws. Of note, diverse laws are designed as incentives for RD&I to stimulate technological autonomy and industrial development.

Table 4. Relationship the legal framework that contributed to effectuation and consolidation of the RD&I technological in Brazil.

Type	Legislation	Year	Purposes
Law	Law nº 10.973, de 02.12.2004	2004	It provides for incentives for innovation and scientific and technological research in the productive environment, aiming at capacity building and technological autonomy and industrial development of the country.
Decree	Decree nº 6.260, de 20.11.2007	2007	Provides for the exclusion of the net income for purposes of determination of the taxable income and social contribution calculation based on net income, the expenditure effected in scientific and technological research design and technological innovation.
Decree	Decree nº 6.259, de 20.11.2007	2007	Establishes the Brazilian Technology System - SIBRATEC, in order to support the technological development of the national business sector.
Ordinace Interministerial	Ordinace Interministerial MPOG/MS/MCT/MDIC nº 128, de 29.05.2008	2008	It establishes guidelines for public procurement of medicines and drugs by the National Health System.
Ordinace	Ordinace nº 3.031/GM/MS, de 16.12. 2008	2008	It provides for criteria to be considered by Laboratories drug production Officers in their bids for the purchase of raw material.
Decree	Decree de 12.05.2008	2008	Create, within the Ministry of Health, the Executive Group of the Health Industrial Complex - GECIS.
Ordinace	Ordinace MCT nº 139, de 10.03.2009	2009	Establishing the National Programme for Support to Business Incubators and Science Parks - PNI.
Ordinace Interministerial	Ordinace Interministerial MCT/ MF nº 977, de 24.11.2010	2010	It provides for the simplification of procedures for the import of goods for scientific and technological research.
Ordinace Interministerial	Ordinace Interministerial MDIC/MCT/MEC nº 930, de 05.11.2010	2010	Establishing the Joint Committee for the Research Center Development and Innovation Strategic Projects - Pro-Innovation Committee under the Productive Development Policy - PDP and and the Action Plan for Science, Technology and Innovation for National Development - PACTI.
Decree	Decree nº 7.540, de 02.08.2011	2011	Establishing the Greater Brazil Plan - PBM with main objective to accelerate the growth of productive investment and technological effort and innovation of domestic enterprises, and increase the competitiveness of domestic goods and services.
Ordinace	Ordinace MS nº 506, de 21.03.2012	2012	Establishing a Programme for the Development of Industrial Health Complex (PROCIS) and its Steering Committee.
Ordinace	Ordinace MCTI nº 245, de 05.04.2012	2012	Establishing the National System of Laboratories in Nanotechnologies - SisNANO as one of the elements of the National Nanotechnology Program under the National Strategy for Science, Technology and Innovation and associated with the Greater Brazil Plan.
Ordinace Interministerial	Ordinace Interministerial MS/ MCTI nº 686, de 02.10.2012	2012	Establishing partnership between the Ministries of Health and of Science, Technology and Innovation for technical cooperation in the formulation of policies to support scientific, technological and innovation in areas of interest of human health.
Ordinace Interministerial	Ordinace Interministerial MCTI/ MDIC nº 652, de 14.09.2012	2012	Establishes the priorities of the industrial and technology policy, to promote and encourage the development of innovative products and processes in national companies and national private entities, non-profit.
Ordinace Interministerial	Ordinace Interministerial MEC/ MCTI nº 1, de 09.01.2013	2013	Establishing areas and priority issues of action of the program Science without Borders.
Ordinace Interministerial	Ordinace Interministerial MEC/ MCTI nº 1, de 09.01.2013	2013	Establishing areas and priority areas of action of the Science Without Borders program: biology, biomedical sciences and health; drugs.
Ordinace	Ordinace SETEC/MCTI nº 2, de 28.07.2014	2014	Establishing the Working Group (WG) of Methodology for Assessment of the Pilot Project of Public Strategic Alliance and Private under the Brazilian Company Working Group for Industrial Research and Innovation.

Font: Ministry of Science, Technology and Innovation - MCTI. Legislation. (Brasil, 2015).

The edition of innovation laws is the main point for expansion and consolidation of the National System of Science, Technology and Innovation (SNCTI). Therefore, the expansion is associated to the interaction between different actors of innovation as federal and state governments, funding agencies, universities and companies. Table 4 shows some of the important legal framework for consolidation of the RD&I in Brazil.

CONCLUSION

Science, technology and innovation are indispensable tools to the economic development of a Nation to build its technological sovereignty. In this sense, LW aims to encourage companies to undertake internal R&D, including cooperative partnerships with universities, research institutions, small and micro enterprises. LW stimulates companies to undertake R&D activities and

cooperative research associating skills, costs and risks inherent of the innovation process as a way to build a sustainable model.

The continuous increase in the number of companies benefited from the LW consolidates this law as an institutional apparatus that contributed for efficiency and competitiveness of Brazilian companies. In addition, it is important to highlight the expansion of the legal framework aiming to support technological development and innovation.

Finally, recent indicators demonstrate technological stagnation in the various R&D sectors in Brazil. From the exposed, there is a clear signal that countries with technological deficit compared to developed countries need strategic changes for Science and Technology, and not only a financial support for RD&I.

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RESUMO

Avaliação da efetividade das políticas públicas de incentivo a p & d na inovação tecnológica no Brasil: um enfoque na lei do bem

O presente artigo abordará sobre as indústrias farmacêuticas que realizam atividades de pesquisa, desenvolvimento e inovação (PD&I) no Brasil, e sua consequente adesão aos incentivos fiscais da Lei do Bem (Brasil, Lei nº 11.196/2005). Nossa hipótese avalia se as políticas públicas de incentivo para transformação do conhecimento tecnológico poderiam incentivar as empresas investirem em PD&I. Nossa pesquisa foi baseada em relatórios do governo que relataram o uso de incentivos fiscais durante o período de 2006 e 2012; e o arcabouço legal de amparo à pesquisa, ambos fornecidos pelo Ministério de Ciência, Tecnologia e Inovação do Brasil. Durante o período estudado, observou-se um aumento de 800% das empresas participantes do Lei do Bem, demonstrando a necessidade de investir em P & D. A soma das despesas com custeio para efeito do cálculo dos incentivos as empresas que operaram em regime de lucro real e que optaram por usufruir dos incentivos fiscais da Lei do Bem atingiram o valor de R$ 40,52 bilhões. Embora um dos propósitos da Lei do Bem seja subsidiar a fixação de pesquisadores nas empresas, os valores totais das despesas capitais não ultrapassam a 4% do valor total investido em atividades de P&D. Semelhantemente observa-se que os percentuais de incentivo ao desenvolvimento e registro de patentes também não ultrapassam a 1%. Embora a Lei do Bem se apresente como um aparato institucional que contribui para as empresas se tornarem eficientes e competitivas para enfrentar o acirrado mercado globalizado, indicadores recentes sobre os gastos com P&D no Brasil demonstram certa estagnação nos investimentos nos diversos setores.

Palavras-chave: Lei do Bem. Políticas públicas. Complexo farmacêutico. Inovação tecnológica.

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