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RESEARCH

GOVERNMENTAL POLICIES TO ENCOURAGE ATENTING: A Literature Review

POLÍTICAS GOVERNAMENTAIS DE INCENTIVO AO PATENTEAMENTO: Uma Revisão da Literatura

POLÍTICAS GUBERNAMENTALES DE INCENTIVO AL PATENTAMIENTO: Una Revisión de la Literatura

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ABSTRACT

The amount of patent applications filed each year in the world's leading patent offices has increased significantly over the past few decades. One of the factors identified as motivating this increase is the government's policies to encourage patenting. This paper aims to review some incentive policies adopted around the world and, mainly, review the history of these policies in Brazil. In this context, the article addressed the *Bayh-Dole Act* of 1980 in the United States; the reform of Intellectual Property (IP) rights in German Universities in 2002; the financial incentives policy to the national depositor initiated in the 90's by the Chinese government; and the 2004 Innovation Law in Brazil.

Keywords: Intellectual Property, Invention Patent, Growth of Patenting, Policies to Encourage Patenting.

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RESUMO

Ao longo das últimas décadas, o número de pedidos de patentes depositados a cada ano nos principais escritórios de patentes do mundo tem crescido a um ritmo rápido. Um dos fatores apontados como motivadores desse aumento são as políticas governamentais de incentivo ao patenteamento. Este artigo tem como objetivo revisar algumas políticas de incentivo adotadas ao redor do mundo e, principalmente, revisar o histórico dessas políticas no Brasil. Nesse contexto, o artigo abordou a *Bayh-DoleAct* de 1980 nos Estados Unidos; a reforma sobre os direitos de PI nas Universidades alemãs em 2002; a política de incentivos financeiros ao depositante nacional iniciado na década de 90 pelo governo chinês; e a Lei de Inovação de 2004 no Brasil.

Palavras-chave: Propriedade Intelectual, Patente de Invenção, Crescimento do Patenteamento, Políticas de Incentivo ao Patenteamento.

RESUMEN

A lo largo de las últimas décadas, el número de solicitudes de patentes depositadas cada año en las principales oficinas de patentes del mundo ha crecido a un ritmo rápido. Uno de los factores apuntados como motivadores de ese aumento son las políticas gubernamentales de incentivo al patentamiento. Este artículo tiene como objetivo revisar algunas políticas de incentivo adoptadas en todo el mundo y, principalmente, revisar el histórico de esas políticas en Brasil. En este contexto, el artículo abordó la *Bayh-Dole Act* de 1980 en los Estados Unidos; la reforma sobre los derechos de Propiedad Intelectual (PI) en las Universidades alemanas en 2002; la política de incentivos financieros al depositante nacional iniciado en la década de los 90 por el gobierno chino; y la Ley de Innovación de 2004 en Brasil.

Palabras clave: Propiedad Intelectual, Patente de Invención, Crecimiento del Patentamiento, Políticas de Incentivo al Patentamiento.

INTRODUCTION

INVENTION PATENT

A patent is a temporary title granted by the State to inventors. The patent owner acquires the right to prevent third parties, without his consent, from producing, using, offering for sale, selling or importing a product subject to their patent and/or process or product obtained directly by a process patented by them for a limited period of time[1] (BRASIL, 1996).

The concession of temporary exclusivity of exploitation and commercialization, which is characterized as a temporary legal monopoly conferred to the inventor, is made in exchange for the obligation to fully disclose, through the publication of the patent that is available to public access, and the invention in a sufficiently descriptive manner. The invention must be adequately described, with the objective of enabling its realization by a technician in the subject[2] and indicate, where appropriate, the best form of execution (BRASIL, 1996; LIMA *et al.*, 2013).

THE GROWTH OF PATENTING

The amount of patent applications filed each year in the world's leading patent offices has increased significantly over the past few decades (**Figure 1**). According to data from the World Intellectual Property Organization (WIPO), in 2016 about 233,000 Patent Cooperation Treaty (PCT) patent applications worldwide were requested, an average increase of 7.3% year on year. More than 3.23 million international applications have been solicited through the PCT system since it began in 1978. Records grew every year except in 2009 when the global financial crisis caused a slowdown (OECD, 2004; TORRISI *et al.*, 2016; WIPO, 2016, 2017).

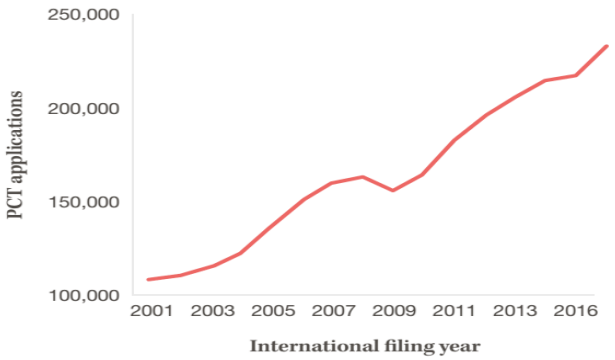

Figure 1 – The growth of patent applications via PCT.
Source: (WIPO, 2017).

The increase in activities related to the patent system is an indication that users in a variety of companies as well as universities and public entities attach greater importance to patents and are willing to incur higher costs to apply for them, acquire and defend them. (NATIONAL RESEARCH COUNCIL, 2004)

One of the motivating factors in the increase of the patent applications number worldwide is the government's policies to encourage patenting, since several countries around the world have instituted actions or policies to encourage patenting by their national institutions. As examples may be cited Bayh-Dole Act of 1980 in the United States; the reform of IP rights in German Universities in 2002; the policy of financial incentives to the national depositor initiated in the 90's by the Chinese government; and the 2004 Innovation Law in Brazil (MARQUES, 2016; NATIONAL RESEARCH COUNCIL, 2004; SNEDDON, 2015)

GOVERNMENT POLICIES TO ENCOURAGE PATENTING

[1] The invention patent will be valid for a period of 20 (twenty) years and a utility model for a period of 15 (fifteen) years from the date of filing. (BRASIL, 1996)

[2] A "technician in the subject", for this purpose, is considered to be the individual aware not only of the teaching of the invention itself and of its references, but also of the general technical knowledge at the time of filing the application. (INPI, 2013)

Considering the aforementioned, the patent system has been increasingly used. In addition to the factors such as the onset and rapid growth of Research and Development (R&D) of new technological fields, the emergence of complex technologies that often require interdependent patent pools to be legally protected, the patent view growth as a commercial tool and active, can also be highlighted as causes of this increase government policies to encourage patenting. For instance, countries such as the United States, Brazil, Germany, and China have implemented policies to encourage patenting for the national depositor (AUTM, 2017; MARQUES, 2016; NATIONAL RESEARCH COUNCIL, 2004; OECD, 2004; SNEDDON, 2015).

World policies

According to Van Norman e Eisenkot (2017), until the second half of the 20th century, the United States government had few policies to encourage the public use of the diversity of patented inventions accumulated. There was no overall policy or method established to transfer ownership of inventions or ideas from government inventors to private or commercial institutions that had a better structure to develop some useful purpose or product of the research. Furthermore, there was not a consistent method for licensing inventions or government patents to private companies for development.

The 1980 Bayh-Dole American Patent and Trademark Act Amendment (P.L. 96-517) made it a general rule that universities, other non-profit institutions, and small companies could acquire exclusive rights to inventions developed with federal support. The Stevenson-Wydler Act of the same year gave federal research agencies and their researchers an additional incentive to patent and license results of internal studies. In part, as a result, the number of university-owned patents has increased (NATIONAL RESEARCH COUNCIL, 2004).
The main provisions of the Bayh-Dole Act include:

i. Non-profit organizations, including universities and small companies, may choose to maintain the title of innovations developed under federally funded research programs;
ii. Universities are encouraged to promote, for commercial purposes, the use of inventions resulting from federal funding;
iii. Universities are expected to apply for patent applications on their inventions;
iv. Universities are expected to offer licensing preference to small businesses;
v. The government will maintain a non-exclusive license to use the patent;
vi. The government retains "march-in" rights[3] (AUTM, 2017).

The adoption of the Bayh-Dole Act has inspired many countries, mainly Organization for Economic Co-operation and Development (OECD) members, to replicate policies similar to this law, with the aim of fostering academic research with practical purposes of producing financial results. According to a survey performed by the Association of University Technology Managers (AUTM), other countries that have legislation similar to the Bayh-Dole Act are Brazil, China, Denmark, Finland, Germany, Italy, Japan, Malaysia, Norway, Philippines, Russia, Singapore, South Africa, South Korea, and the United Kingdom (AUTM, 2017; MUELLER; PERUCCHI, 2014).

China has been leading the world in the number of patent applications for a number of years, surpassing the United States, Europe, and Japan (WIPO, 2017).

Lei, Sun e Wright (2013) highlight two theories that debate the causes behind this boom in Chinese patents. The first is that this result is an indicator of China's breakthroughs in innovative capacity resulting from the focus of its development plan (Medium to Long Term Plan for the Development of Science and Technology of 2006) to migrate its economy from the "made in China" to "invented/designed in China". The second, however, refers this growth to the various patent grant policies offered by the government. For example, the Chinese government promotes financial incentives for national institutions to file patents in the Chinese Patent Office, such as occurred on April 14th, 2012, when the Chinese Ministry of Finance issued new measures for the administration of special funds for subsidies to the application for patents abroad. In order to be qualified for the subsidy, applicants must be small and medium-sized enterprises, public institutions or Chinese scientific research institutions. According to these measures, the subsidies involve financial aid for official charges of deposit process, examination or other services paid to the patent offices abroad (CHINA IPR, 2012; LEI; SUN; WRIGHT, 2013; SNEDDON, 2015; WIPO, 2017)

In Germany, property rights for university inventions were subject to legal change about a decade ago. In February 2002, the German Government amended clause 42 of the employer invention law, known as the teacher privilege (*Hochschullehrerprivileg* in German). Established on the basis of Article 5 of the German Constitution, which protects the freedom of science and research, this clause granted university professors/researchers the privi-

[3] Os direitos de march-in permitem que o governo federal, em circunstâncias específicas, exija que o proprietário da patente conceda uma licença não exclusiva, parcialmente exclusiva ou exclusiva a um requerente. Se o proprietário da patente se recusar a fazê-lo, o governo pode conceder a licença em si. Os termos da licença devem ser razoáveis. (THOMAS, 2016).

lege of maintaining the property rights of their inventions. The 2002 amendment transferred the property rights of the inventor's university inventions to the University with the intention of increasing the exploitation of university inventions for commercial purposes (CZARNITZKI *et al.*, 2014; DORNBUSCH; NEUHÄUSLER, 2015).

Brazilian policies

Since the beginning of 2000, the Brazilian government has been making efforts to strengthen the innovation process in Brazil, especially for Brazilian education and research institutions, through public policies and the enactment of laws (PINHEIRO-MACHADO; FREITAS, 2016).

In order to regulate and, at the same time, create mechanisms for the promotion of innovation, scientific research and protection of intellectual property, the Brazilian State sanctioned Law No. 10,973 (Innovation Law) on December 2nd, 2004, and regulated it on October 11st, 2005, in Decree No. 5,563[4]. Inspired by the French Innovation Law[5] and the American Bayh-Dole Act, Law No. 10,773/2004 represents the legal benchmark for innovation in Brazil. Structured in seven chapters, four of which are aimed at stimulating innovation activity in different spheres[6], the Innovation Law can be defined as a juridical-institutional framework aimed at strengthening the areas of research and knowledge production in Brazil, in particular, the promotion of cooperative environments for scientific, technological and innovation production in the country (JÚNIOR *et al.*, 2016; RAUEN, 2016).

The Innovation Law seeks to stimulate innovation activity within the *Instituições Científica, Tecnológica e de Inovação* (ICT)[7] [Scientific, Technological and Innovation Institutions], as well as in the business sector. Among the topics covered by the Innovation Law, great importance is given to the establishment of incentive mechanisms for ICT - company interaction and the strengthening of intermediary agents of this relationship, such as support institutions and *Núcleos de Inovação Tecnológica* (NIT) [Technological Innovation Centers]. Some highlights of the law are summarized below. (BRASIL, 2004, 2005; REPICT; REDETEC, 2006).

i. Strategic alliances and cooperative projects;
ii. Sharing of scientific and technological laboratories;
iii. Waiver of bidding for the licensing or technology transfer process;
iv. The researcher's remuneration may occur in three ways: a research fellowship to stimulate innovation, participation in the remuneration of those service activities and economic gains resulting from exploitation of creation protected by intellectual property rights;
v. The researcher's license with regard to the incorporation of companies;
vi. The law regulates the role of the Support Foundation by allocating a percentage of the total amount of financial resources for the execution of R&D projects, aiming to cover operational and administrative expenses incurred in the execution of agreements, covenants and contracts;
vii. It makes mandatory the *Núcleo de Inovação Tecnológica* (NIT) [Technological Innovation Center], structure instituted by one or more *ICT*, with the purpose of institutional innovation policy management of the institution. The *NIT* has responsibility for the results of economic exploitation resulting from intellectual property used, the use of public resources or infrastructure financed by public resources;
viii. The granting of tax incentives establishes the public subsidy of up to 50% of the expenses of companies with the remuneration of researchers, masters, and doctors and stimulates the companies to contract and to use the partnerships of small companies, institutions, and independent researcher.

The result of national policies to encourage innovation is more evident when the evolution of patent applications at *Instituto Nacional da Propriedade Industrial* (INPI) [National Institute of Industrial Property] is observed (**Figure 2**). As the discussion of the Innovation Law began in 1999 and it came into force in December 2004, it is believed that this legislation played a role in highlighting the IP theme and thereby boosting access to the patent system by reflecting in the progressive growth of patent applications as shown in the graph from 2005 (MARQUES, 2016).

[4] Law No. 10,973 of December 2, 2004 provides incentives for innovation, scientific and technological research in the productive environment, and provides other measures. (BRASIL, 2005)

[5] *Loi no 82-610 du 15 juillet 1982 d'orientation et de programmationpourlarecherche et ledéveloppementtechnologique de la France.*

[6] Chapter II – from the encouragement to the construction of specialized and cooperative innovation environments; Chapter III – from the encouragement to the participation of *ICT*s in the innovation process; Chapter IV – from the encouragement to the innovation in companies; Chapter V - Encouraging the Independent Inventor. (BRASIL, 2004)

[7] Organ or entity of the direct or indirect public administration or legal entity governed by private non-profit organization legally incorporated under the Brazilian laws, with headquarters and forum in the Country, that includes in its institutional mission or its social or statutory goal the basic or applied research of a scientific or technological nature or the development of new products, services or processes. (BRASIL, 2016)

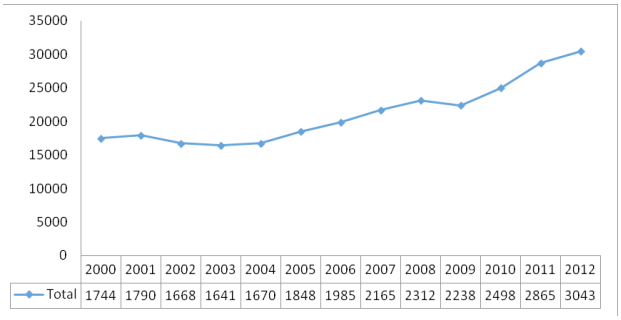

Figure 2 – Evolution of the patent filing number at INPI.
Source: Own elaboration based on INPI (2016a)

Although Law 10,974/2004 brought advances in innovation processes in Brazil, after more than a decade of its effectiveness, it was evident that some reformulations were necessary with the purpose of reducing legal and bureaucratic obstacles and give greater flexibility to institutions active in this system. After a process of about five years of discussions between players of the national innovation system, within the ambit of the Science and Technology Commissions from the Chamber of Deputies and the Senate Chamber, whose starting point was recognition and the need to change points in the Innovation Law and in nine other laws related to the theme[8], the new legal mark for innovation, known as the Science, Technology and Innovation (ST&I) Code, Law No. 13,243/2016, was approved on January 11st, 2016 (RAUEN, 2016).

The new legal benchmark of ST&I was created by prioritizing the development of three main axes: the integration of private companies into the public research system; the simplification of administrative, personnel and financial processes in public research institutions; and the fostering decentralization of ST&I sectors development of in States and Municipalities (JÚNIOR *et al*., 2016).
The new law advances in several points, among which stand out:

i. Formalization of national private I*nstituições de Ciência e Tecnologia* (ICT) [National Science and Technology Institution] (non-profit private entities) as an object of the law. The new legal benchmark has changed the concept of *ICT*, also integrating "the non-profit private legal entity and including in its institutional mission or its social or statutory objective the basic or applied research of a scientific or technological nature or the development of new products, services or processes" (BRASIL, 2016; RAUEN, 2016);
ii. Expand the role of NITs, including the possibility that support foundations may be *NIT*s of *ICT* (RAUEN, 2016);
iii. Decrease in some of the barriers to importing R&D inputs (RAUEN, 2016);
iv. Formalization of incentive fellowship to the innovation activity (RAUEN, 2016).

Pinheiro-Machado e Freitas (2016) presents a summary (**Table 1**) of other national public policies that were instruments for the promotion of technological development in the country. All of these policies bring the issue of intellectual protection into the picture, making clear the importance of the strategic use of IP as a necessary condition for obtaining intellectual property rights.

It is also important to highlight the activities that *INPI* has been taking to facilitate access to the IP system. For example, the Institute applies discounts of up to 60% on the values of services provided by the Institute for natural people[9]; micro-enterprises, small businesses and cooperatives; research and non-profit institutions (*INPI*, 2017).

Another example is the pilot project "MPE Patents", launched on February 17, 2016, which will allow the application of prioritization of the examination of patent applications filed by micro-enterprises and Brazilian small companies. The *INPI* establishes phase II of the Project through INPI Resolution PR No. 181, on February 21st, 2017, published in RPI 2408, dated on March 1st, 2017. The resolution prepared for this phase of the MPE Patent Pilot Project brings some modifications, where the following can be underlined: application exclusively by electronic form; exclusion of patent applications examined by technical divisions with a high number of priority examination requirements in relation to their decisions, in particular, Mechanical Engineering; participation of up to 150 patent applications (*INPI,* 2016b).

[8] The new Legal Framework of ST&I amends the Law No. 10,973 (12/2/2004), Law No. 6,815 (08/19/1980), Law No. 8,666 (06/21/1993), Law No. 12,462 (08/4/2011), Law No. 8,745 (12/09/1993), Law No. 8,958 (12/20/1994), Law No. 8,010 (03/29/1990), Law No. 8,032 (04/12/1990), and Law No. 12,772 (12/28/2012), under Constitutional Amendment No. 85 (02/26/2015). (BRASIL, 2016)

[9] Brazil's natural and physical person that hold no corporate interest in the company that belong to the item being registered or deposited in INPI. (INPI, 2017)

Table 1 - Public policies for the purpose of technological development in Brazil.

Year	Instrument	Goal
2004	*Política Industrial, Tecnológica e de Comércio Exterior (PICTCE)* [Industrial, Technological and Foreign Trade Policy]	Long-term policy directed toward the future based on an articulated set of measures to strengthen and expand the industrial base by improving innovative capacity, to increase economic efficiency, development, and diffusion of competitive technologies. This policy was the boost to reinstate the *INPI* in the national scenario, emphasizing its importance in the innovation and technological development scenario.
2004	Technological Innovation Law No. 10,973, regulated by Decree No. 5563/05	It established mechanisms of interaction between public and private with a view to technological development and technology transfer for companies, besides establishing in ICT the *NIT* to ensure institutional policy to encouraging protection of creations and technology transfer.
2005	Law of Good No. 11,196	It consolidated the tax incentives for legal person automatically, provided it conducts R&D activity and makes income declaration through the real profit regime, among other aspects.
2007-2010	*Plano de Aceleração do Crescimento da Ciência, Tecnologia e Inovação* (PACTI) [Growth Acceleration Plan for Science, Technology and Innovation]	Plan coordinated by the Ministry of Science, Technology, and Innovation (MSTI) with the objective of continuing the development progress and articulating policies and programs for the consolidation of the country's technological development.
2008-2011	*Política de Desenvolvimento Produtivo (PDP)* [Productive Development Policy]	It expanded the scope of *PICTCE* with the objective of giving sustainability to economic growth and increasing R&D investments, to expand supply capacity in the country, preserve the balance of payments, increase innovation capacity and strengthen micro and small enterprises.
2011-2014	*Plano Brasil Maior (PBM)* [Greater Brazil Plan]	The objective was to increase the competitiveness of national industry by encouraging innovation and adding value through a set of measures to stimulate investment and innovation, support for foreign trade, defense of domestic industry and the internal market.
2012-2015	*Estratégia Nacional para Ciência, Tecnologia e Inovação (ENCTI)* [National Strategy for Science, Technology and Innovation]	It highlighted the importance of ST&I as a structuring axis of development, continuing the advances obtained in the PACTI, and ratifying the role of innovation for sustainable development, with emphasis on the generation and appropriation of scientific and technological knowledge.
2016	New Legal Benchmark of ST&I Law No. 13,243	It stimulates the scientific development, research, scientific-technological training and innovation, changing the following Laws: 10,973/2004 (Innovation Law), 6,815/1980 (Foreigner Statute), 8,666/1993 (Bidding Law), 12,462/2011 (Differentiated Regime of Contracting), 8,745/1993 (Temporary Signings), 8,958/1994 (Law on Foundations of Support), 8,010/1990 (Import Law), 8,032/1990 (Import Tax Reduction Law) and 12,772/2012 (Plan of Careers and Positions of Federal Magisterium), under the terms of Constitutional Amendment No. 85/2015.
2016-2019	*Estratégia Nacional para Ciência, Tecnologia e Inovação* (ENCTI) [National Strategy for Science, Technology and Innovation]	It establishes as main axes: promotion of scientific and technological research; modernization and expansion of the ST&I infrastructure with increased funding for the sector, training, attraction and human resource allocation; and promotion of technological innovation in companies. The objective is to improve institutional conditions to raise productivity through innovation; reducing regional asymmetries; developing innovative solutions; and strengthen the bases for promoting sustainable development.

Source: Pinheiro-Machado e Freitas, 2016

CONCLUSIONS

The patent is a property title that allows the temporary exclusivity of exploitation and commercialization. By taking into consideration the growth of patent application number in the world, the patent system has been given increasing importance over the years. One of the factors identified as motivating this increase is the government's policies to encourage patenting.

The article analysis of government policies and programs to encourage patenting indicates that there was a worldwide effort for actions that mainly attracted national science and technology institutions to use the system of intellectual protection by patents, especially with commercial purposes.

For instance, one of the main provisions of the United States Patent and Trademark Amendment Act Bayh-Doleen encourages universities to promote, for commercial purposes, the use of inventions arising from federal funding.

In Germany, the employer invention law has been amended in order to assign property rights of university inventions to the University with the intention of increasing commercial exploitation of the patent.

In Brazil, the Innovation Law of 2004 has a whole chapter dedicated to encouraging the *ICT*s participation in the innovation process. In addition, one of the highlights of the Law involves the waiver of bidding for the licensing or technology transfer process.

Hence, it is clear that some of these incentive policies and actions had as their main objective to encourage national depositors to interact with companies and exploit the commercial value of the patent.

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