

Evolution and setback in patent applications filed at INPI: Sergipe, 1984-2017

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ABSTRACT

The advancement of technologies refers to the process of innovation and how it expresses and impacts on the economic growth of society and the quality of life of people. Thus, the design of public policies to support and encourage innovation is due, in particular, to the relationship between universities and business. This article seeks to identify the most significant technological growth and areas of knowledge in research carried out in the universities of the State of Sergipe, Brazil. For that, a documentary survey of technological prospectation was carried out for the period from October 1984 to January 2017, through public databases of INPI and E-MEC. Therefore, a systematic analysis was carried out to investigate the legal characteristic (public / private), quantity of deposits, number of concessions, period of protection, area of knowledge, international classification and inventors. In the period, 8 patents were granted out of the 218 deposited, the majority (78%) being for public universities, specifically the Federal University of Sergipe. It was found that public expenditure on innovation increased by 737% in relation to 2000. In the same period, in relation to the number of patents, an increase of 2228,5% occurred. In addition, of the areas of knowledge analyzed, the chemistry was highlighted; metallurgy and human needs. The study identified that there was a significant growth of technologies, according to the deposits made by the universities; that this growth is linked to the State's expenditure on research and development; and that only these patents showed the need of the State to develop products aimed at such areas.

Key-Word:Universities.Data bank. Innovation.

INTRODUCTION

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The change in world technological dynamics has been enhanced by the growing number of innovations. The application of new knowledge in empirical situations has resulted in the speed of technological advances, generating a self-feeding dynamic, in which innovations come from products and processes that depart from human needs. According to Rocha and Ferreira (2001), the innovation process Technological development is, however, only one side of a broader and deeper phenomenon experienced by contemporary societies: the change of the sociocultural paradigm itself associated with a transformation in the pattern of capitalist accumulation. This paradigm is intertwined with the advancement of communication technologies and the development of expert systems in the organization of life, which result in the separation of time and space.

We will look at this study about the changing relationship of information technologies, which can share information and knowledge - which is essential today for the competitiveness of countries and companies - and, therefore, result in economic growth, wealth generation and improvement. of society's quality of life.

Given this, policies supporting science, technology and innovation have become an important factor for the development of countries' economies, as they promote a development process associated with technological capabilities, gains from innovations, increased participation in the international market, expansion and strengthening of the market. (OLIVEIRA, 2009).

The primordial policies for encouraging innovation arose, according to Macedo and Barbosa (2000), in 1477, in the Republic of Venice, when the idea of encouraging inventions through the granting of monopoly of use, the patent. This was initially based on the principles of Rousseau's *The Social Contract* as an agreement between the inventor and society. The State claimed to grant the inventor exclusive use of the invention for a certain period of time and, on the other hand, the inventor disclosed his invention to society, which would thus have free access to the information.

Brazil, however, began its innovation policy in the mid-nineteenth century, being the first of the developing countries to grant patent protection to inventions (MACEDO; BARBOSA, 2000). According to the text *Patents: History and Future*, of the National Institute of Industrial Property (INPI, 2016), prior to 1809, the date of publication of the license that regulates the industrial property activity in the country, several mechanisms retained industrial activity. Firstly, the colonial pact of 1500, which provided for a single way to exploit and obtain manufactured goods, restricted to Portugal; and second, in the year 1785, the license of Queen Dona Maria, which provided for the illegality of industrial

production in Brazilian lands. This fact is due to the attempts of factory production in Brazil, which were successful and showed to the Portuguese crown the possibility of losing the colony.

Currently, the legal framework for innovation, regulated by Law No. 13.243 of January 11, 2016, provides for incentives for scientific development, research, scientific and technological training and innovation. The milestone foresees the consolidation of practices that encourage innovation in the country, focusing on technological growth.

Brazil is a developing country and, to achieve economic growth, its adherence to policies, such as the legal framework of innovation, that foster technological progress is required. For technological growth to occur, incentives are needed for research that develops the practice of intellectual property protection and also produces technology. Aiming the financial support, coming from companies as well as the State, for new researches that cover the various areas of knowledge, so that they can contribute to the technological and industrial growth of Brazil.

Measures to encourage technological production are employed from the common interests of both the state and companies, and stations lacking a close connection with universities, according to Tonholo (2001), because although the university's fundamental mission is to develop its work. educational, she must also rethink her organization for applied scientific research.

Amadeu and Torkomian (2009) recently demonstrated in a study that questions about intellectual property and technology transfer came to occupy the agenda of discussions of university policy makers, especially in public universities.

The university, although its mission is to train professionals working in the labor market and to foster discourses in various areas of knowledge, is also part of the external actions promoted by the financial market and factory production, since it is home to the mass producing new people. concepts and inventions for the market, and their relationship with companies, government and society's problems is essential.

According to Mueller and Perucchi (2014) the growth of university patent filings between the 1990s and the first decade of this 21st century, is a consensus among several authors, further states: that the northeast region has an increase of deposits in 2005 and points to the International Patent Classification (IPC), where patents related to the areas of chemistry and metallurgy were the most frequent.

The previous research in this study was developed to identify the technological growth expressed in the number of patents filed by the universities of the state of Sergipe, observing the areas of knowledge that were most expressed, year of patent filing, year of grant, IPC and patent numbers, in addition to observing the peculiarities of universities, such as the legal characteristic.

To this end, it was necessary to study the profile of the universities and patent deposits of the Sergipanas universities, and the E-MEC (Higher Education Regulation System) platforms and the National Institute of Industrial Property (INPI) database were used.), a federal regulatory body and filing of all Intellectual / Industrial Property products.

METHODOLOGY

Through the use of the Microsoft Office Excel 2007 Software, data were tabulated for all higher level institutions in the state of Sergipe, taking note of the amount of patents filed by the universities of the state of Sergipe. A documentary study of technological prospection had as a time series the period from October 1984 to January 2017, made in public databases, such as INPI and E-MEC, the official and unique information database for Higher Education Institutions. (HEI).

We considered all the universities of Sergipe that were active until 2017. The survey also used data from the INPI platform, using the CNPJ of the IES. The analysis of patent filings data was made in update lot 2405, which data refer until April 26, 2017.

The information present on the INPI and E-MEC platforms was combined. With this, a relationship was established between patents filed by institutions in the State through their legal characteristics. Through the analysis of the processes filed with the INPI, the following parameters were collected: year of patent filing, year of grant, International Patent Classification (IPC) and patent numbers. All inventors were cataloged according to their inventions.

Systematic analysis of the information collected was performed to reveal the amount of deposits made up to 2017, relating the number of deposits with inventions granted in the 33-year period of protection of inventions. Among the analyzed variables, it was considered as more relevant, the investigation of the areas of knowledge to which

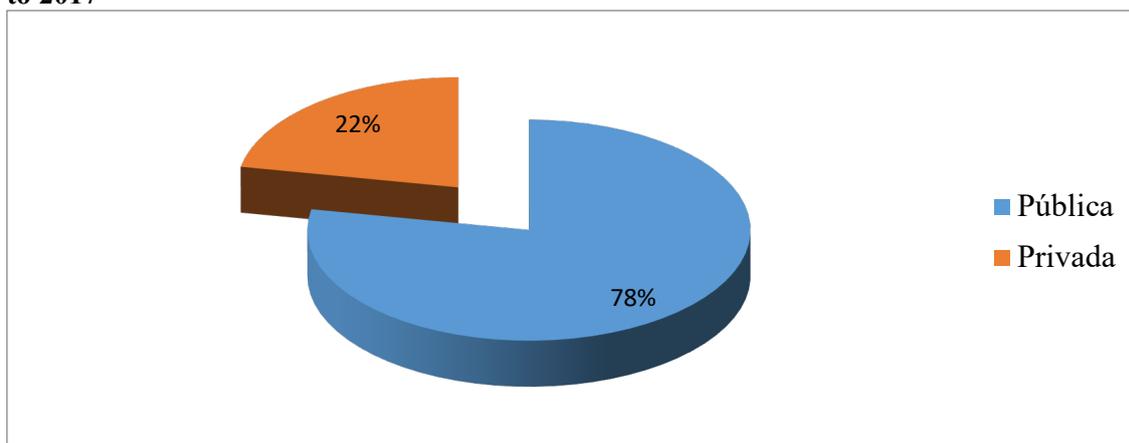
the invention belongs; For this purpose, the International Patent Classification (IPC) was used to indicate the areas of patent knowledge.

RESULTS ANALYSIS AND DISCUSSION

The patent system provides the foundation for the gathering, classification and dissemination of technological information, contributing to the rationalization of resources used in research and development (JANNUZZI; AMORIM; SOUZA, 2007).

The present research was governed by a survey of public data banks INPI and E-MEC, and the presence of 218 patent applications filed with the INPI during the years 1984-2017 during the 33 years of filing activity. As shown in Graph 1, deposits belonging to private universities are 22% of the total presented and 78% from Sergipe public universities.

Graph 1 -Patents filed in the state of Sergipe by public and private universities, from 1984 to 2017



Source: (MEC, 2017)

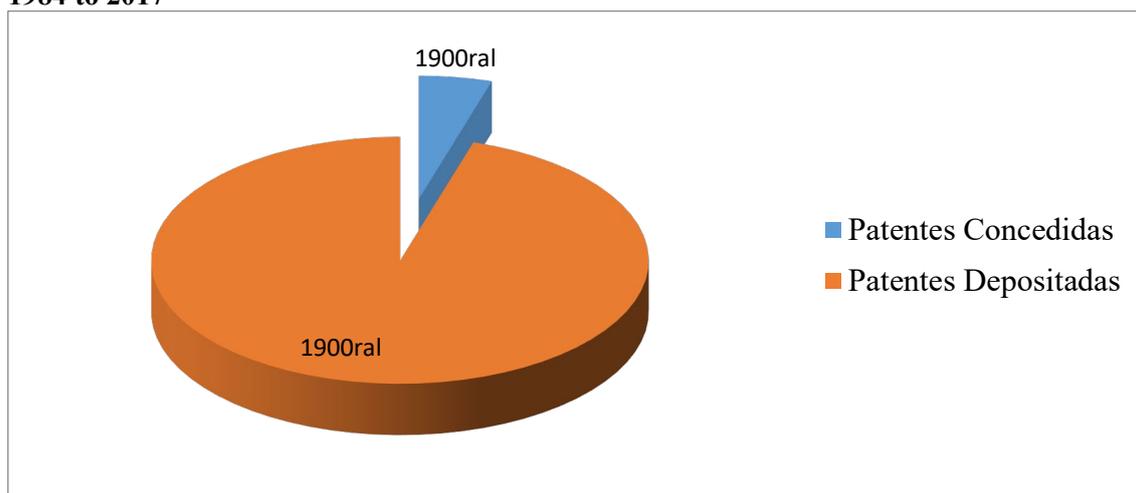
During the study, it was observed that only eight patents were granted for uses and fruits of its activity, as shown in graph 2. These concessions took place in 1990,1991,1992, 2004 and 2017, as evidenced in graph 3. During these years , 218 patent filings were observed in the INPI platform, with evidence of the Federal University of Sergipe (UFS), with 160 cases, followed by Tiradentes University (UNIT), with 50 cases, and the Federal Institute of Sergipe (IFS), with 10 processes at the INPI.

UFS has filed 160 cases during the 33 years of inventive protection activity. Its First Patent, Sodium activation process of montmorillonite clays by the use of an extrusion reactor with varying activating agent contents in aqueous or solid solution in the presence of wet or saturated water vapor with deposit number PI 8404987-1, was filed on October 3, 1984, and granted in June 1990. Six years of process legitimized its protection, the university in all has 159 patent filings, and it was noted that between the years 1984 e2009, the number of deposits did not exceed 3 registrations, and in eighteen years there was no deposit.

UNIT has 50 registrations in nine years of protection activity, having its first patent, Emulsion Polymerization Process (PI 0904192-3) filed on October 5, 2009. It was found that none of the patents were granted by INPI.

The Federal Institute of Sergipe has 10 patent registrations in the five years of inventions protection activity in the institution. His first patent was filed on December 21, 2012, Audiovisual Alert System for side bike riding bike (BR 10 2012 032849 6). The institution has no invention granted by the INPI.

Graph 2 - Number of Patents filed and granted by the Federal University of Sergipe from 1984 to 2017



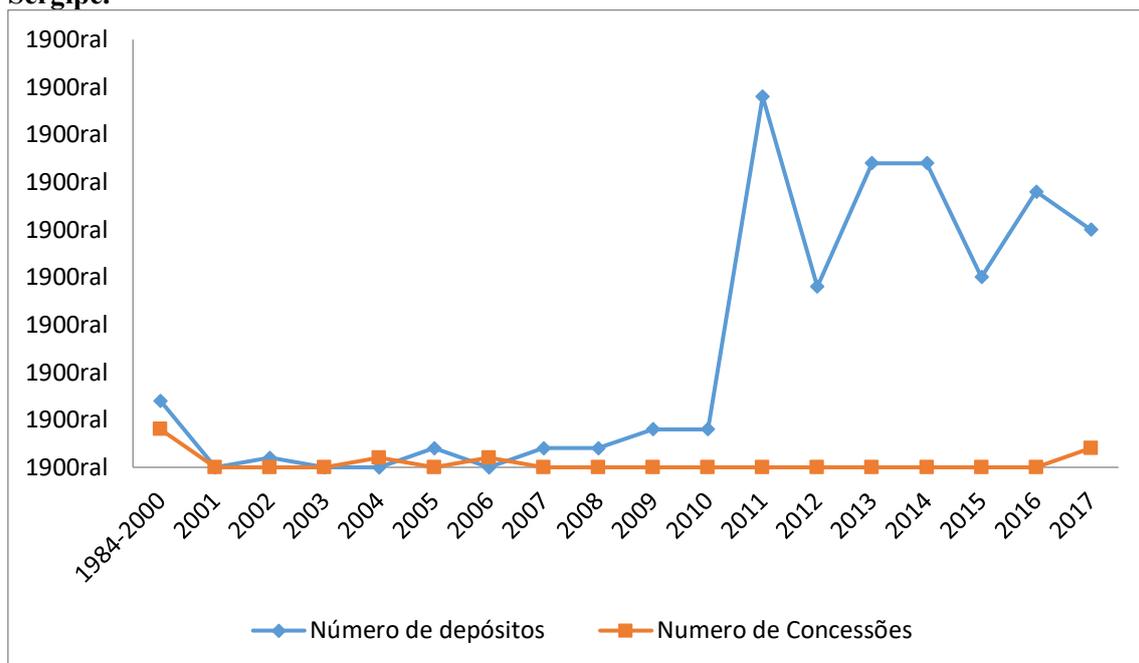
Source: INPI (2017)

Between 1984 and 2017, an increase in deposits was identified, with a growth of 1307% in 2011-2017 compared to 2001-2010, as it shows the growth of inventive protection culture in the state of Sergipe. As will be shown in graph 3. Secundo Mueller and Perucchi (2014), what is clear from these readings is the growing interest of the government in universities as producers of innovation and, at the same time, very large

differences between these institutions in the ability to generate patents. Thus, this initiative highlights a need for more accurate data on patent production.

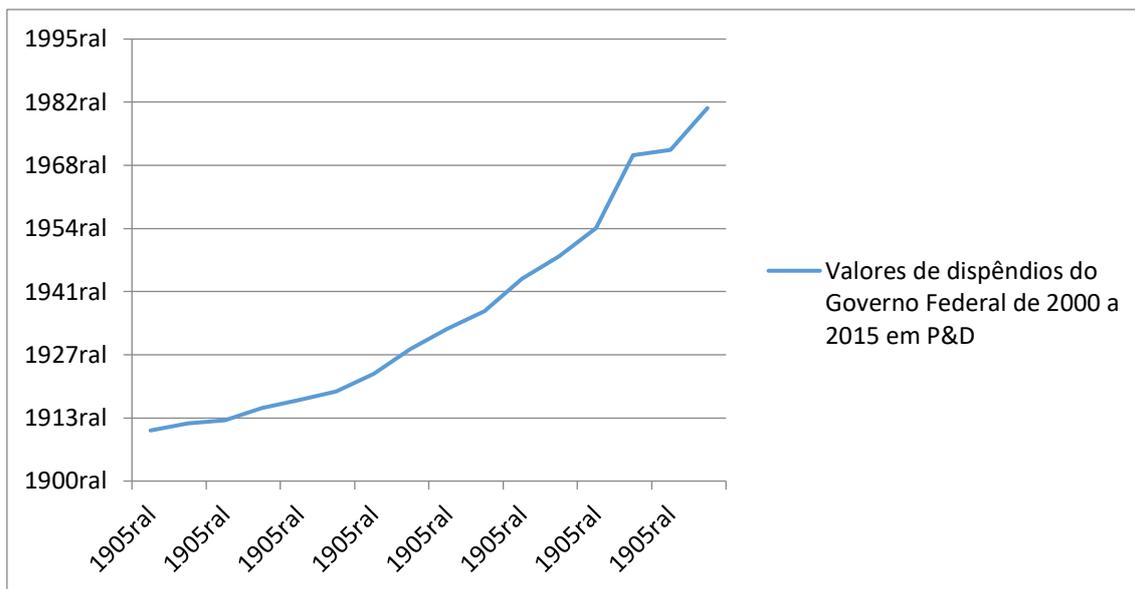
In the period 2000-2015, it can be seen, as shown in Figure 4, that public expenditure on R&D in 2015 increased by 737% over 2000. In the same period, compared to of patents, there was an increase of 2228.5%. Based on the agreement on the number of patents filed and the public investment for R&D, it can be observed that the State can contribute directly to increase research and development in Sergipe.

Graph 3 - Number of patents filed and granted between 1984 and 2017 by universities of Sergipe.



Source: INPI (2017)

Graph 4 - Federal Government expenditure from 2000 to 2015 on R&D



Source: KOELLER; VIOTTI; RAUEN, 2016.

The use of a country's public spending indicators as a measure of effort for the development and implementation of its National Science, Technology and Innovation Policy is a methodological reference for the calculation of science and technology (S&T) expenditures. according to the Frascati Handbook of the Organization for Economic Cooperation and Development (OECD, 2007).

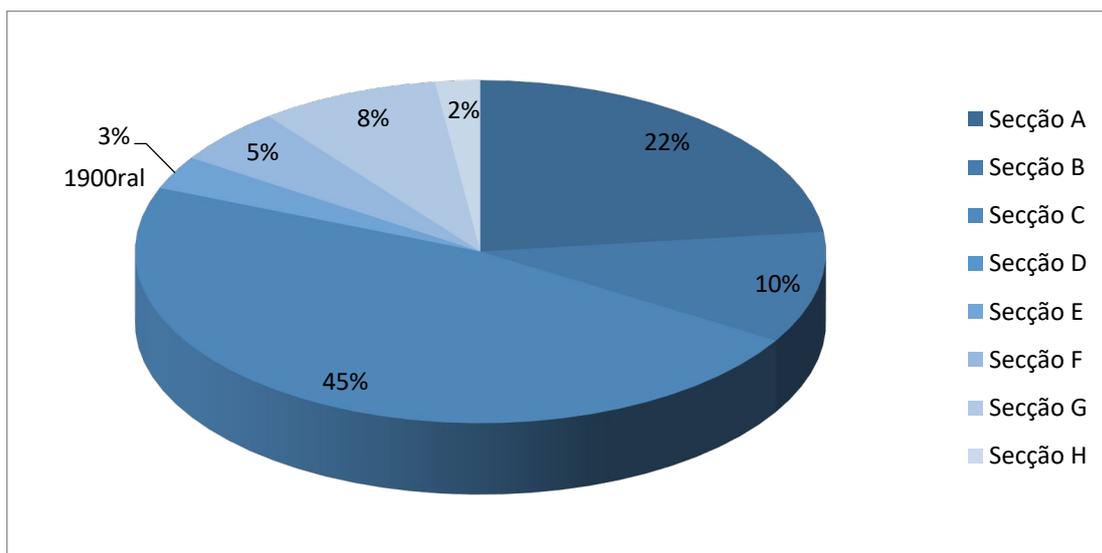
In 2013, Germany had 2.83% of national R&D expenditures in relation to GDP; The United States had 2.74% of national R&D expenditure relative to GDP, and Brazil, in turn, had 1.24% of national R&D expenditure relative to GDP (KOELLER; VIOTTI; RAUEN, 2016). Brazil, in its performance in public R&D expenditures, equates to developed countries such as those mentioned above; Thus, the agreement on the direct relationship between the government and the performance of scientific production is evidenced as a step towards the improvement of the production of inventions, reinforcing its interest in leveraging the production of patents and encouraging its production.

Table 1 -International Classification of Patents Found from 1984 to 2017

Período	IPC
1984-1989	B e C
1990-2000	B e C
2001-2010	A, B, C, F e G
2011-2017	A, B, C, E, G, F e H

Source: INPI (2017)

Graph 5 - Presence of Sections of the International Patent Classification (IPC) in patents filed in the state of Sergipe from 1984 to 2017



Source: INPI (2017)

In addition to the number of patents filed in the state of Sergipe, the classification by area of knowledge was analyzed according to the International Patent Classification (IPC), implemented by the Strasbourg Agreement (1971) and which came into force in Brazil in 1975. The IPC aims to standardize patent systematization and serve as an effective search tool for the retrieval of these documents by users of the patent protection system (JANNUZZI; AMORIM; SOUZA, 2007).

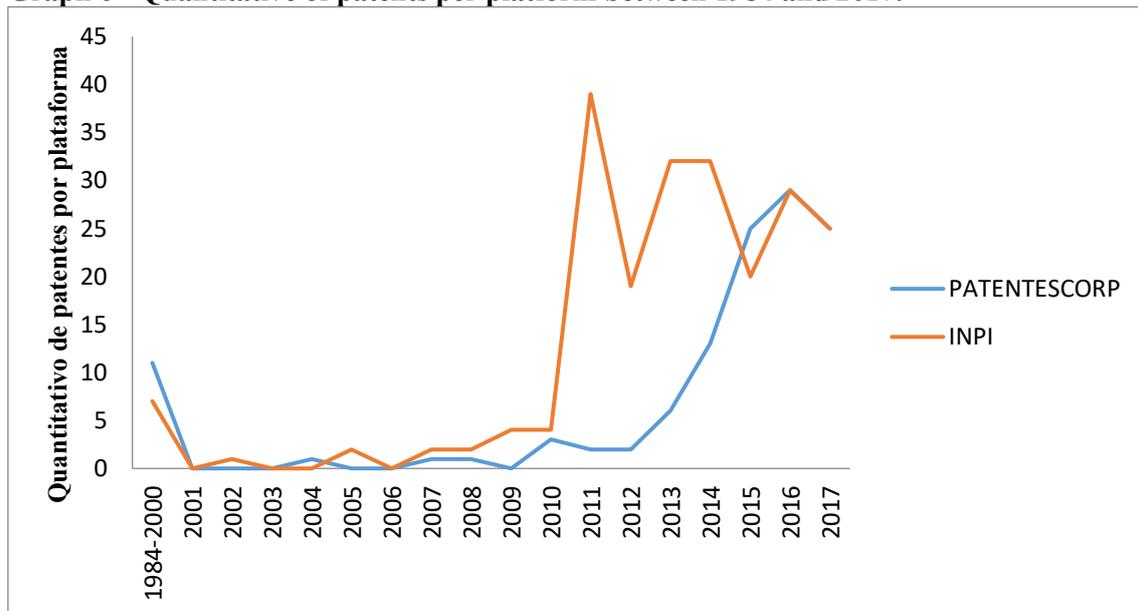
Table 1 shows us that the areas contemplating patents filed at INPI by Sergipe universities are: A (human needs), B (processing operation; transportation), C (Chemistry; Metallurgy), E (fixed constructions), F (Mechanical Engineering; lighting; heating; weapons; explosion), G (Physics) and H (Electricity). Between 1984 and 2000, there were only inventions for processing and transportation (B) and Chemical and Metallurgy (C) operations, and between 2001 and 2017 there was a greater variation in the types of inventions manufactured. All classification sections were found, except section D (textiles; paper), identifying a higher presence of section C, with 45% of patents with this classification, followed by 22% of section A and 10% of section B. As shown in graph 5, it is important to note that of the 218 registered patents, in 75 of them, it was not possible to identify the CPI.

The patent is an important indicator of the technological activity of organizations. Although it can be characterized by its intangible value, the patent production index reveals investment in technological research and innovative companies (MARICATO; NORONHA; FUJINO, 2010).

Making a comparison with the Federal University of Alagoas (UFAL), Silva (2016) states that in the period from 2003 to 2016, the University of Alagoas made 16 trademark applications, 53 patent applications and 4 computer program registration applications.

Still on national patent filers, according to INPI's 2017 ranking of resident patent filers (PI), the State University of Campinas led as the largest national patent filer (with 77 applications), followed by the Federal University of Campina Large (with 70 applications). Briefly analyzing the ranking, it is clear that of the twenty largest resident patent filers, eighteen are educational and research institutions.

Graph 6 - Quantitative of patents per platform between 1984 and 2017.



Source: INPI (2017), WIPO (2019).

In 2016, the year prior to the data presented above, the INPI filed 31,020 patent applications, showing a reduction from 2015 (with 34,046 patent applications).

Of these 31,020 patent applications received by the INPI in 2016, over 90% (ie 28,009 applications) referred to invention patents, 9.5% (2,937 applications) to utility models and 0.2% (74 applications) and the addition certificates.

On the world stage, just to put it in context, the IP Institute of China received the highest number of patent applications in 2018, a record 1.54 million applications which makes up 46.4% of the global total and is similar in terms of magnitude to the total number of institutes in second position on a scale of 11.

The IP Institute of China is followed by the US (597,141), Japan (313,567), the Republic of Korea (209,992) and the European Patent Office, the IEP (174,397). Together these five institutes accounted for 85.3% of the world total. Among the top five institutes, China (+ 11.6%), EPO (+ 4.7%) and Republic of Korea (+ 2.5%) registered an increase in the number of applications, while Japan (-1.5%) and the US (-1.6%) registered slight declines. For the US, it was the first decline in order numbers since 2009. Germany (67,898), India (50,055), the Russian Federation (37,957), Canada (36,161) and Australia (29,957) also ranked among the the top 10 institutes. All of these institutes have registered increases in order numbers, from 7.5% in India to 0.3% in Germany (WIPO 2019).

FINAL CONSIDERATIONS

Innovation and technology are tools for human development. To regulate the exploitation power of inventions, protection policies have been created for these products and processes. For this, it is necessary a junction between the public power, the industry and the universities, so that, together, they invest an expansion of technology. As observed in this study, the increasing R&D expenditure by the government contributes to the spread of innovation policy, which results directly in the number of patents filed, regardless of the institutions' use of resources. In the 33 years surveyed, only 8 patents were obtained, out of 218 filed, which shows a lack of analysis of processes by the INPI. In addition, of the areas of knowledge analyzed, according to the IPC, those that stood out were Chemistry, Metallurgy and human needs, thus revealing a need of society for instruments that improve their quality of life.

The study found that there was significant growth in technology, according to deposits made by universities; that this growth is linked to state spending on research and development, and that these patents showed that the areas of knowledge, according to the IPC, which focused more on deposits show the need for the state of Sergipe to develop products aimed at the areas of chemistry, Metallurgy and human needs. Thus, it can be said that policies for fostering innovation are fundamental for technological growth and studies aimed at technological innovation.

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