

FORMATO DE IDENTIFICACION DE PONENCIAS

1. CÓDIGO DE LA COMUNICACIÓN - **458**

2. TÍTULO COMPLETO –

“Construction of Expertise in Intellectual Property: the Brazilian experience”

3. EJE TEMÁTICO (VER ANEXO)

EL CONOCIMIENTO COMO HERRAMIENTA PARA LA INNOVACIÓN

4. AUTORES: (COMPLETAR CON CADA UNO DE LOS AUTORES)

1º autor

- APELLIDO, NOMBRE – Amorim-Borher, Maria Beatriz
- INSTITUCIÓN – World Intellectual Property Organization (WIPO)
- EMAIL - beatriz.amorim-borher@wipo.int
- PAÍS - Switzerland

2º autor

- APELLIDO, NOMBRE – Pinheiro-Machado, Rita
- INSTITUCIÓN – Instituto Nacional da Propriedade Industrial-BR (INPI)
- EMAIL - ritap@inpi.gov.br
- PAÍS - Brazil

3º autor

- APELLIDO, NOMBRE – Vianna Gonçalves, Ada
- INSTITUCIÓN – Financiadora de Projetos e Estudos (FINEP)
- EMAIL - ada@finep.gov.br
- PAÍS - Brazil

5. RESUMEN

Abstract: This paper examines strategies/initiatives taken by the Brazilian National Intellectual Property Office (INPI) to improve IP training as a key element to facilitate the use of IP system in order to enhance technological development. In 2004, INPI structured a Directory (DART) whose main challenge has been to

develop programs aiming at the increase of the number of Brazilian institutions/individuals using IP protection. DART's main mission is to have IP serving as an effective tool for innovation. Knowledge and experience about IP protection and commercialization appeared to be one of the main obstacles for the achievement of better indicators in technologic performance. In this context, DART has implemented, in partnership with other institutions, initiatives in IP education that are now organized under the newly created INPI's Academy. The conception/organization of IP training at all levels, including short courses, disciplines for undergraduate curricula, and graduate programs, has proved to be an important contribution to the National System of Innovation. The paper argues that capacity building on IP protection and commercialization is a central issue for the betterment of indicators related to technological development in Brazil. It also offers information on the structuring and the impact of IP training offered by INPI, indicating the urgent need to develop larger number of programs on technology management and to consider this type of training in the realm of public policies for industry and innovation.

6. TRABAJO COMPLETO

1. Introduction

This paper analyzes recent measures taken in Brazil to disseminate Intellectual Property (IP) culture and to promote IP capacity building programs. The strengthening of the understanding of IP appears as a central measure to facilitate the improvement of technological development, as well as a key element to assess better levels of competitiveness.

During the 1970's and 80's, the military governments which ruled Latin American countries, opted for the built up of an industrial sector following "an import substitution model". In this context, local industries controlled domestic market. One of the central goals was the achievement of positive figures in the trade balance. This scenario has been changing since the late 80's, when the Brazilian economy was opened and the political system moved towards democracy.

During the military Government in Brazil, science and technology (S&T) was a priority. As a result, a strong domestic scientific base was constructed (REINACH, 1998). However, in spite of recognizing the strong relationship between knowledge and economic growth, Brazil was not able to establish adequate strategies to facilitate the transformation of scientific and technological assets into innovation (CASTRO and OLIVEIRA, 1993). In addition, Brazilian institutions and firms could

not take advantage of imported technologies by absorbing, adapting and improving them as an outcome of a consolidated indigenous technological capability.

More recently, globalization has reinforced the key role played by innovation and knowledge to competitiveness and economic growth. Among other countries, Brazil has been struggling towards the construction of a better environment for technological development.

In this context, IP protection and IP management appear as important elements for enterprises to gain market share. Intangibles have increased their value and relevance for business strategies. In the USA, technology-licensing revenue accounts for an estimated \$45 billion annually; worldwide, the figure is around \$100 billion and growing fast. Technology firms are seeking for solid patent portfolios in order to place themselves in a better position for the negotiation of licensing agreements as well as to protect their business from legal disputes which might threaten their business (THE ECONOMIST, 2005).

In spite of having been able to establish an important structure for scientific production, a process that was initiated in the late 50s, it was only recently that Brazil launched a series of important policies for the strengthening of its National System of Innovation through the link of technological advances to industrial competitiveness.

One of the key elements for the success of technology transfer activities and for an effective use of intellectual property rights (IPRs) is the existence of competent professionals to undertake the various tasks related to the management of intangibles. A study conducted by the Association of University Technology Managers (AUTM) indicated that the success of Technology Transfer Offices is based on their employees, which comprises licensing experts and technology managers (AUTM, 2006).

The Brazilian National Institute of Industrial Property (INPI), through its Directory of Institutional Partnership and Technological Information (DART), has taken a leadership position in the establishment of activities on IP education in order to assist the main innovative institutions to improve their capacity IPRs.

This paper will present the main activities on IP training and research implemented by DART since its creation, in 2004. It will argue for the need of specific measures to facilitate the structuring of programs tailored to train technology managers.

The first part of the paper will bring a brief presentation on the current environment for innovation in Brazil, situating the difficulties of the country in transforming knowledge into products and processes. It will be argued that a Brazilian ambition to increasingly occupy a leading position in the global economy passes through the betterment of its capacity to manage intellectual capital.

In this scenario, the second part of the paper will present the several IP training activities organized by DART aiming at demonstrating the strong commitment of INPI to build competencies on IP under a multidisciplinary model.

Concluding remarks will be offered to reinforce the relevance of the existing initiatives on IP education and to point out the need for continuous efforts towards further capacity building of Brazilian institutions.

2. Brief comments on the Brazilian environment for innovation

The construction of a Brazilian scientific and technological infrastructure was initiated in the 50s, inspired on the American proposal that science was “an endless frontier” and that all fields of knowledge deserved Government support (BUSH, 1990). The main argument was based on a linear model of innovation in which investment in basic science would definitely result in technological development. It was in this period that important institutions, such as the National Council for Scientific and Technological Development (CNPq), the Advanced Coordination for High Education Personal (CAPES) and the Brazilian Innovation Agency (FINEP), were created with the mission of giving basis for knowledge production.

From 50's to 80's, Brazil placed strong efforts to develop graduate programs in all fields of science and humanities. The result was the establishment of a significant number of master and doctorate programs. According to data provided by the Ministry of Science and Technology (MCT), graduate programs increased from 583 in 1975 to 2,880 in 2006 (5-fold increase). It is interesting to note that the growth

was more accentuated in doctorate courses that rose from 147 in 1975 to 605 in 2005, representing an increment of 4.1 fold (Figure 1A). As Figure 1B shows, government also increased the number of scholarships in order to attract more young students to scientific careers. Brazil increased in more than 32-fold the number of scholarships granted to master and doctorate students in the last 36 years: 1,247 in 1970 to 40,538 in 2005 (BRAZIL, MCT_{a, b}).

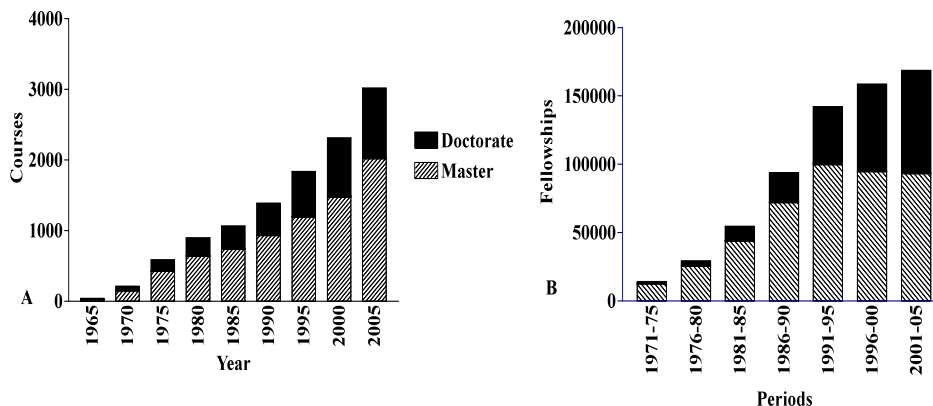


Figure 1: (A) Total number of Master and Doctorate programs from 1965 to 2005. (B) Total number of fellowships granted to master and doctorate students (1971 to 2005), divided in five-year periods. Source: MCT_{a, b}.

As a result of this commitment to structure a scientific basis, productive research groups were formed, impacting with a significant growth of the country's share of the world science (Figure 2A and 2B). Today, Brazil contributes with 2.1% of the scientific knowledge produced worldwide (MCT_c).

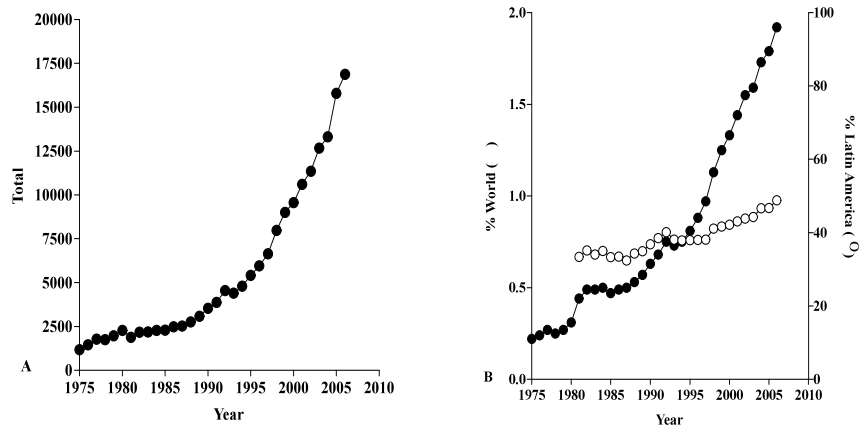


Figure 2: (A) Total number of Brazilian scientific publications in international indexed journals in relation to worldwide scientific publications annually. (B) Percentage of Brazilian contribution in relation to and to Latin America scientific input, 1975–2006. Source: MCT_c.

Although Brazil has been capable of producing a science of good quality and has occupied more relevant positions in the global scientific community, the country has not been able to present positive data as it regards the production of technology.

According to ALBUQUERQUE (2000), Mexico, India, Brazil, Argentina and Chile, could be classified as countries with immature innovation systems, in which there is a reasonable volume of scientific research and high-qualified post graduation programs, but a weak capacity to convert knowledge to innovation.

The phenomena could be particularly explained by the choice for an import substitution policy, which did not create a competitive environment. Enterprises were given a captive internal market and did not include efforts to innovate in its business strategies. In this sense, the prevailing dynamics were the import of foreign technology, which was not always followed by the desirable practice of adapting and improving it. However, since the 90s, the Brazilian Government has been putting in place policies to stimulate the industrial investment in research and development (R&D) (MCT/FINEP, 1998).

Nowadays in Brazil, around 70% of all resources placed in R&D activities are originated from public sector. The same figure appears for the amount of human resources holding master and doctorate degrees working in public institutions. It is widely known that in the most advanced economies there is a high concentration of R&D investment allocated by enterprises, and that firms hire the majority of human resources with highly qualified science and engineering degrees (NSF, 2008).

A study about technological innovation in Brazilian industry, in the period of 1994 to 1996, concluded that there was not much innovation and that little knowledge was embedded into industrial processes. As a result it was concluded that innovative performance has relied little on internal R&D activities, focusing mainly on foreign technologies. According to the authors, the Brazilian technological activities are generally limited to technology transfer and R&D adaptation (QUADROS *et al*, 1999).

It is important to note that Brazil has been strongly committed to increase investment in R&D. According to MCT, in 2007, R&D investment amounted to 1.46% of gross domestic product (GDP). Most industrialized countries have invested an average of nearly 2% of GDP in R&D. In 2007, Japan and South Korea overpass this average, investing 3.4% and 3.2% of its GDP, respectively (MCT_d).

The fast path of scientific and technological development, the significant speed of technological diffusion, the reduction of product lifecycle, the increase of R&D costs and the implicit high risk in technological activities, have created an instability that strengthens the importance of IP management as a mechanism to guarantee market positioning and to stimulate new innovative investments (BUAINAIN and CARVALHO, 2000).

The need for measures and policies to encourage firms to bring innovation to the core of their competitive strategies has also given a new dimension to the use of the IP system.

In this regard, recent public policies, such as the Innovation Law¹, the Policy for Industry, Technology and Foreign Trade (PITCE)² and, more recently, the Policy

¹ For more information see <http://www.mct.gov.br/index.php/content/view/8477.html>.

for Productive Development (PDP)³, among others, have been important to establish a link between innovation and economic priorities. In this context, IP appears as an important mechanism to be considered in technology transfer transactions.

It is in this framework that DART/INPI has taken a protagonist role on the planning and implementation of education programs on IP protection and commercialization.

The following section will bring information on the various initiatives organized by INPI/DART's IP Academy.

3. The Challenges of Establishing IP Training: the experience of INPI-Brazil

In Brazil, very few universities offer IP as a discipline. According to a survey developed by the World Intellectual Property Organization (WIPO) in 2001, only 20 Brazilian institutions of higher education undergraduate courses work on IP. In eighteen of these universities the discipline was organized within law schools. This situation is not exclusive of Brazil. According to MASKUS (2005), American universities give little attention to intellectual property. He also affirms that the subject is more present in Law school curricula. When IP is included as part of the program of engineering schools and science departments, it is always taught by lawyers.

In a context that places knowledge at the center of economic and social development, skills related to IP protection and commercialization appear as a key challenge within public policies and business strategies. Capacity building initiatives on IP become important elements to strengthen technological development and to enhance economic growth.

²For more information see <http://www2.desenvolvimento.gov.br/sitio/ascom/ascom/polindteccomexterior.php>.

³ For more information see <http://www.mdic.gov.br/pdp/index.php/sitio/inicial>.

INPI's IP Academy has been dedicated to increase IP capabilities so that the use of the IP system is intensified among Brazilians⁴. The Academy has been a reference in the establishment of training programs on IP and innovation, building a strong network with academic and research institutes on providing a locus for debates on the challenges and opportunities for the use of the IP system.

More specifically the Academy operates in order to: 1) Consolidate activities of IP research; 2) Establish mechanisms for dissemination of knowledge on IP and innovation; 3) Capacity building human resources through training courses and academic training. All the activities aim at promoting IP education in the context of innovation and development strategies.

The Brazilian IP Academy offers three types of training: 1) short-term courses for technology managers in association with state based partners; 2) short-term courses with different target groups in partnership with WIPO; and, 3) a Professional Master in IP and Innovation. It is envisaged for the near future the structuring of an e-learning program in order to better reach out to users throughout the country. One aim is to establish a program of e-learning to amplify the possibilities of action.

Next, it will be described some of the initiatives taken by INPI aiming at the creation of capabilities for the protection and management of technology.

3.1. Short term IP Training Programs

Since 2005, INPI has been organizing seminars and short-term courses on IP protection and commercialization offered to technology managers throughout Brazil. The initiative is developed in the realm of partnerships established between INPI and State-level Institutions in the area of science and technology, industry and commerce. The partnership is initiated by the organization of a Seminar with the purpose of raising awareness. The Seminar is followed by a short-term course offered in three modules (Basic, Intermediate and Advanced) totalizing 120 hours of training (one week each module). The target groups are universities (teachers,

⁴ In the last five years, an average of 30% of the total of patent applications at INPI-Brazil has been presented by residents. Only 10% of the total number of patents was granted to nationals.

researchers, students and technology managers), funding agencies, research centers, Government, industry representatives, among others.

As shown on Figure 3, the total number of participants in the mentioned training programs has grown over time, since 2005. Mainly, in the South and Southeast Regions, where is concentrate the countries' industrial production. In 2008, 45% of all short-term courses organized by INPI took place in the South Region, despite the fact that the total number of participants trained was less than in the Southeast.

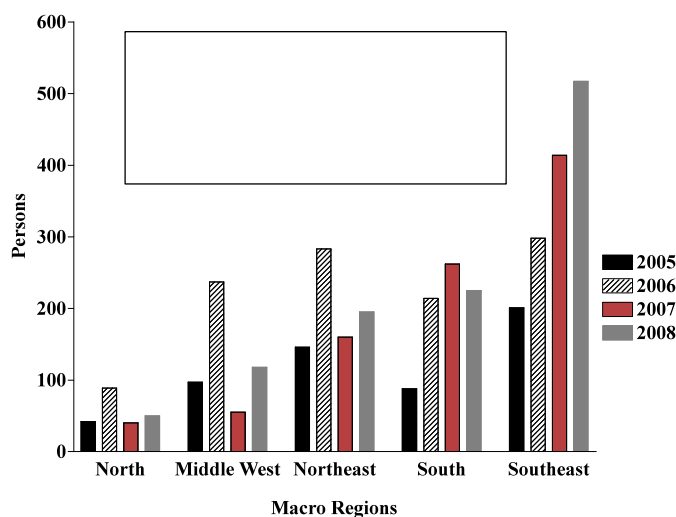


Figure 3: Number of participants trained in short-term IP training courses from 2005 to 2008, divided by macro regions. The embedded table shows the total number of courses per macro region in the same period. Source: INPI.

It is important to reinforce that the demand for this type of training course is increasing, mainly, for specific topics as biotechnology or specific groups, such as Technology Innovation Unit's (NIT) managers, for example. The increasing demand for training indicates that there is a need for a continuous work of the Academy, and an enormous gap to be fulfilled. As previously said, an adequate strategy to be followed by a country with continental dimensions would be the creation of an e-learning platform.

INPI's Academy has profited from a strong partnership with WIPO (a specialized United Nation Agency) for the training of technology managers⁵. The relationship between the two institutions dates from the genesis of the Organization.

In 1997, WIPO and INPI signed a Bilateral Cooperation Agreement. One of the main objectives of the refereed instrument was the promotion of training on IP of INPI staff as well as users of the system. In this framework, several training programs have been co-organized, aiming at building capabilities for the creation, protection and commercialization of technology.

It is worth calling attention to the challenges faced by developing countries related to the development of skills in the field of technology management. As mentioned before, Brazil has indicated, through its recent Industrial Policies and Innovation Law, the understanding that technology must be at the center of economic growth and competitiveness. For that, Brazil has been implementing several measures to facilitate the generation of innovative products and processes.

However, as argued before, the country lacks a specific strategy for the development of capabilities on IP and technology management. There is a huge need for professionals who are able to identify relevant knowledge, to decide about best ways to protect it and to place it in the market. These are professionals who should be able to operate in the interface of R&D, business and law.

In this context, WIPO and INPI have implemented a series of specialized programs in the area of IP protection and management, comprising, among others, licensing, patent drafting, IP valuation, beside others.

WIPO offers a program called the Successful Technology Licensing (STL). STL is a program designed to provide skills needed for the celebration of licensing agreements. It is a four to five days program with a two to three days of theoretical concepts and small exercises (self tests) and two days of practical work.

During the course, which is designed to have 40 to 50 participants, the group has the opportunity to negotiate the licensing of a technology and, at the end, should be able to present the final deal in a contract form. WIPO adapts the design of each program to the needs and main interests of Member States.

⁵ For more information see www.wipo.int.

In Brazil, STL was offered in six occasions, five in Rio de Janeiro/RJ and one in Salvador/BA. Two hundred and thirty six participants were trained (Table 1). One of the programs was designed as training for trainers (2006) and three of the others were area-specific, two in energy and renewable energy (2008)⁶ and another on biotechnology (2008). It is worth noting that public institutions, mainly universities and research centers, mainly attended the first editions of the licensing program. Recently, in 2007/08, programs attracted more enterprises and INPI was not able to respond to the total demand. DART received an average of 150 applications for each program that would accommodate 50 what reinforces the need for further work to be undertaken by the IP Academy.

In the first editions, INPI's training programs trained an average of 30% of participants from firms. More recently, this percentage has grown up to 50%. This fact indicates that the National environment has favored the development of innovation, encouraging more enterprises towards the use of IP and the practices of technology transfer.

Table 1: Total number of training courses and international seminars (T) uphold in Brazil from 2005 to 2008 by Brazilian INPI and the WIPO, and the number of persons (P) trained.

Training Courses	2005		2006		2007		2008		Total	
	T	P	T	P	T	P	T	P	T	P
Successful Technology Licensing	2 ^a	74	1 ^b	20	1 ^c	50	2	92 ^d	6	236
Patent Drafting	-	-	-	-	1	43	1	50	2	93
International Seminars	4	116	1	20	6	821	5	530	16	1,487
Total	6	190	2	40	8	914	8	672	24	1,816

Source: INPI.

a. Rio de Janeiro/RJ and Salvador/BA.

b. Workshop "Training of Trainers", Rio de Janeiro/RJ.

c. Course specific for oil and gas sector, sponsored by INPI/WIPO/PETROBRAS.

d. Courses specific for renewable energy and biotechnology.

⁶ Supported by Petrobras and FINEP.

As it was noted, the lack of good patent drafters also contributes to the low percentage of patents granted to nationals in Brazil. The drafting of a patent is not a simple task. A professional with a reasonable technical background should do it. Many of the best patent drafters have a technical and a legal expertise. This would be the best combination, which reflects the multidisciplinary nature of the IP field. WIPO Patent Drafting program is organized on a 7 to 10 days course. It has a theoretical module, followed by exercises conducted with the assistance of international experts. The practical material is prepared in different technical areas, according to the demand of Member States.

In 2007, WIPO and INPI organized, in partnership with Petrobrás and FINEP, a 10 days program with focus on chemistry, biotechnology and mechanics. A distance-learning module followed the face-to-face programs. The distance learning has been offered to reinforce the concepts learned on the regular program and is all based on practical exercises. Table 1 shows that two patent drafting courses were organized, one in 2007 and another in 2008. Ninety-three participants were trained.

3.2 Long Term IP Training Programs

SANTOS *et al* (2003) showed that the number of Brazilian universities that offer disciplines on IP is not significant. They also indicated the need for the structuring of specific programs on IP and innovation within law, business, science and engineering schools. In this regard, it is worth mentioning some actions taken by INPI, aiming at supporting IP education at undergraduate and graduate levels.

The first experience of the Institute took place in 2001 with the organization of a specialization course in partnership with the Federal Center for Technological Education (CEFET-RJ). INPI would participate in the conception and implementation of a first edition of the program. The idea was that CEFET would carry on with the offer of forthcoming programs. However, the program was not consolidated due to the fact that it was not created on the basis of existing research groups.

Taking into account the refereed experience, INPI constructed a partnership with the Federal University of Rio de Janeiro (UFRJ). The project was based on the

creation of a Laboratory on IP and Innovation within the Center of Economic Sciences and Law (CCJE). The laboratory was organized around eight research groups to explore topics related to Innovation, IP and Development. The idea was to get faculty to work at the same time in research and with teaching, so that knowledge would be generated and, at the same time, transmitted. The project main focus was to promote reflections over the IP system, taking into account its limitations and possibilities as a tool for economic and social development. This would be done not only through education, but also through the structuring of a research basis on the field.

In 2006, another important initiative organized by INPI was the launch of a Professional Master Program in IP and Innovation, which was certified, in 2006, by the Brazilian Ministry of Education. According to MASKUS (2005), *“the greatest need is for extensive integration of the economics of IP with law, technology and business (rights management and capital markets) ... institutions that establish strong interdisciplinary programs in the analysis of IP will be the intellectual leaders in this area for some time to come.”*

INPI's Master course is based on a multidisciplinary proposal, with lecture from the field of economics, law and business. The first edition of the Master program had 29 students. Currently the program counts with students from three consecutive selecting processes, totaling 64 graduates. It is important to say that three students already have concluded their dissertations.

As it was put before, efforts for the development of programs on IP education and research activities were organized under the IP and Innovation Academy which was formally created in 2007.

Besides getting involved with the short-term programs and with the Master course, faculty linked to the Academy also conduct research projects, always in cooperation with traditional academic institutions. This is central to the generation of ideas for the betterment of the IP system and for the understanding of complex issues such as the relationship between IP and innovation and between IP and development.

Research projects are divided in three main areas: 1) Globalization and regionalization: IP protection and its role in development; 2) Policies and emerging fields; and, 3) Intellectual property, technology society and Brazilian firms. Currently, at least ten projects are being developed in the framework of the cited areas: Diffusion of industrial property in Brazilian biotechnology enterprises; the industry of immunobiologicals in Brazil; IP for small and medium enterprises in Brazil; Evaluation of drugs development for treatment of neurodegenerative diseases; Assessment of the ethanol chain in Brazil; Biofuel processing; Manufacturers: Creation, Protection and Management; Environmental resources, traditional knowledge and benefit sharing; Scientific citations in Brazilian patent applications and patent granted by USPTO; Intellectual property in agriculture; among others.

It is expected that INPI's Academy consolidates the several initiatives already launched and strengthens its structure, incorporating new educational strategies, such as distance learning programs, in order to enlarge its contribution for the generation of competencies in a field which has only recently received attention from the Government, the academic community and industry.

4. Conclusion

This paper examined the strategies and initiatives taken by the Brazilian IP Office to promote the creation of capabilities on IP as it relates to innovation and development.

Over the years, Brazil has implemented important policies that led to the construction of a solid scientific infrastructure. The positive results can be seen on the growing numbers of research groups as well as in the increasing amount of scientific/technical papers published in international indexed journals. In contrast, public policies were not capable of facilitate the transformation of scientific knowledge into technological advances. The way the innovation system was organized and operated did not allow a high degree of integration among research and governmental institutions, and between them and the private sector. In this context, IP was not used as a tool to enhance innovation.

It was only recently that technology has been at the center of public initiatives, such as the Innovation Law, the PITCE and the actual PDP. In this context, IP has emerged as a field to be further explored.

In this connection, INPI has finally been able to take over a leadership role in the promotion of the use of the IP system by nationals. This work has been conducted with the view that the inclusion of IP into public economic strategies, as well as, into the business operation models of enterprises will allow the country to achieve more productivity and higher degrees of competitiveness.

INPI has chosen IP education and research as one of the main areas through which the institution will reach current and potential users of the system, in order to overcome the non-existence of adequate managerial and planning skills for the betterment of economic and social indicators.

For that, the Institute's IP Academy has focused on the structuring of different training programs. The growing demand for the organization of new courses has indicated the need for a continuous work. It has been a challenge for the Academy to take IP into a multidisciplinary environment. In this sense, the teaching and research activities are structured in such a way that IP is placed in the interface of economics, business, law and science. The first step, which comprises the structuring of IP education and research, has been initiated.

Future analysis should verify two issues: 1) the impact of recent policies to promote technological development and innovation; and, within this context, 2) the impact of the several training programs on the performance of the NITs and of participants from innovative enterprises.

5. References

Albuquerque, E.M. Domestic patents and developing countries: arguments for their study and data from Brazil (1980–1995). *Research Policy*, 29 (9): 1047 – 1060, 2000.

AUTM - Association of University Technology Managers. *US Licensing Activity Survey, 2006*. Available via www.autm.org. Accessed June 2009.

BRAZIL, INPI - Instituto Nacional da Propriedade Industrial. Available via http://www.inpi.gov.br/menu-esquerdo/patente/pasta_estatisticas/instituto/estatisticas. Accessed June 2008.

BRAZIL, MCT/FINEP - Ministério da Ciência e Tecnologia and Financiadora de Estudos e Projetos. *Estudos dos Impactos e Resultados dos Incentivos Fiscais de que tratam as Leis 8.248/91 e 8.661/93*. Brasília. 1998. 136p.

BRAZIL, MCT_a - Ministério da Ciência e Tecnologia. Available via <http://www.mct.gov.br/index.php/content/view/7812.html>. Accessed July 2009.

BRAZIL, MCT_b - Ministério da Ciência e Tecnologia Available via <http://www.mct.gov.br/index.php/content/view/5817.html>. Accessed July 2009.

BRAZIL, MCT_c - Ministério da Ciência e Tecnologia. Available via <http://www.mct.gov.br/index.php/content/view/8499.html>. Accessed July 2009.

BRAZIL, MCT_d - Ministério da Ciência e Tecnologia. Available via <http://www.mct.gov.br/index.php/content/view/7969.html>. Accessed July 2009.

Buainain, A. and Carvalho, S. *Parcerias Estratégicas* – n° 9, 145-153, Oct/2000.

Bush, V. *Science: The Endless Frontier*. National Science Foundation, USA, Washington DC, USA, July 1945, reprinted in 1990.

Castro, C.M. and Oliveira, J.B.A. Os recursos humanos para a Ciência e a tecnologia. In: *O estado atual e o papel futuro da Ciência e tecnologia no Brasil*, FGV, p. 233-253, 1993.

MASKUS, K.E. Emerging needs for including IP education and research in university curricula, July 2005. Available via http://www.wipo.int/academy/en/meetings/iped_sym_05/papers/pdf/maskus_paper.pdf. Accessed February 2008.

NSF - National Science Foundation, *Science and Engineering Statistics*, 2008. Available via <http://www.nsf.gov/statistics/seind08/>. Accessed July 2009.

Quadros, R., Furtado, A., Bernardes, R. and Franco, E. Technological innovation in Brazilian industry: an assessment based on the São Paulo Innovation Survey. *III International Conference on Technology Policy and Innovation*, Austin, 1999.

Reinach, F.C. Adapting to change in Latin America. *Nature*, 392: 647 – 648, 1998.

Santos, M.E., Páscoa, M.B.A., Rossi, A. A Propriedade Intelectual nas Universidades Brasileiras: O Estado da Arte. *X Seminário Latino-Iberoamericano de Gestão Tecnológica (ALTEC)*, México City, MX, 2003.

The Economist. "A market for ideas". Print edition, Oct 20th 2005. Available via http://www.economist.com/specialreports/displayStory.cfm?story_id=5014990.

Accessed January 2008.