Area: S4 University in regional innovation and social development

- University technology transfer

Technology transfer in a public Brazilian university

Key- Words: university technology transfer, intellectual property, university technology management, spin-out

1. Introduction

In 2008, Brazil was responsible for 2.63% of the items added to ISI (Institute for Scientific Information) database. This percentage demonstrates a higher Brazilian participation in the international scientific production. However, despite this increasing participation, the transformation of knowledge into technology applied to the industrial segments is very low (MCT, 2009). One of these indicators can be seen by the number of patent applications in the US. In 2008, Brazil made 499 patent applications at USPTO, more than other Latin American countries, such as Argentina (139), Chile (63) and Mexico (269), however, less than China (5.148) and India (2.869), and a few less than Russia (531) (USPTO, 2009).

Furthermore, Brazilian universities and research institutes are making more patent applications in the country (NUNES; GOULART, 2007), thus they may assume a more important role supporting the development of new technologies, which is very important for the productive segment, seeking innovations. Among the various forms of transferring technology resulting from academic research, we highlight the licensing of patent applications / patents and the creation of new companies - *spin-offs* (GUSMÃO, 2002).

In Brazil, the practice of formal technology transfer between Brazilian universities and companies is recent. After the creation of regulatory instruments, such as Law No. 10.973/04, named Innovation Law, which aims to promote innovation through technology transfer between Scientific and Technological Institutions (ICT) and companies, this relationship has intensified. It made the ICTs create technological innovation centers (NIT) to administrate their innovation policy. Besides this Law, it is worth mentioning the creation of other instruments, such as Law No. 11.196/05, named the Law of Good, which encourages the hiring of teachers and PhDs, and provides tax breaks for companies that cooperate with ICT, in addition to new credit facilities for technological research provided by Research Support Foundations.

Within this context, we can highlight the University of São Paulo (USP), which is currently the largest Brazilian research university with about 5.600 teachers and 87.000 students, accounting for approximately 35% of Brazilian scientific production indexed in the *Institute for Scientific Information* (ISI) in 2006. (USP, 2009). In order to manage its innovation policy, Agência USP [USP Agency] was created in 2005 – a body related to the Dean's Office of the University of São Paulo which is improving the protection and transfer of technology from research results achieved in the university.

Once the practice of technology transfer is not consolidated in Brazil due to a large effective volume, it is important to verify the process of technology transfer carried out at the ICTs and the results achieved in order to identify weaknesses and strengths in legal, strategic and operational procedures. Therefore, the purpose of this project is presenting concrete evidence of the actual protection and technology transfer procedures, with particular emphasis on the analysis of problems and results of four licensing procedures: two non-exclusive; and two exclusive, performed at the University of São Paulo.

Therefore, a descriptive study with a qualitative approach was prepared, using case study as a research strategy. The participants were interviewed and observed in order to collect data.

This paper is structured as follows: After this introduction, Section 2 presents the theoretical and scientific context about the subject of study; and Section 3 explains the methodology applied on the development of the research and analysis of the results. Section 4 presents the USP's quantitative and qualitative results regarding the executed license agreements. Finally, section 5 provides an analytical perspective on the Brazilian context and specific characteristics seen through the results of this research.

2. Technology transfer in universities

Studies by different authors addressing the technology transfer have been performed in developed countries such as England and especially in the USA (Friedman, Silberman, 2002; GRAFF; HEIMAN; ZILBERMAN, 2002; LOCKETT et al., 2005; Markman et al, 2005, Mowery et al. 2001; nerka; ROGERS; TAKEGAMI, 2000, O'Shea et al., 2005; SHANE, 2004).

However, in Brazil, there is quite a few case studies on university licensing, and this subject has been approached especially by governmental guidelines, which are necessary to encourage the commercialization of intellectual property rights (FUJINO; STAL, 2004; SCHOLZE; CHAMAS, 2000; STAL; PLONSKI, 1999), as well as the management of the technology developed at the universities, and technology transfer offices (SANTOS; SOLLEIRO, 2004; TERRA, 2001; TORKOMIAN; PLONSKI, 1998).

In this paper, we assume the technology transfer as a process through which an invention or intellectual property arising out of an academic research is licensed or transferred to for-profit entities, and consequently commercialized (FRIEDMAN; SILBERMAN, 2002, p.4, our emphasis). Furthermore, we must apply the same definition to non-profit entities and to the government upon special negotiation forms within specific contexts.

As for the performance of US universities on the protection and commercialization of technologies, we notice an unprecedented volume or resources and revenue compared to other countries. Yet small compared to the number of patent applications made by the industry, the US academic segment has materially grown in the last 20 years. The number of universities engaged in licensing technologies reached 200, and the volume of patents grew four-fold (MOWERY; SHANE, 2002). The US federal government licensed less than 5% of the 28.000 patents before the Bayh-Dole Act (NEAL, 2008).

The Association of University Technology Managers (AUTM) is responsible for the most complete data surveys. This entity was created to organize data and support the technology management of US and Canadian universities. Since 1991, data are published through its official report called *Licensing Activity Survey*. In 2004, only in the US, 381 institutions participated – 232 were universities. From 1998 to 2004, 3.114 new products from 185 different institutions hit the market. Only in 2004, there were 10.517 patent applications from 184 institutions (AUTM, 2005).

Hoye and Pries (2009) surveyed all data on patenting and commercialization activities jointly with 172 Canadian researchers from that country's largest university. It was observed that there is a great concentration of this activity in terms of its distribution in the academic community. This can be seen as 80% of the protected inventions come from 12% of the researchers.

The number of patent applications is growing in Europe, and this phenomenon is characterized by an homogenous magnitude among the universities, and also by the acquiring of economical results. Great part of the universities has not a considerable number of technology protection and commercialization activities, and the scholars are concerned about a growing difference between the universities based on the financial results obtained from the commercialization research (GEUNA and NESTA, 2006).

The research of Chappel et al. (2005) points out that the low compensation to the university inventors represents one of the hurdles to technology transfer. Another problem is that the effectiveness of technology transfer varies according to the university size and the number of sciences they study. Technology transfer firms that deal with several different areas have a lower effectiveness. The economies of scale in this segment are also not observed, which points out that the smaller and more specialized firms can be more effective.

In general, a broader analysis of the European patent system shows that it is fragmented, making it very expensive. Usually, it makes the researcher publish its project in order to avoid the costs

associated to the patenting process. This fact is one of the explanations why the technology protection activity is less common in European universities as compared to North-American universities.

Based on two surveys with university technology transfer specialists and researchers, Harman (2010) says that, in Australia, the research commercialization is sometimes successful; however, the performance of these activities usually varies. The key problems identified are related to the lack of resource for R&D activities, with higher emphasis on “concept test” funds in case of technology transfer experts, besides critics on the university management regarding the support to inventions commercialization activities.

A research was performed in 79 companies in Poland to investigate the main barriers to technology transfer. The analyses of the questionnaires revealed a few conclusions that support the theory on the subject. The lack of experience and closed culture of R&D institutions for cooperating with companies was identified as the higher hurdle. Besides that, there is also the recurring inefficient support system to R&D and innovation within companies. There could also be observed further difficulties to obtain financial resources, the lack of companies’ own resources and the lack of innovative spirit of the companies’ employees. Therefore, the lack of relevant communication between the science and the industrial departments is the root of all difficulties of the technology transfer process (JASINSKI, 2005).

The final underlying issue that must be remarked is the emphasis on the country's regulation aspects for technology transfer activities. This problem is pointed out by Jasinski (2005). He highlights the key role of the legal barriers, given that the bureaucracy and the absence of proper legal regulations are critical issues. According to the Brazilian context, despite the recent modifications, the same criticism remains; however, with the clear perception that the currently involved segments are seeking a higher efficiency of the domestic innovation system.

The high potential for maximizing the efforts on research and development in Brazil through a higher interaction of the domestic competent bodies was set aside during most of the twentieth century. The lack of clear guiding laws for public and private bodies up to the beginning of the twenty-first century led to the discouragement for collaborative researches and quite a few practical results of innovation were formally established through the licensing of academic patents.

As a result of the existing discrepancy between science and technology policies and the Brazilian industry policies established by the beginning of the second half of the twentieth century, in addition to the characteristics of an industrialization process that disfavored - at first - the establishment of endogenous innovation forces, Brazil had difficulties to advance into a higher global technological level.

Despite the aforementioned, the science produced in Brazil and the governmental support in all spheres resulted from a consistent support to academic research for technology development in 2000. The Brazilian Innovation Law was established in 2004 to promote the use of the knowledge and science generated by the numerous segments of the society; especially the public segment, through the intensification of research and development activities aiming at innovations. Gusmão (2002) says patent licensing and creation of new companies – *spin-offs* – has been considered the most important change to university-companies (U-C) relations in the past few years, in order to transform knowledge into marketable goods.

As one of the results of the organizational advances in the Brazilian innovation field, the Intellectual Property Managers and Technology Transfer Forum (FORTEC) were created in 2006 to support the political and management aspects and strengthen the practices of the technological management in ICT. The data of a research performed jointly with all Brazilian NITs were released at the 2nd FORTEC Meeting held in 2008. Out of the total 88 identified NITs, 54 answered the questionnaire; 35% from the southeast region, 41% from the south, and the remaining questionnaires from the other regions. The universities are the research institutions of 95% of the NITs, versus 5% of research institutes. The NIT is associated to the University’s Research Department (30%) and the Management Department

(18%). The remaining is diluted into different associations. In 2007 the largest number of NITs created in Brazil has been registered, which totalized 14. In 2006 there were 7. Around 55% of the NIT has formal intellectual property instruments, and 65% has a resource distribution policy for inventors. As for the size of the team, around 40 NITs, i.e., almost 50% has from 1 to 10 employees; most of them are scholarshippers and interns. Following are the main activities:

- Organization of events and dissemination of the intellectual property culture;
- Follow-up activities and guidance on intellectual property processes;
- Technical and administrative support on technology transfer processes;
- Legal advice on technology transference.

Analysis of patent applications per region indicates great regional differences. 1.800 were accounted for the southeast region; 210 for the south region, and less than 50 for all other regions. The economic gains from exploitation of technologies are not significant, and do not brake the barrier of BRL 1.300.000. However, they evidence an already existing practice for part of the organizations.

Considering that most of the NITs are very recent, the current moment is characterized by qualification and structuring processes, also considering the regional differences, and the establishment of good practices and their evaluation, in order to provide an increasing quality and productivity for these centers. FORTEC has been the organizing and supporting entity of these actions in collective terms and represents a great advance in this perspective.

As we may see in Chart 1, the number of patent application in Brazilian universities has increased 237% as compared to the total deposits from 2001 and 2004. Moreover, this number kept increasing during the following years, provided that – taking USP as an example – we verified that the number of applications grew from 38 in 2004 to 58 in 2009.

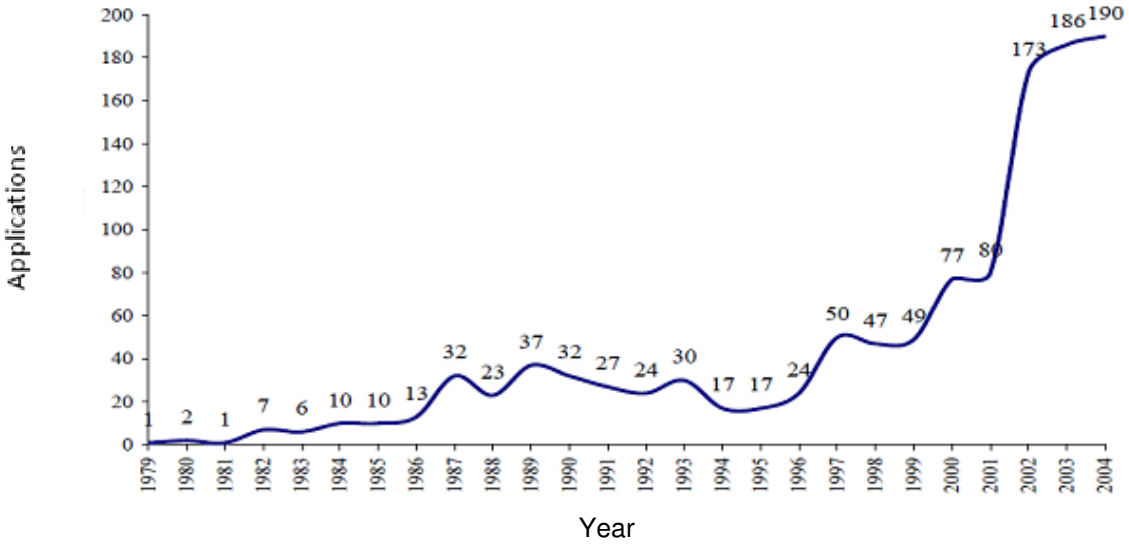


Chart 1 – Evolution of Patent Applications from Brazilian Universities 1979-2004.
Source: Póvoa (2008).

These are important data to be presented, given that the patent applications are the basis for licensing as a technology transfer mechanism. Following, are specific concepts and a brief organization of the literature relating licensing practices and their theoretical role to the current innovation context.

2.1 Patents as an instrument for technology commercialization and open innovation

As an initial point for the comprehension of the academic patent licensing, it is worth to introduce structuring concepts regarding its conceptual definition. The patent is defined by the World Intellectual Property Organization (WIPO) (2005), as "an exclusive right assured by an invention, which a product or process provide a new way of doing something or offering a new technical solution to a problem." The patent is also a temporary ownership title over an invention, enabling its exclusive exploitation or preventing the production of third parties without the inventor's approval.

As a movable asset (such as a house or car) the patent can be sold, purchased, licensed or assigned (RODRIGUES, 1998).

As for the technology transfer, once it is clear and distinct, and explicitly regulated by Law, the patent can be considered a proper mean to transfer the necessary technical knowledge for the production of certain goods.

Therefore, it is important to emphasize the mean character that the patent shall have for the universities, because this is an expensive project, and its sole purpose is protecting the invention from commercial exploitation; otherwise, it is only for the pride of its inventors (STAL; FUJINO, 2002). The role of the intellectual property for the public universities – especially the protection through patents – is distinct in relation to companies that make patent applications in order to have the exclusive commercial exploitation rights. On the other hand, the universities do not make patent applications for themselves, but to protect, codify the knowledge and make the invention economically feasible (GRAFF; HEIMAN; ZILBERMAN, 2002).

Under the operational standpoint, the universities' patent licensing agreements are similar to the commercial agreements. However, they can provide further conditions that mirror the objectives of the university and the development level of the technologies. The terms, conditions and payment are agreed by the technology transference firm of the university and the company. The provisions of the agreements aim at aligning the interests and cooperative relationship of the parties (GRAFF; HEIMAN; ZILBERMAN, 2002).

The same authors add that, normally, the universities do not provide any guarantee over the licensed technologies, limiting their responsibilities. Payment for the license shall be made as follows: 1) initial payments (down payments) and current payments (royalties). Current payments are normally made by specifying a minimum yearly percentage taking into account the administrative expenses. In the USA, 57% of the universities receive current payments from licensing earnings.

Concluding the literature approach on patent licensing, it is worth emphasizing its insertion into the context of current innovation. In this regard, as a strengthening factor to the protection and commercialization of technology, it is important to promote open pro-innovation actions that, according to Chesbrough (2006), can be understood as an anti-thesis to the industrial innovation which occurs exclusively from the R&D internal process, because it accepts this process in an open system.

In the open innovation model, the projects can be inserted to the innovation process at any time, and other projects can also be excluded from the internal R&D process either to be externalized and incorporated by other organizations of the head institution or not. New external technologies can also be internalized throughout different stages of the innovative process (CHESBROUGH, 2006). In this regard, the patent license is a legal well-defined mean for internalization and externalization of technologies originating new businesses within different contexts.

3. Methodology

The basic nature of this study is characterized as descriptive based on the qualitative approach to the research issue and its objective is presenting concrete evidence of the actual protection and technology transfer procedures, with particular emphasis on the analysis of problems and results of

four licensing procedures: two non-exclusives; and two exclusive, performed at the University of São Paulo.

The study is considered a descriptive study, because according to Triviños (1987, p. 128) - the qualitative research is considered as descriptive.

> The descriptions of the phenomena are associated to the meanings provided by the environment […] the results are expressed, for example, through portraits (or descriptions) in illustrated narratives with statements to provide the necessary concrete base, with photos etc., followed by personal documents, fragments of interviews, etc.

The chosen technical procedure was the case study. According to Yin (2005, p. 18), the case study is adequate for answering questions such as “how” and “why” about a contemporary set of facts, which the researchers has little or no control.

Two techniques were used in order to collect data: Participant observation, once the researchers participated in the licensing processes with or without exclusivity, and a semi-structured interview with the responsible for the technology transfer department.

The study was carried out at the University of São Paulo, which is ranked 78th in the Council of Taiwan, which classified the top 500 education and research institutions worldwide, and the first among the Latin American universities.

The qualitative evaluation was performed by documentation and content analysis of the primary data collected by the survey.

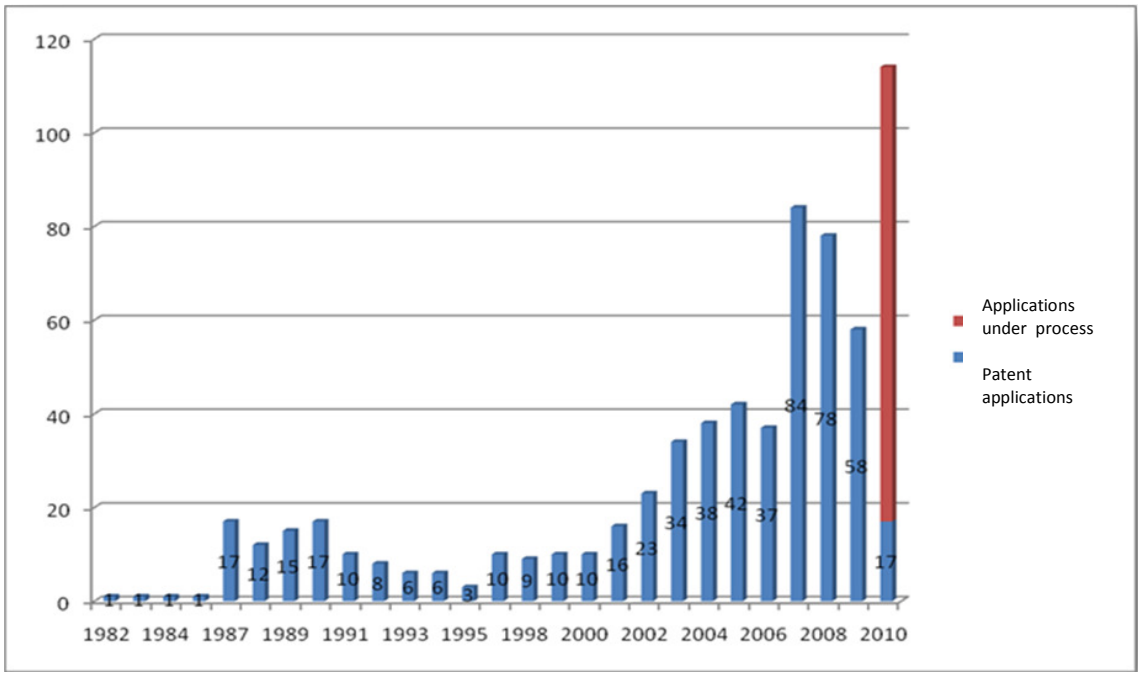
4. Results

4.1 Performance in patent applications and comments on the strategy use in licensing models

Agência USP de Inovação, organization in charge of the technology management within Universidade de São Paulo – USP, was created in 2005 with the purpose to "promote the use of scientific, technological and cultural knowledge produces at USP in the social and economic development of the State of São Paulo and the country" and to identify, support, promote, encourage and implement partnerships with corporate, government and non-government segments pursuing results for the society.

The intellectual property is better developed, since USP established, in 1986, a pro-patent internal structure application, which was incorporated by Agência USP Inovação since its foundation.

The growth magnitude of patent applications at USP may be seen in Graphic 1, however, the average of new applications from 2007-2009 was approximately 73 per year. In 2010, about 71 new applications are simultaneously under process, and 17 were already filed in the first semester.



Graphic 1 - Patent applications deposited by USP between 1982 and 2009 consolidated.

In the accumulated total of patent applications/patents, USP recorded approximately 570 and 88 granted. Furthermore, there are ownership adequacy procedures in patent applications, meaning USP starts to be a part of it, increasing such numbers. Before that, it is concluded that such activity is consolidated within USP extent, creating a great amount of intangible assets for technology negotiations.

Aiming to promote the use of such protected technologies, Agência USP Inovação carries out patent licensing processes involving an analysis of the use of the licensing strategy. Such analysis includes market and technology elements (differential, development stage, market context adequacy), which support the decision for a specific model, exclusively or not.

As summarized by Figure 1, exclusivity was adopted in business processes in which the benefit intended with technology incorporation is highly impactant in the value chain. Markets that are more favorable to such context are oligopolyzed, and they usually require high investments to release new products. Pharmaceutical industry is an example, pointing out the relevance of pharmaceutical patents is very high. Yet, it is possible that small companies based in knowledge are interested in exclusive licensing aiming at continuing with the development in order to sell intellectual property.

As for the adoption of non-exclusive licensing strategy, it is especially seen, in the cases studied, that technologies had little added value, not changing industry profitability regarding the product. Yet, it was noticed the application incidence of this strategy in competitor companies, aiming to expand the product portfolio. Small and medium companies were first as main clients; however the model may be used to large companies seeking to develop collaboration projects with the university, focused in the concrete authorization for exploiting the technologies subsequently developed.

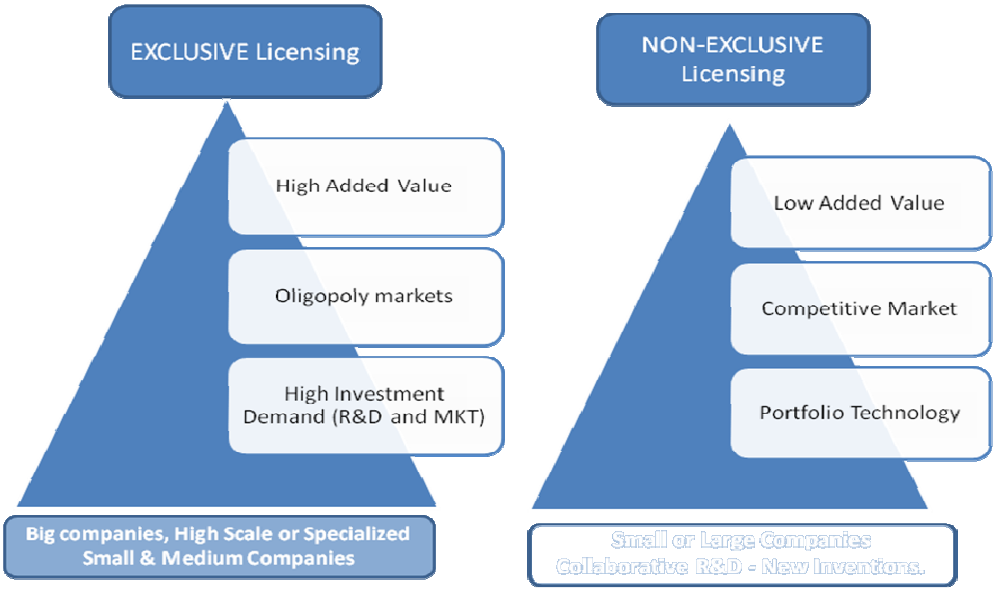
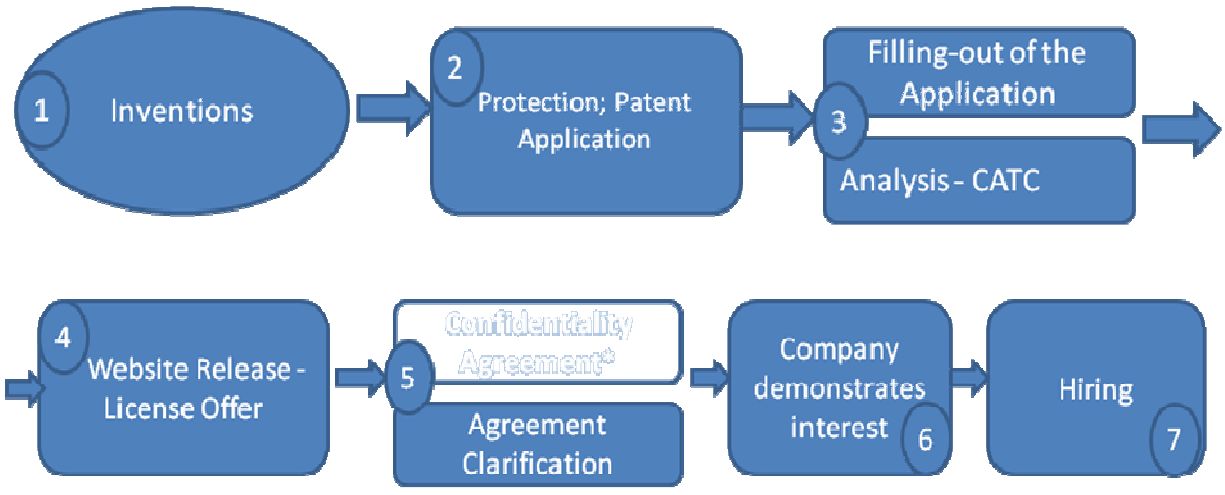


Figure 1: Elements studies in the use of application licensing/patent strategy as for use exclusivity.

4.2 Description and analysis of four licensing cases

4.2.1 Non-exclusive licensing cases

The non-exclusive licensing of applications/patents process at USP, within its Agência de Inovação, is practical when analyzed since 2007 as for its procedures. Based on the items of Innovation Law, steps guiding this process were created, as indicated by Figure 2.



*The Confidentiality Agreement is optional according to the access needs to secret information on technology and market prior to the agreement's execution.
Figure 2: Steps of the non-exclusive licensing process at Universidade de São Paulo.

Considering the two following cases and the practice set forth at USP, the university researcher presents Agência USP Inovação with an invention to analyze the protection by intellectual property. By confirming the invention's patentability, patent application is written with the preparation of a technical

and commercial study, which shall be the classification object at the Technical and Commercial Analysis Committee - CATC, comprised by employees of the aforementioned Agency.

As from the preparation of the technology report and the sales potential assignment carried out by votes of the CATC members, considering: low; moderate; or high sales potential, the sales strategy for marketing actions is adopted aiming at technology transfer or its development continuity along with external organizations.

With the purpose to increase the licensing opportunity, Agência USP Inovação's website presents a Note comprising the offer of non-exclusive application/patent license. In the event the companies are interested in further information, they might execute a Confidentiality Agreement as the questions on the contract terms are solved. Aware of its interest, the company submits a Formal Manifestation on the sale, followed by the definition of compensation aspects, terms, secrecy and penalties for such contract.

Following, starting by Table 1 – synthesis of the non-exclusive cases -, the key aspects of the processes checked at USP are presented.

Key aspects of Exclusive Licensing Cases					
	Year and Protection	***Direct Market Potential***	***Company Size and Segment***	***Term***	***Compensation***
Case 1	Patent Application 2004	Lubricant and Chemical Industry	Chemical Industry Small Company 100 > employees	4 years	3% royalties – net revenue
Case 2	2 Patent Applications 2003 2008	Educational Kits Industry, Publishers	Educational Toys and Kits Small beginning company > 5 employees	5 years	2% royalties – net revenue

Table 1 – Synthesis of key aspects in two non-exclusive licensing cases at USP.

Initially, it is worth mentioning the non-exclusive licensing mechanism has become more widely renowned and encouraged after the Brazilian Innovation Law of 2004. Such legal milestone set forth the chance of direct sale between the university and interested external companies, making the process attractive for small, medium and large companies, when the business model may be adequate for commercial use in competitions.

Case 1 indicates a technology developed at Escola de Engenharia de São Carlos by a Ph.D. researcher and a doctorate student. The technology proved to have little economic impact on its market segment, though highly attractive to companies, as it replaces a mineral source for a vegetable in industrial lubricants. The Industry's quest for enhanced environmental friendly technologies facilitated the marketing of such patent application.

After filing the patent application in 2004, with the main request of a chemical formula specific for cutting fluids to be used in combustion machines of the industrial cutting process based on water and

castor oil, a sale process of intellectual property was started in 2007. As from the interest by a small company in the chemical industry, Agência USP Inovação acquired more detailed information with the technology inventors in order to benefit the opportunity identification by the company.

Once the company confirmed its interest by a letter sent to USP, administrative steps to release the License Offer Note in Agência USP Inovação's website were carried out as non-exclusive, as it was set forth as the best business model for technology use.

The contract sets forth the commercial use of technology for 4 years, including the license and supplying of technology as materials and records used to create it. The compensation set forth was 3% royalties on the net income of the company with products using the content of the university's patent application. There was no payment at the agreement's execution.

Case 2 indicates two similar patent applications of specific content under the other development and market conditions. They are two 3-dimension model kits, one of DNA and another of Amino acids. Such technologies are not very complex as for production processes and new products, being different and original for its arrangement and providing for the purposes of life sciences teaching. The applicant was a new company, which formally presented interest in technology use to USP, following the same previously mentioned steps. The agreement sets forth the commercial use of technology for 5 years, including the license and supplying of technology as materials and records used to create it. The payment set forth was 2% royalties on the net income of the company with products in which technology is used, and no payment was carried out at the time of the execution.

4.2.2 Exclusive licensing cases

The exclusive patent licensing process at USP, as part of its Innovation Agency, is also a recent practice, given that the first one occurred in 2007. The steps of this process were structured according to Figure 3, based on the Innovation Law.

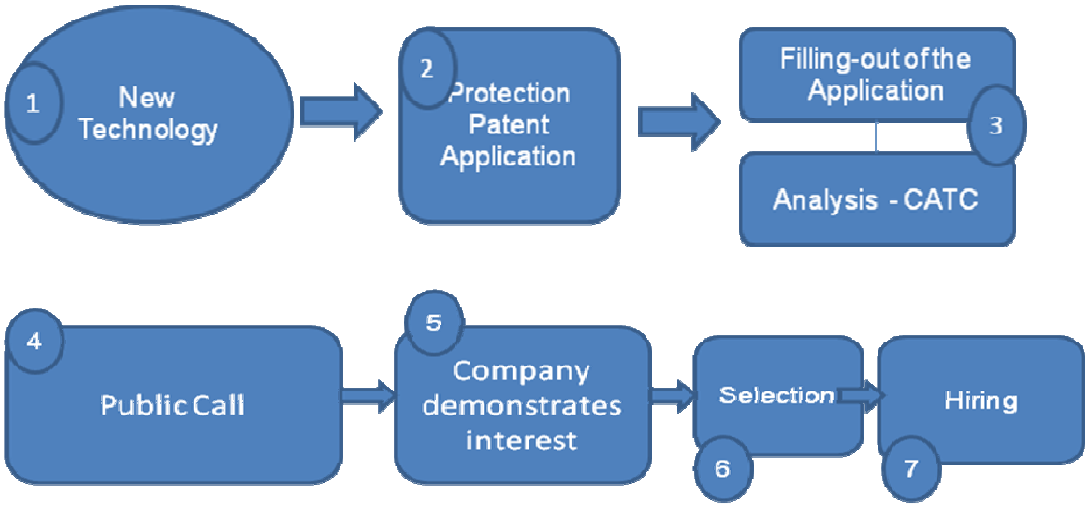


Figure 3: Phases of the exclusive licensing process at University of São Paulo.

The practice established at USP for exclusive licenses follows the requirements provided by the Innovation Law (2004). The modality process with exclusivity differs from the process without exclusivity at the fourth phase, where there is technology communication for potential interested parties. In this modality, once USP is a public institution, a call notice is released containing the following information: 1) Clear and brief description of the subject matter of the agreement; 2) hiring conditions, such as the legal and tax good standing of the interested party, as well as its technical and

financial qualification for exploring the inventions; 3) objective technical criteria for qualifying the better agreement, observing the particularities of the invention; and 4) terms and conditions for commercializing the invention. The agreement to be executed is an adherence agreement, that is, it is part of the call notice, which cannot be amended. This call notice is published in the Federal Official Gazette in order to reach the interested parties, and also on Agência UPS de Inovação's website.

After released, the interested companies may send their offers, requested documentation and their proposal. Agência USP de Inovação will select the best one and inform the company. After this procedure, the agreement is executed.

In table 2, you can find the key aspects of two exclusive licenses made by USP.

Key aspects of Exclusive Licensing Cases					
	Year and Protection	***Direct Market Potential***	***Company Size and Segment***	***Term***	***Compensation***
Case 3	Patent Application made in 2000	Pharmaceutical Industry	Incubated Company Around 13 employees	10 years	Up front: U$$ 8000 3% royalties – net revenue
Case 4	Patent Application made in 2002	Pharmaceutical Industry	Small Company Around 30 employees	10 years	Up front: 135 000 3% royalties – net revenue

Table 2 – Key aspects of two USP exclusive licensing cases.

Case 1 presents a technology developed by a scholar from Faculdade de Medicina de Ribeirão Preto. It is about a pharmaceutical composition for treating illnesses caused by microbacteria. This technology was licensed by a biotechnology company that incubates companies related to USP RP campus.

Case 2 also presents a technology developed by a scholar from Faculdade de Medicina de Ribeirão Preto. It is about a pharmaceutical composition that uses serum from latex and has angiogenic activity, supporting the healing of the tissue. This technology has numerous applications and the company that licensed it was established due to the innovating potential and the possibility provided by such technology to create innumerous products.

Therefore, as highlighted above, the exclusive licensing cases are of great interest for pharmaceutical companies, which develop higher accrued value products, and with high development expenses. Therefore, such modality is usually chosen by this segment. These cases provided a broad knowledge to Agência USP de Inovação, as these were the first exclusive licensing processes made after the enactment of the Innovation Law, by the end of 2005.

According to the requirements provided by law, it was necessary to make interviews with companies from the segment in order to check the information detailed prior to the hiring, so the process is not prejudiced, once this is an adherence agreement. In this category, it is not possible to hold negotiations with the companies.

Furthermore, both the processes were slow and bureaucratic, and took around 2 years to be concluded. This term was partially caused by the internalization of the process and understanding of the Innovation Law by the university's legal department.

5. Conclusions

In the Brazilian context, it was verified that universities and research institutions have increased their participation in the number of applications in the country, being considered contributors to the development of new technologies and incremental innovation, representing great importance to the productive sector in a quest for innovations. Besides that, the technology transfer practices in Brazilian universities are recent, as the Innovation Law of 2004 was enacted by the end of 2005. Thus, the exclusive and non-exclusive licensing procedures were verified through this study performed by USP, which is considered the best Latin American university.

It was observed that, for the licensing of non-exclusive patent applications, the process is less bureaucratic and allows direct negotiation with the company, minimizing conflicts and deadlines. This model is indicated by literature (Nelson (2004) in many cases as the most appropriate because it is knowledge originated in public institutions, with different degrees of maturity and which should be widely disseminated to the society, observing possible opportunities to expand relationships for the technological progress.

In cases of exclusive licensing, it is not possible to directly negotiate with the company because the attorney's offices of some Brazilian public universities understand that there is the necessity of an announcement for wide dissemination and subsequent receipt of bids from potential interested companies. Thus, this interpretation makes the process more bureaucratic and time-consuming. Another sensitive issue due to absence of trading in contracts with exclusivity is the adequacy limited to the benefits of both parties.

Under the processual point of view, we observed the need for greater flexibility of the internal university's bodies regarding the analysis of the agreements and internalization of the licensing process.

Furthermore, it was possible to observe the profile of the companies that licensed the technologies and observed that there are new technology companies in three occurrences and a medium chemical company in one. Theses cases picture the impact an innovation may have over the technological growth and improvement for these companies, providing an example of the role of an entrepreneurial university, through which the university is capable of cooperating with companies and other institutions, preparing qualified human resources; besides the research and extension activities through partnerships in order to support the economical development, as emphasized by ETZKOWITZ (2004).

With this analysis, it was possible to verify the weaknesses and strengths of each licensing; therefore, favoring the continuous improvement of the technology transfer procedure carried out by USP through Agência de Inovação, being also useful for other research institutions playing similar roles.

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