From University to Industry: Technology Transfer at Unicamp in Brazil

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ABSTRACT

This chapter discusses how Brazil has dramatically increased technology transfer and innovation through the State University of Campinas, or Unicamp. The leader in patenting and licensing activities in Brazil and Latin America, Unicamp has vaulted to this position in the short span of two and a half years through its technology transfer office, Inova. Providing background information about Brazil's legal framework and practices, especially as it concerns the ownership of intellectual property and benefit sharing, the chapter discusses government incentives for innovation in light of Inova's impressive results. Two successful cases of technology transfer are presented as guides to realistic expectations about investments, terms of license, and royalties.

1. INTRODUCTION

In the last two years, the University of Campinas, or Unicamp, a Brazilian university publicly funded by the state of São Paulo, has become a leader in technology transfer. The critical agent in this process is Inova Unicamp,[1] the university's technology transfer office. In the last two and a half years, Inova has signed 128 technology transfer agreements and licensed 45 technologies (41 patents and four cases of know-how) to both private companies and the government. These agreements will last for more than ten years and have already generated royalties for the university. In the same period, Inova applied for 153 new patents, 22 trademarks, and 24 software registrations. Additionally, ten companies from Unicamp's business incubator have become self-sustaining. They may leave the university, after which they will pay Unicamp a percentage of their income for the next five years. Although Inova is still very young, in its first six months it achieved more results in technology transfer than had been achieved in Unicamp's entire history.

These outstanding results are unique for both Brazil and Latin America. The success of Inova has encouraged other Brazilian universities, as well as small- and medium-sized companies, to look to Unicamp as a management model.

2. PATENTING ACTIVITIES AT UNICAMP

Founded in 1967, Unicamp has, on average, 31,000 students; half of these are undergraduate students and half are graduate students. There are about 1,800 faculty members. With a total of 20 research units, Unicamp offers more than 50 undergraduate degrees and more than 100 graduate degrees. As a multidisciplinary university, Unicamp pursues a variety of technologies in many fields. Inova has assessed all of them and has aggressively pursued new patent applications

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and licensing deals for those that have been most promising.

Table 1 lists the most frequent patentors in Brazil between 1999 and 2003: Unicamp is ranked as number one. It is interesting to note that among the top 20 institutions, there are five universities and two donor agencies. This runs contrary to the norm in developed countries, where industries patent more than universities and R&D centers.

The size of Unicamp's IP portfolio is also growing rapidly. As of last year, Unicamp has a substantial IP portfolio:

- 48 patents granted and 377 filed
- 17 registered trademarks and 36 filed
- 66 registered software applications/inventions and 66 filed

This portfolio is considered large for Brazil, showing that Unicamp's community has a good

Table 1: Patenting Activities in Brazil: A Ranking of Institutions (Total Patents Issued from 1999 to 2003)

Institution	Number of Issued Patents
Unicamp	191
Petróleo Brasileiro SA (PETROBRAS)	177
Arno SA	148
Multibrás Eletrodomésticos SA	110
Semeato SA Ind. e Com.	100
Companhia Vale Do Rio Doce	89
FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo)	83
Brasil Compressores SA	81
Dana Ind Ltda	71
Universidade Federal de Minas Gerais	66
Johnson & Johnson Ind. e Com. Ltda	56
Universidade São Paulo	55
Jacto Máquinas Agrícolas	54
Minas Gerais Siderurgia (Usiminas)	48
Electrolux do Brasil SA	45
EMBRAPA	42
Conselho Nacional de Desenvolvimento Científico e Tecnológico	42
Universidade Federal do Rio de Janeiro (UFRJ)	38
UNESP - Universidade Estadual Paulista "Júlio de Mesquita Filho"	34
Dixie Toga SA	31

Source: Unpublished data from INPI (Instituto Nacional de Propriedade Industrial), Brazil.

understanding of the importance of protecting research results. Figure 1 shows the evolution of patenting activity at Unicamp. One can recognize an increase in activity after 1996, when the new Brazilian IP law was released, allowing protection for food, drugs, and chemicals, areas in which the university is very strong.

In terms of patent distribution by institute within Unicamp, patenting activities are not uniform within the university's research units. The greatest contributor to the portfolio is the Chemistry Institute, which was responsible for 48% of patents. As a result, most of the licensing agreements are made with the pharmaceutical, chemical, and medical devices industries, employing technologies originating from the Chemistry Institute. Other technologies such as medical applications (17% of licensing agreements), agribusiness (8%), and food (8%) occupy smaller places.

Inova's patent database is available online.[2] Patents are organized by market sector and can be searched by key word. This structure simplifies the localization of the available technologies by sector, which is useful for Inova's commercial team and also for external customers (industry or investors).

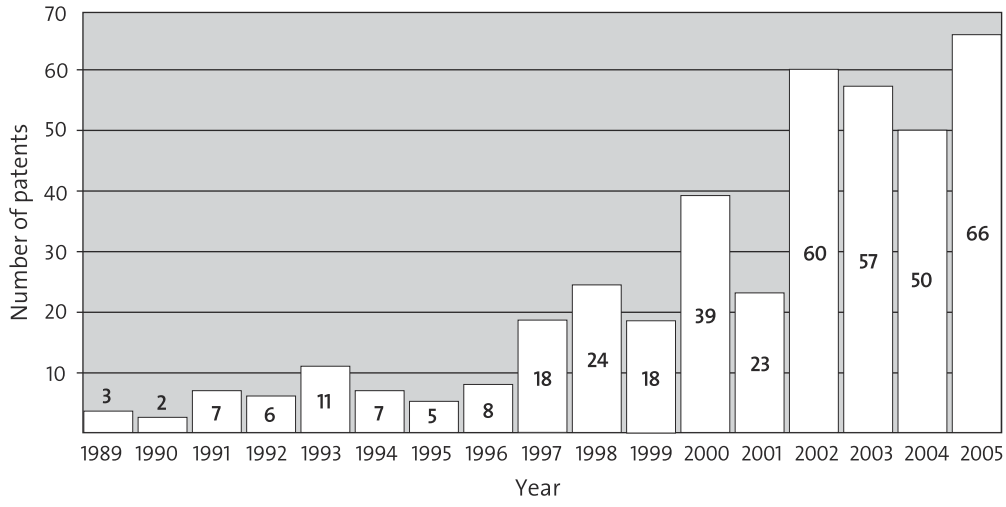
3. TECHNOLOGY TRANSFER ACTIVITIES AT UNICAMP

Unicamp is not only Brazil's biggest patentor but also the country's biggest licensor. According to Brazilian Law,[3] an employer is the rightful owner of all of its employee's results. Unicamp, therefore, owns 100% of its professors' and researchers' results. Although the Brazilian Innovation Law[4] allows public institutions to give up ownership to the inventor, Inova has not practiced this option. Its inventors lack commercial expertise, and it is more attractive to both the university and to the inventor for Inova to commercialize the technology and give the inventor part of the licensing fee.

Unicamp also commonly practices sponsored research. In such cases, ownership is normally split 50/50. In exceptional cases, where the industry partner or investor requires 100% ownership, Inova compensates the university by selling Unicamp's ownership to the partner.

Inova is driven by market demand. Instead of selecting Unicamp's technologies and offering them to the market, Inova finds out the market demand first and then looks for the solutions available inside of the university in response to that demand. Our focus is on the customer first

Figure 1: Patents Filed by Unicamp



and on the technology second. Since Unicamp has a good and big technological production, normally we can provide to the market more options than they expect. Inova always tries to provide to the market a technology protected by a strong patent.

This market-demand model is partly why its results are so impressive. Another factor that contributes to Inova's success is the professional staff involved in technology transfer: the commercialization team comes from private institutions and has business skills. Most other universities in Brazil and Latin America use people from their research staff in technology transfer positions. But negotiation, market investigation, evaluation, and so on, are best done by business people who are specially trained to do it.

The 128 technology transfer agreements signed in two and a half years make Unicamp the biggest technology transfer provider in Brazil and Latin America. As Unicamp has multidisciplinary competence, the agreements were made both with private companies and with the government, as well as in many different industry sectors.

The licensing agreements last for more than ten years, and have already generated royalties for the university. These royalties range from 1.5% to 10% of the net income derived from the licensed technology. Each case has particular issues: all licensing contracts include royalty auditing in order to confirm that the sales results that the licensees present are correct.

It is noteworthy that according to the Innovation Law public sector inventors must receive from 5% to 33% of royalties or licensing income, as an incentive to develop new inventions and innovations. Unicamp grants inventors 33% of royalty and licensing income. The following cases make clear how much this income can realistically represent. Professors are paid for any consulting.

Two successful examples of technology transfer involving technology developed at Unicamp and handled through Inova are detailed in Box 1. These cases are presented as guides to suggest realistic expectations for investment, terms of license, and royalties.

4. GOVERNMENT INCENTIVES FOR INNOVATION

In recent years, the Brazilian government has provided new incentives for innovation. These include:

- tax benefits to companies that pay royalties (licensees)
- tax benefits to companies that invest in R&D, inside or outside the company (The latter includes funding R&D in universities, R&D centers, spinout companies, and independent inventors.)
- compensation for taxes paid for royalties abroad during the execution of technology transfer contracts
- no taxes on money paid to maintain patents, trademarks, and cultivar registrations abroad
- sponsorship/subsidy of 60% of the salary of a scientist hired by a company

All sectors are targeted by the law, but the Brazilian government has paid special attention to information technology, energy (electricity, oil, natural gas), semiconductors, biotechnology, and pharmaceuticals.

Importantly, the Innovation Law established that all government universities and R&D centers must have an office to take care of IP. This will increase patenting and licensing activities in public universities and R&D centers in the next few years.

5. CONCLUSIONS

In recent years, patenting and technology transfer activities have become institutionalized in Brazil. A concrete example is Inova, the technology licensing office of the State University of Campinas. Other public universities and R&D centers have been studying and trying to understand Inova's model, in order to follow its example. With regard to intellectual property, Brazil is at a crucial juncture. The government, especially in recent years, has released many incentives to innovation, which are reaching universities, R&D centers, and private companies. This certainly will increase patenting and technology transfer activities in the

Box 1: Examples of Unicamp Technology Transfer Successes

BiPhor

Licensee. Bunge (a global agricultural company)

Technology. white pigment based on aluminum phosphate nanoparticules (nanotechnology)

Target market. water-based paints (world market estimated at US$5 billion per year)

Advantages over existing technologies (TiO2). whiter, cheaper, "green" (or environmental) chemistry, improved quality and durability

Bunge's terms.
- investments of US$450,000
- exclusive license for 20 years
- target market share of 10%, worth an estimated US$500 million per year

Unicamp terms.
- 1.5% royalties (approximately US$4.5 million per year for 20 years)
- 33% of royalties (approximately US$1.5 million) to the inventors

Status.
- pilot plant running at 1,000 tons per year in sample production
- commercial plant to be running in five years at 100,000–200,000 tons per year
- sales price to be a little lower than TiO2 (product's competitor), which costs US$3,000 per ton

Aglycon Soy

Licensee. Steviafarma (medium-sized Brazilian pharmaceutical company)

Technology. concentrated phytoestrogen, extracted from soybeans using biotechnology (The unique process, developed at the university, employs a genetically modified microorganism owned by Unicamp and available at ATCC.)

Target market. hormonal therapy

Advantages over existing technologies. improved efficacy without side effects caused by conventional drugs, anticancer agent, LDL cholesterol reducer, fungicide, anti-inflammatory, and antioxidant

Steviafarma's terms.
- investment of R$100,000
- exclusive license for ten years
- target market share of R$36 million per year (Brazil only)

Unicamp's terms.
- 6% royalties over ten years (approximately R$1.2 million per year for 10 years)

Status.
- ANVISA registration granted
- production scheduled for September 2006

country and strengthen the relationship between public institutions (where the Brazilian research is mainly concentrated) and private companies, contributing strongly to innovation.

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1 Although a young organization, Inova now employs 20 people in technology transfer. They include business managers, support and marketing specialists, lawyers, patent analysts, and administrative assistants. These people and the others responsible for accounting, financial planning, management, and other crucial tasks, are strongly motivated and always have an eye for synergy. Together they are responsible for Inova's success. For further information, please visit www.inova.unicamp.br.

2 www.inova.unicamp.br.

3 Law 9.279, May 1996.

4 Law 10.973, December 2004; and Decree 5.563, October 2005.