

Work in Progress - A Model to Foster Technological Innovation and Interaction between Academy and Industry in Mexico

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Abstract - Nowadays, human societies are undergoing major transformations in their search for creating wealth and prosperity under the restrictions imposed by depleted natural resources, rapid climate change, and energy shortages. In this document, we describe work in progress toward the implementation of a model to foster technologic innovation via the interaction between academy and industry. The model takes into account the constrains imposed by the processes and values of the Mexican institutions. Our model seeks to be a vehicle for increasing several indicators characterizing innovation. In the paper, we describe the current state of several experiences that have emerged under this paradigm.

Index Terms – Technological Innovation, Interaction between Academy and Industry, Degree Programs.

INTRODUCTION

Nowadays, we live in unparallel times of opportunities because of the great many changes taking place in the world. In our opinion, the basis of this relies on two technological factors: Our tremendous ability to process information (Currently, the faster computer runs at 1.105 petaflops (1) and, following, Moore's law, computer performance doubles every 18 months); and our capacity to communicate globally (with a population of approximately 6.76 billion people, there are 4.13 billion of cellular phone subscriptions in the world (2) while an estimated of 23.6% of the world population are internet users (3)). These factors are creating waves of technological progress, opening opportunities for huge and growing economic markets, globalization of productive activities and enormous demographic transformations.

Despite this sea of prosperity, in the Global Competitiveness Index 2008-2009 (4), Mexico appears in place 60 out of 134 evaluated countries. Furthermore, the index is made out of 12 pillars. One of them corresponds to innovation and business sophistication factors. In the factor of innovation, Mexico qualified in position 90 out of 134 countries. In this context, there is the need to create wealth and prosperity under the restrictions imposed by depleted natural resources, rapid climate change, and energy shortages. To take advantage of the opportunities, while facing the problems, Mexico is encountering demanding challenges. For instance, its oil reserves are dwindling (5),

its share of exports is declining sharply, and the activity of drug lords is creating a state of internal turmoil. In a nutshell, the country is losing its competitive edge, especially in innovation, the aspect most recognized as the creator of value and prosperity.

In the following sections, we present a description of the model we are implementing to accelerate the rate at which innovations are created by promoting the interaction between academy and industry.

A PERTINENT DEGREE PROGRAM

Our model considers to the students as the change agents, the professors as their academic support, and the industry as the guiding force for them. Initially, the industry provides the academy with a brief description of their research needs. Later on, we diffuse among the candidates to our degree programs, and their academic advisors, the problem description. Every candidate to our degree program is required to elaborate a project proposal as part of their admission requirements. This project is expected to be based on a problem definition provided by the industry. A person from the industry joins the student's tutorial committee (STC). The STC is empowered to expel the student out of the program upon failing twice in the revisions of the advance of the project. The presence of the industry representative is very important because it helps to detect early the emergence of a product that can be transferred. In these cases, a commercial relationship between the academy and the industry is established to transfer the technological results. The model takes advantage of several aspects of the Mexican innovation system. For instance, upon admission, every student is entitled to receive a scholarship from the Mexican government. Also, we do not ask the industry for money at the beginning of the project. The commercial relationship is established once the results are obtained. For financing, we have created an internal kick off fund that helps to start up the project and prototyping. In the future, we expect the internal dynamic of results commercialization to provide financial support for new projects. In advanced economies, it is usually the companies that carry out the research they need (6) or the government that invest money in private research laboratories (7).

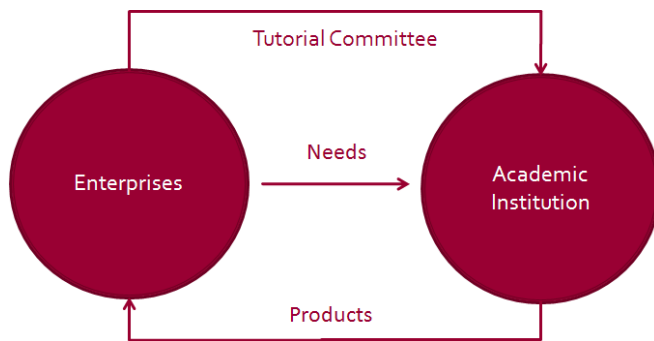


Fig. 1. An enterprise commits to both express its scientific, technology or innovation needs and to become part of the student tutorial committee. The academic institution degree program commits itself to create the conditions for the academic work and to offer for sale the products developed to the enterprise that posed the problems in the first instance.

STRUCTURAL CHANGES

The structural changes that we sought run in three different directions. On the one hand, we need to change the way students are prepared. Our academic program is undergoing two major changes. One of them corresponds to the curricula of the programs themselves. We focus them on innovation, understood as the transit from ideas to the marketplace. A course on innovation became a central part of the degree programs. The course is built on three axes: A methodology to transform ideas into products, technology surveillance and entrepreneurship. Our objective is to develop human capital with the objective of creating entrepreneurs not employees. A second factor is how the professors accomplish their job as academic leaders. Along with a partner research center, we implemented a 180 hours course on the administration of innovation projects aimed at professors. Here our objective is to open an avenue for the professors to start talking in terms of innovation, market place, important needs, business plans, and strategic thinking besides the technical skills that they all have. The third fact is how the government gets involved in this effort. Here the problem was to convince government officials to provide initial funds for this project. In the long run, we expect the program to generate its own resources via the economical exchange that results from technology transfer of the results. However, to convince professors and students on the convenience of working on projects proposed by industry, we give them funds to buy small pieces of equipment, substances, or to pay for expenses due to travel or other research related issues.

NOWADAYS AND BEYOND

Our model includes several indicators related to innovation such as the number of commercial patents, the number of professors and students involved in projects with industry, and the industry expenditure in science and technology. All of these take into account the current incentive system, and the rules governing the procedures and values of the different institutions involved. In September 2008, we

started three projects with industry under the paradigm described in this paper. The three projects were related to topics in the area of alternative energies. We support these projects with a small fund of approximately \$15,000 USD. Now, we are ready to launch a call for proposals with a fund of approximately \$45,000 USD. Our main customers are private research centers. We think that they were especially sensitive to our initiative because they understand the benefits of doing research and because they are close to the marketplace via their mother companies.

Our driving incentive is how to create wealth and prosperity under the constraints imposed by depleted natural resources, rapid climate change, and energy shortage. Our current model addresses the problem of establishing a solid relationship between academy and industry. Nonetheless, a second necessary step consists on selecting those projects that are at the same time innovative and responsive to the constraints. These are necessary steps in the development of our model.

ACKNOWLEDGMENT

This work would not have been possible with the continuous funding via projects and scholarships provided by IPN, CONACYT and CONCYTEQ. The author would like to thank to the enterprises taking part in this work.

REFERENCES

1. **TOP500.** TOP500 Supercomputer Site. [March 29, 2009.] www.top500.org.
2. **International Telecommunication Union.** The ICT Development Index. Measuring the Information Society. [March 22, 2009.] http://www.itu.int/ITU-D/ict/publications/idi/2009/material/IDI2009_w5.pdf.
3. **econsultancy.** Internet World Stats. March 22, 2009. <http://www.internetworldstats.com/stats.htm>.
4. **World Economic Forum.** Global Competitiveness Report. *World Economic Forum*. February, 2009. [March 22, 2009.] <http://gcr.weforum.org/gcr/>.
5. **Deutsche Bank Research.** www.dbresearch.de. [March 22, 2009.] http://www.dbresearch.de/PROD/DBR_INTERNET_DE-PROD/PROD000000000196419.pdf.
6. **Harris, C.** *Art and Innovation: the Xerox PARC Artist-in-Residence Program*. s.l. : MIT Press, 1999.
7. **Nielson, D. L.** *A Heritage of Innovation: SRI's First Half Century*. s.l. : SRI International, 2004.