

## **High Tech Activities in Emerging Countries – A network perspective on the Argentinean Biotech Activity**

Achieving a sustained path towards development is one of the main challenges of the developing world. Developing countries are usually trapped in the production of low value added commodities which significantly affect their chances to create wealth and well-being. New technologies (such as ICT, biotechnology, nanotechnology and new materials), which are mostly developed and remarkably concentrated on the North, appear as windows of opportunities for developing countries to shift their product specializations towards higher value added content and more technologically demanding activities. The focus of this thesis is precisely to better understand how high tech activities can spring and develop in emerging countries.

We adopt a network approach to analyse empirically the case of biotechnology in Argentina. In our view the relevance of adopting the network framework in our investigation relies on several factors. First, it is known that biotechnology is an activity which is knowledge-intensive and in which technical change takes place at a rapid pace. Thus, exploring how knowledge diffuses among and to Argentinean firms becomes meaningful to comprehend how firms' acquire and build their technological capabilities. Second, it is a widely held view that the complex and broad knowledge bases of new technologies encourage firms to become 'networked organizations' looking for complementary knowledge, skills and resources outside their boundaries. Third, networks have been found to be a means that facilitate biotech firms' growth and innovation performance in leading regions.

The thesis is divided into three parts. Part I is dedicated to explore the development of the biotechnology activity in Argentina. We provide an updated overview of the scientific, technological and productive capacity on this high-tech field in that country. In addition, we explore the Argentinean biotech firms' collaborative network and identify its main structural properties. A model is built in order to explain firms' patterns of R&D collaboration. The theoretical results about network formation are further empirically examined. Part II of the thesis is mainly concerned with the study of the biotechnology development in Argentina from the scientific side. We study the biotech scientific knowledge network taking Argentinean biotech researchers as the unit of analysis. Finally, Part III is focused on policy issues to enhance and sustain the development of high-tech activities in emerging contexts.

The empirical part of the thesis is based on original data on Argentinean biotech firms and biotech scientific researchers. The unique opportunity to run a survey together with the United Nations Economic Commission of Latin America and the Caribbean (ECLAC) in 2009 enabled us to collect new and original information of private biotech activity in Argentina. In addition, we also make use of data about scientific researchers engaged in biotech activity in Argentina, which was kindly shared to us by ECLAC.

The main findings of our investigation can be summarized as follows. We found that the development of biotech activity in Argentina was heavily grounded and dependent on local scientific and technological knowledge. However, we observed that biotech activity both in the industrial and the scientific sphere develops in close collaboration with the international community, and in particular, with leading regions. Thus, the sustainability of a science-based activity in an emerging country appears to be largely dependent not only on the extent to which knowledge is generated and shared at local level (both within the business sphere and between science and industry), but also on the mechanisms used to connect to industry leaders. Policy intervention should support and foster both type of interactions. Our results shed light on the relevance of considering factors such as local competition, firms' knowledge capabilities, firms'

access to information and macroeconomic instability when understanding the rationale of network structures and designing appropriate policy interventions.