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HEALTH BIOTECHNOLOGY INNOVATION: A CASE OF STUDY OF MEXICO.

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Technical terms and commonly used abbreviations

BIRMEX	Laboratorios de Biológicos y Reactivos de México S.A. de C.V.
CINVESTAV	Centro de Investigación y Estudios Avanzados
HBT	Health Biotechnology
IPN	Instituto Politécnico Nacional
OECD	The Organization for Economic Co-operation and Development
PNS	Programa Nacional de Salud.
R & D	Research and Development
SNS	Sistema Nacional de Salud.
UN	The United Nations.
WHO	World Health Organization

Research topic

Health Biotechnology (HBT) has the potential to solve health problems that require science intensive solutions and can not be solved by any other health field. Developing countries have endemic or specific health problems that are typically not the principal objective of global biotechnology firms. Further solutions involving technological transfer may not be available to address the problems and therefore it is necessary to develop domestic technologies and innovations to address developing countries' health problems. Some examples of developing countries' innovations in HBT are the meningitis B vaccine from Cuba, low cost hepatitis B vaccine from India and recombinant human insulin from Brazil, (Thorsteinsdóttir H., Daar A. S. and Singer P. A., 2006) .

On the other hand, developing countries also invest in HBT with the expectation that the investment will generate future income and economic growth. The IMS Institute for Healthcare Informatics (2013) reports that the United States is the country that has the largest investment per capita in the world, Japan and Canada are the following countries.

Mexico invests in HBT to accomplish the Programa Nacional de Salud (SNS) objective, which is to address the health needs and problems of the Mexican population. Mexican HBT investments funds studies on diseases like diabetes, cancer, influenza neglected tropical diseases, among other (Bottazzi M. E. et al., 2011). The aim of the investment is to obtain products that enhance the health of the Mexican population such as the development of vaccines (BIRMEX, 2009). However, there is a lack of information on the effects of HBT investment in Mexico. This proposal aims to address this lack of knowledge and examine the dynamics of innovation in HBT in Mexico. I aim to understand the state of innovation in this field in Mexico, and identify what can be done to strengthen innovation in HBT in the country.

Research significance

The state of innovation in HBT in developing countries, such as Mexico, needs to be understood in order to identify the reasons that encourage or discourage the progress of HBT in the country. Identifying the key challenges confronting innovation in this field will allow the decision makers to propose strategies to further innovation in HBT in Mexico, like developing programs that stimulate innovation in HBT, allocate finances that support strategies in HBT innovation, promote collaboration among countries aimed to solve common health problems, etc.

This may result in enhanced opportunities to access domestic and international markets, drive the economic growth, reduce the cost of health care services, improve the health of the population, among others (Motellón L. 2011; Dogramatzis 2010; Tait J., Wield D., Bruce A. and Chataway J., 2007)

The main contribution of this study is, thus to develop an overview of the dynamics of HBT in Mexico and identify strategies that can strengthen the innovation efforts.

An introduction to Health Biotechnology

Health biotechnology provides new solutions to medical needs not covered by traditional development of chemical drugs. The subfields of HBT can influence specific medical requirements, for example, immunology and molecular biology can support diagnostics by developing new and more accurate methods to detect diverse diseases, genomic medicine can target therapeutics to the genetic make-up of populations and individuals to improve health and lessen the burden of diseases, regenerative medicine can help the body to repair or replace injured tissues, etc. (Motellón L., 2011; McMahon D., 2011; Hardy B., 2011)

The United Nations (UN) convention on Biological Diversity (2009) defines biotechnology as: “Any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use”

There is not an official health biotechnology definition. Dogramatzis (2010) defines healthcare biotechnology as “Healthcare biotech is about diagnosis, prevention, and treatment of disease”

For the purpose of this project, I define HBT as:

Any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for diagnosis, prevention, and treatment of human disease” (From UN. 2009 and Dogramatzis 2010)

There is a large demand for HBT products. Pharmaceutical research and biotechnology companies in the United States invested, for example, a record \$ US 65.3 billion in 2009 in the research and development of new life-changing medicines and vaccines, an increase of more than \$US 1.5 billion from 2008 (PhRMA, 2012). Further, in 2012 the U.S. Investment in Health Research (2012) reports the investment to medical and health research expenditures to have been \$US 130.3 billion, and \$US 19.3 billion were exclusively invested in Biotechnology R & D.

Innovation definition

The so-called Oslo manual from OECD (2005) defines technology product innovation as: “The implementation/commercialization of a product with improved performance characteristics such as to deliver objectively new or improved services to the consumer. A technological process innovation is the implementation/adoption of new or significantly improved production or delivery methods. It may involve changes in equipment, human resources, working methods or a combination of these”

The problem with this definition is that it does not define the range of what could be understood as “new”. New for whom? If we use the term new as “new-to-the world” the innovation could only be possible in developed countries with cutting edge technologies. For this study I prefer to use the definition of innovation given by

Ernst et al as “the process by which firms master and implement the design and production of goods and services that are new to them, irrespective of whether or not they are new to their competitors – domestic or foreign” (Ernst, Mytelka et al. 1998). This definition makes innovation possible in developing countries such as Mexico, because it can include “new” in a wide range of contexts, from “new-to-the world” to “local new” for the industry that is developing it.

Objectives and Research Questions

This study will examine health biotechnology innovation in Mexico, using the following questions as a guide:

- 1) What is the state of health biotechnology innovation in México?
- 2) How has Mexico built health biotechnology innovation capacity?
- 3) What conditions and strategies have encouraged health biotechnology innovation in Mexico?
- 4) What are key challenges for health biotechnology innovation in the country and what can be done to address them?

Methodology

- 1.1I will do a patent analysis examining health biotechnology patents in Mexico where biotechnology patents will be a proxy for innovation.
- 1.2I will identify key actors in health biotechnology innovation in México by carrying out a thorough internet search and analyses of publication databases in health biotechnology.
- 1.3I will interview the key actors in health biotechnology innovation in Mexico to obtain qualitative and quantitative information. This information will allow me to analyze the innovation and start to identify the factors and conditions that shape it and strategies that can strengthen the innovation.
- 1.4I will also analyze key documents such as policies, regulations, laws and other document to gain a better insight into health biotechnology innovation in Mexico.

1.5 I will integrate the analysis from the interviews, patent analysis and document to justify my conclusions

Schedule of activities

semester	2014-2						2015-1						2015-2						2016-1						2016-2						2017-1						
Activity / Month	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	
Selection of consultants	x	x																																			
Structuring the project	x	x	x	x	x	x	x	x	x																												
Setting the framework	x	x	x	x	x	x	x	x	x	x	x	x																									
Method development and selection of candidates					x	x	x	x	x	x	x	x																									
Standardization of the method										x	x	x	x	x																							
Protocol presentation predoctoral Review													x	x	x																						
Conducting interviews														x	x	x	x	x	x	x	x	x															
Analysis of results																			x	x	x	x															
Bibliographic Research	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Making Article																									x	x	x	x	x	x							
Exhibition at Congress																									x	x	x										
Discussion of Results																															x	x	x	x	x	x	
Development of thesis writing																																					
Thesis Review																																					
Correction of the thesis																																					
Presentation and doctoral examination																																					
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