

# **Manchester International Summer School on Emerging Technologies.**

## **Sociotechnical analysis of the process of R&D on Nano-science and technology in Brazil's and Argentina's Agrifood systems**

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# INTRODUCCION

Since mid-2000's, the nanoscience and nanotechnologies (N&N) have a central place in discussions about global development.

Biotechnology

ICT's

Converging  
Technologies

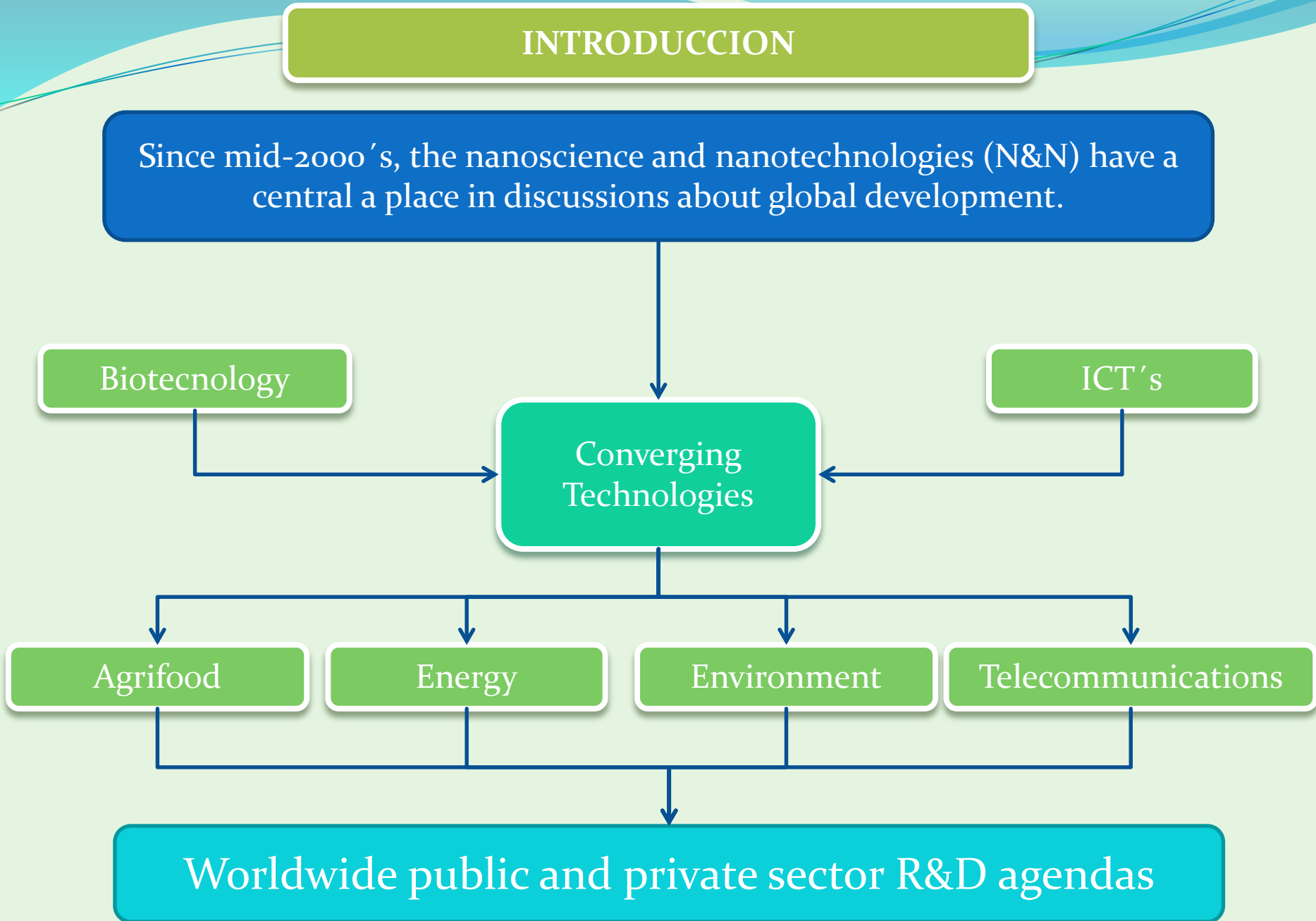
Agrifood

Energy

Environment

Telecommunications

Worldwide public and private sector R&D agendas



In Latin America, this process has a huge impact. Under the belief that they could allow an improvement of the competitiveness at the international level, central governments have been allocating increasing resources in R&D nanotechnology agenda.



**Direct relation between R&D investment and development.**

As a consequence, they launched initiatives that place nanotechnologies in a central place on the nation's development programs. Among these, Argentina and Brazil have been made the greater efforts to promote the area. This was made by the creation of a specific set of policy programs and institutions

Argentina

C&T Strategic Plan for 2020

Argentina Nanotechnology  
Foundation

Technological funds

In 2005 launched the Bi-National center of nanotechnology (CABN) as a  
form collaborative working of the researchers

Brasil

C&T Nanotechnology Program

16 Research Networks

Other institutions: EMBRAPA  
and PETROBRAS

Table 1 Economic, population, science and technology, and government nanotechnology R&D for Argentina, Brazil, Chile, and Uruguay and selected reference countries (countries ranked by per capita income)

Country	GNI per capita US\$ PPP 2006 (thousands) <sup>a,b</sup>	Income group <sup>c</sup>	Population 2006 (millions) <sup>d</sup>	R&D spending (% GDP) <sup>e,g</sup>	Researchers in R&D <sup>e,f</sup> (per million population)	S&E articles 2005 <sup>g</sup>	Patents 2005 <sup>e,h</sup>	Government nanotechnology R&D (Estimated) US\$ 2006 <sup>i</sup>	
USA	44.1	HIC	299.4	2.68	4,605	692.7	244	1,775	
Japan	32.8	HIC	127.8	3.15	5,287	434.0	857	975	
Germany	32.7	HIC	82.4	2.49	3,261	535.1	158	505	
Spain	28.2	HIC	44.1	1.11	2,195	422.5	53	50 <sup>j</sup>	
R Mexico	12.0	UMC	104.2	0.40	268	37.8	1	12 <sup>k</sup>	
A Argentina	11.7	UMC	39.1	0.41	720	79.0	4	2 <sup>l</sup>	
C Chile	11.3	UMC	16.4	0.61	444	95.6	1	10 <sup>m</sup>	
U Uruguay	9.9	UMC	3.3	0.26	366	58.3	1	— <sup>n</sup>	
B Brazil	8.7	UMC	189.3	0.98	344	53.1	1	27–40 <sup>o</sup>	
China	4.7	LMC	1,311.8	1.44	708	31.9	16	220	
India	2.5	LMC	1,109.8	0.85	119	13.3	1	106	

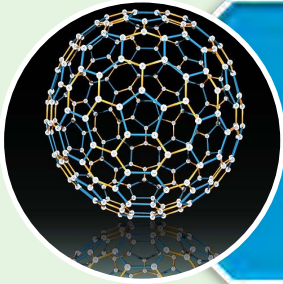
Kay and Shpira (2008)

N&N also generates big expectation at the agrifood system level. Developments in this area include things such as enforcement and detection of agro-chemicals, packaging, sensors for food security, food additives, and novel foods, among others.

ARGENTINA Y BRASIL EN NÚMEROS						
PRODUCTO	1990/1991		2000/2001		2010/2011	
	Argentina	Brasil	Argentina	Brasil	Argentina	Brasil
<b>Leche</b> (millones de litros)	6,13	15,7	9,8	19,3	10,0	30,0
<b>Carne vacuna</b> (millones de toneladas)	3,0		2,72	9,2	3,6	
<b>Stock vacuno</b> (millones de cabezas)	51,6	141,7	48,7	170,2	48,9	205,3
<b>Producción de maíz</b> (millones de toneladas)	7,7	22	15,3	34,5	23,7	55
<b>Área sembrada de maíz</b> (millones de hectáreas)	2,2	12	3,5	12	4,6	13
<b>Producción de trigo</b> (millones de toneladas)	10,9	3,30	15,9	1,66	15,8	5,9
<b>Área sembrada de trigo</b> (millones de hectáreas)	6,2	3,28	6,5	1,5	4,6	2,15
<b>Producción de soja</b> (millones de toneladas)	10,8	15,4	26,8	38,4	48,9	75,3
<b>Área sembrada de soja</b> (millones de hectáreas)	5	9,7	10	14	18,9	24,2

Source: Ambito Financiero (2012)

## In this context:



How the scientific and technological capabilities available from nanotechnology in Argentina and Brazil are integrated for the generation of research and development (R&D) oriented to the agrifood system?



What is the role of public institutions in the development and application of nanoscience and nanotechnology (N&N) oriented to the agrifood systems Argentina and Brazil?



How is the construction process of the public policy agenda for N & N for the Argentine and Brazilian agrifood system?

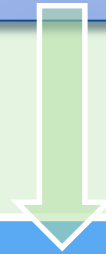


In Latin America from the STS studies approach different aspects of N&N have been analyzed such as: social and environmental consequences, regulatory frames and intellectual property rights, among others. While the researches from this field try to understand the relations between N&N and society, still studies that put the focus on the agri-food and agro-industrial systems are scarce.

Even less is the scientific and technical production that wants to analyze the articulation of scientific-technological and institutional capacities for N&N, as well as the design and formulation of policies on Science and technology that enable R&D N&N processes for development with equity.



**In this context the aim of this project is to analyze in Argentina and Brazil, under a sociotechnical theoretical frame, the innovation process of the N&N for the agri-food sector that allows social inclusion dynamics.**



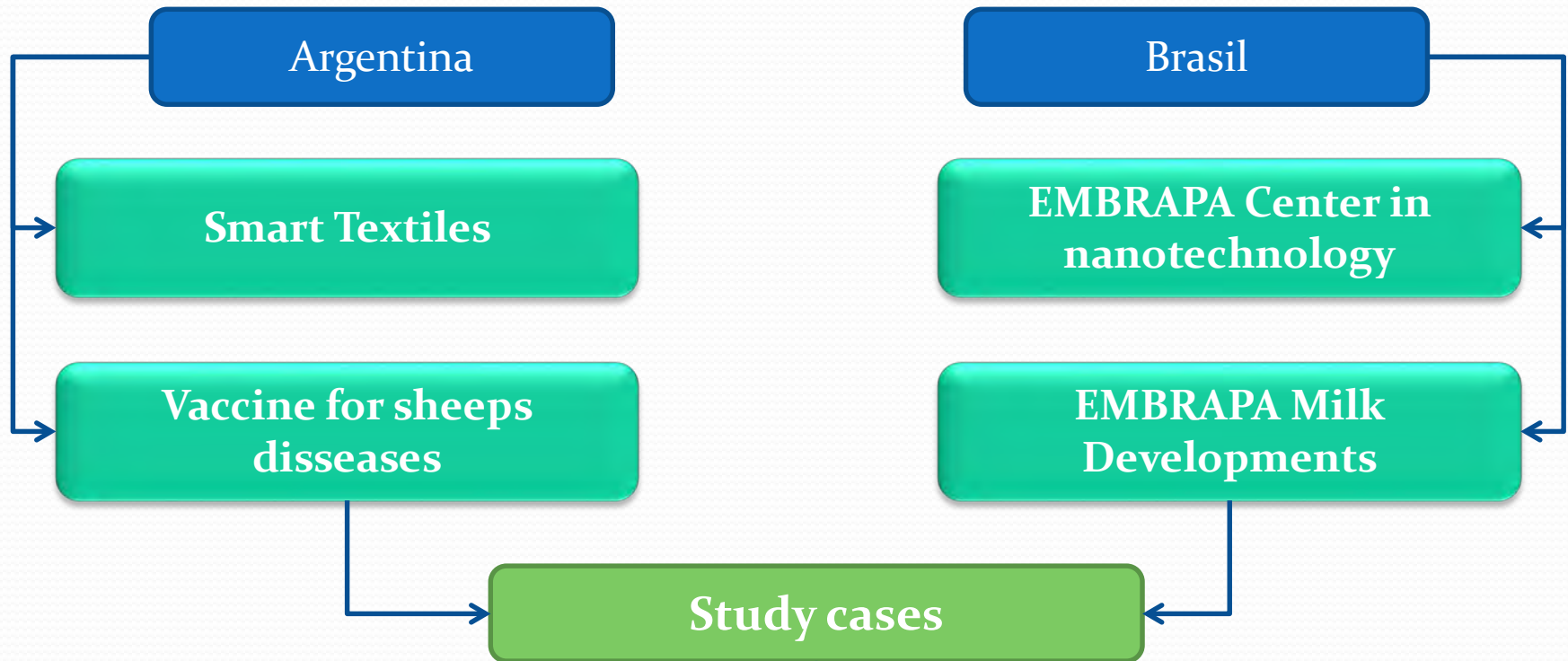
For this work is necessary to use concepts that can account the complexity and multidisciplinary character in the dynamics of nanotechnology-based development

Sociology of Technology

Economics of Innovation

Policy Analysis

Particularly in this region, where agricultural production is one of the main sources of income, nanotechnological developments to this area have already several projects.



Both cases are in the same phase of the research process and promise to make a solution for a punctual problem. However, there is no exists real advance in the products and the only existent results are published papers.



**Thank you for your  
attention!**