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Knowledge availability, Innovation Logics and Institutional rules co evolution in Bioindustries

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SUMMARY

INTRODUCTION

What is Open Innovation?

Open Innovation: « *The use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively*. ». (Chesbrough, 2006, p.2)

- Companies can no longer rely solely on their own resources and skills to innovate in a world where technological development is based on expanding knowledge.
- In developping collaborations, entrepreneurs influence the evolution of the institutional framework that compels them (Chesbrough, 2003).

INTRODUCTION

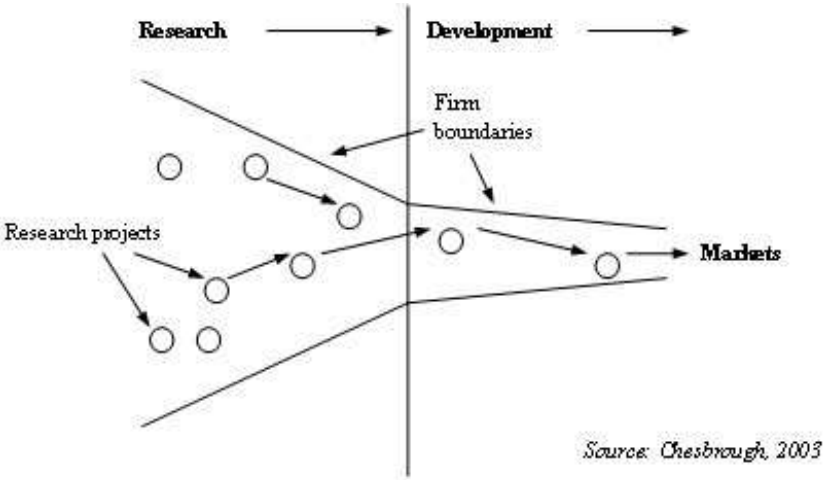
What is Biotechnology?

Biotechnology: *« The application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services. »* (OCDE, 2005).

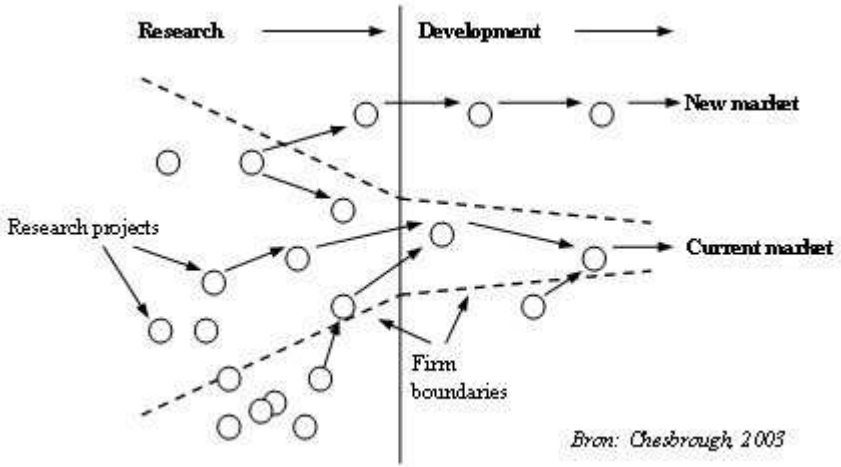
- A difficult science to define
- A transversal Molecular Biology Toolbox used in many different sectors of activities (health, food, energy, materials…)
- *A knowledge-based* and *technology-based* domain *science driven* (Saives et al., 2005)

INTRODUCTION

What is Open Innovation?



CLOSED INNOVATION LOGIC



OPEN INNOVATION LOGIC

Innovation Logics Evolution in the Biotechnology Domain

The emergence of Biotechnology 1960s – 1970s

Scientific Basis

- 1953 Molecular Structure of DNA (Watson & Crick, 1953).
- 1966 Discovery of the Genetic Code (Crick, 1968)

Technological Basis

- Reinforcement of biomedical inventions
- 1973 DNA Recombination Technology developed by the Stanford University (Cohen *et al.*, 1973).
- The first real tool of genetic engineering that will pave the way for the cloning of genes, allowing the study and manipulation of genetic material of living organisms.

Innovation Logic

- Public Research dominance
- Puclic Universities
- Knowledge available in the public domain
- Open Innovation Logics dominance

Innovation Logics Evolution in the Biotechnology Domain

The emancipation of Biotechnology 1980s – 1990s

Research Policy Evolution

- 1980 The Bayh-Dole Act amends legislation on intellectual property arising from research funded by the federal government in USA. It provides to universities, small businesses and nonprofit organizations the control of the intellectual property of inventions resulting from this funding.
- 1980 American Congress authorized the first patent on life (Chakrabarty decision).
- 1987 Adoption of the patentability of living in the USA by the Patent and Trademark Office.

Innovation Logic

- Public and Private Research
- Puclic Universities and Private Laboratories collabrations
- Knowledge partially available in the public domain
- Closed Innovation logics globalization

Innovation Logics Evolution in the Biotechnology Domain

The rise of Biotechnology 2000s – 2010s

Research Policy Evolution

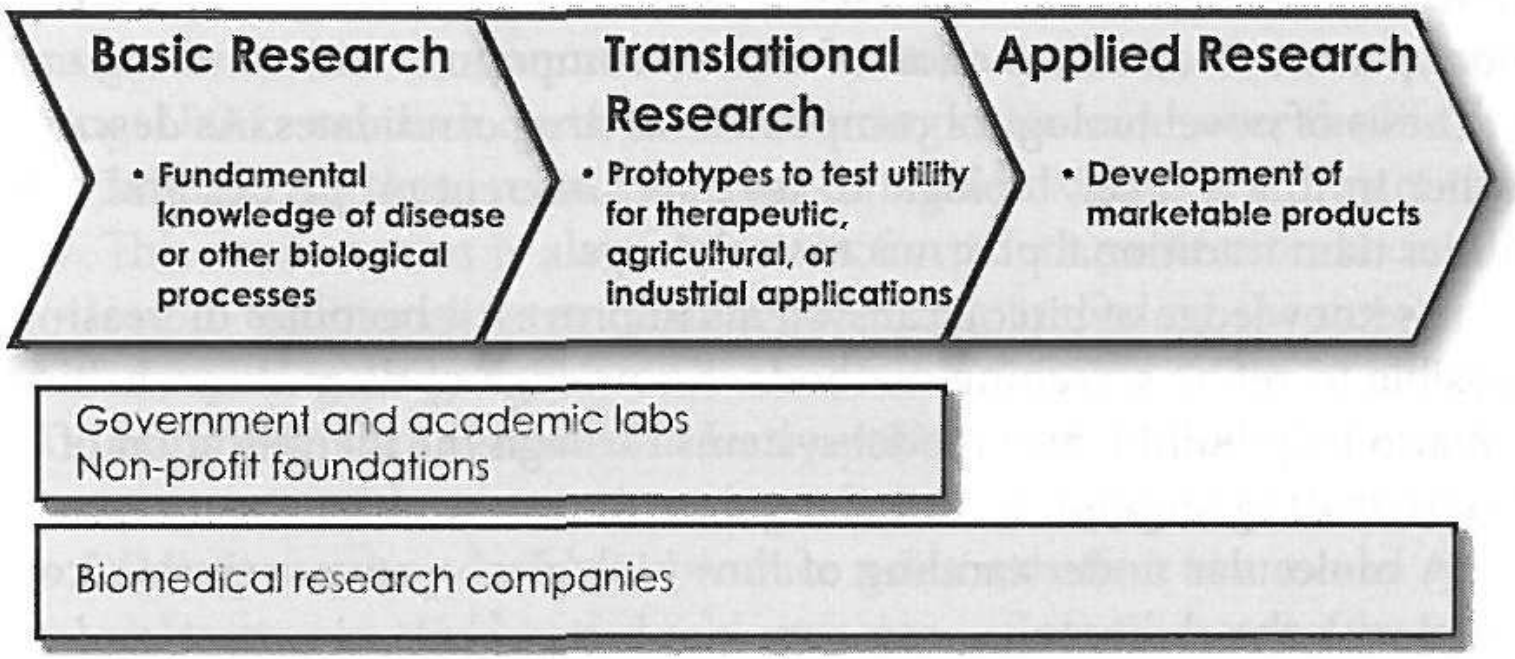
- Transformation of the American research into a tool to promote the competitiveness of national firms.
- Modification of the classical conception of the relationship between intellectual property rights, R & D and the innovation process in USA (Granstand , 1999; Jaffe, 2000; Mazzoleni and Nelson 2000)
- The foundations and the role of IPRs as institutional arrangement are therefore particularly affected.
- 1998 Adoption of the European Directive 98/44/EC on the patentability of living organisms.

Innovation Logic

- Private Research dominance
- Complex Networks, Business Ecosystems development
- Availability of basic Knowledge decrease
- Closed Innovation logics vs Open Innovation Logics

Innovation Logics Evolution in the Biotechnology Domain

To an anti-commons tragedy?



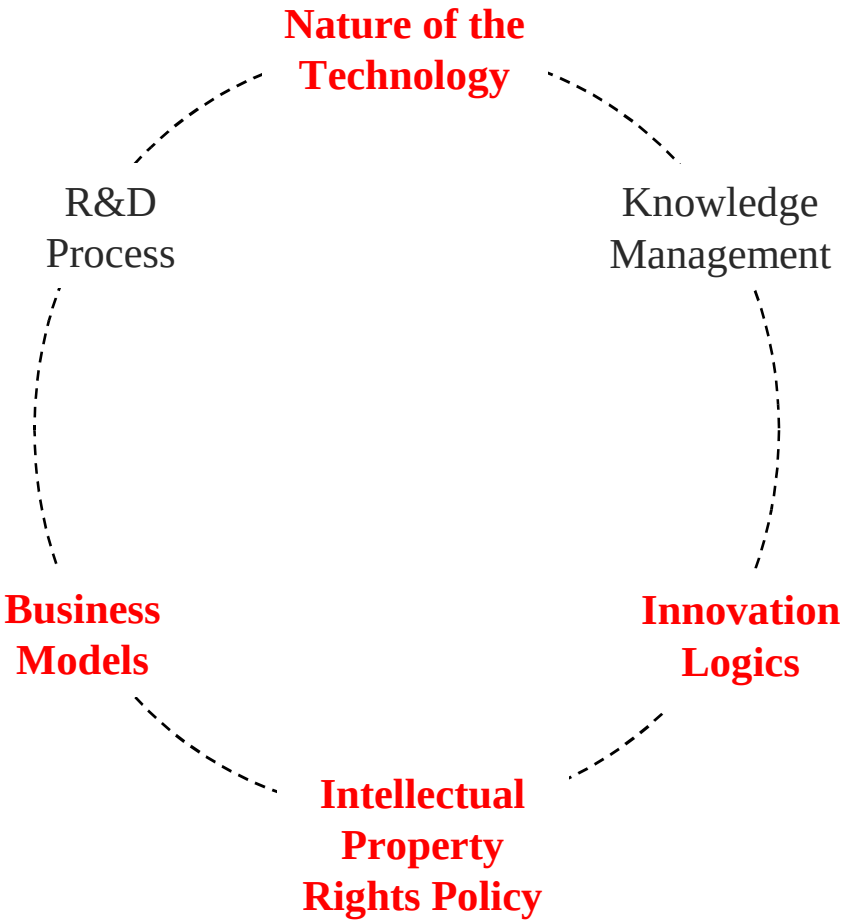
Impact of innovation logics evolution on Institutional Rules

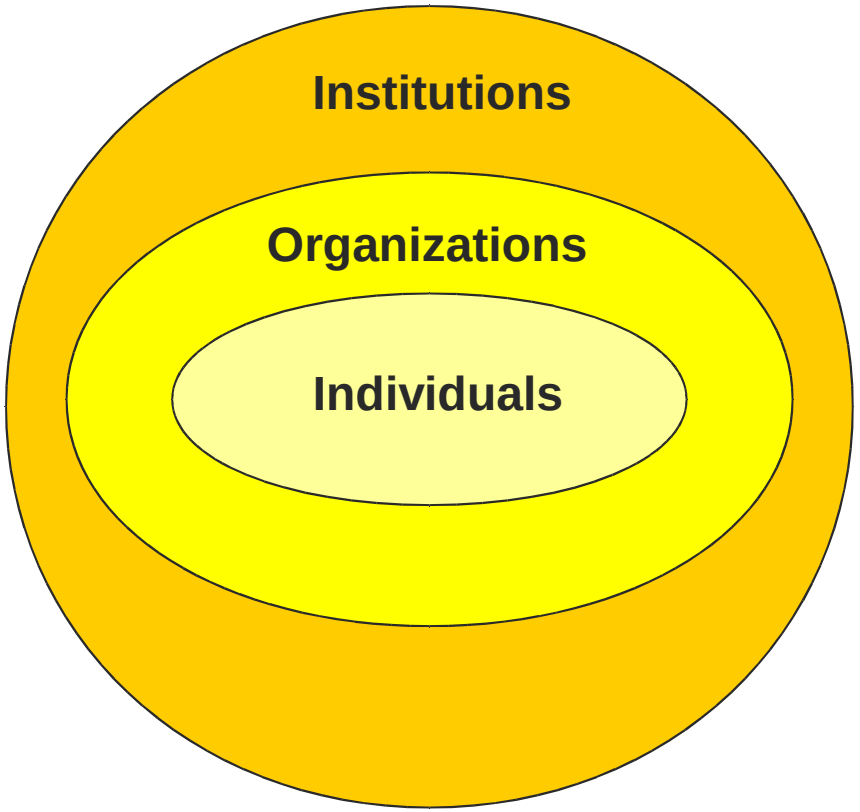
Neo-institutional approach

- Interactions between actors (individuals and organizations) on the one hand, and the constraints and opportunities generated by the institutional framework evolution on the other hand, is a dynamic equilibrium at the origin of the evolution of institutional rules themselves (North, 1990; Powell & DiMaggio, 1991).
- « *Individual action can only be explained in a societal context, but that context can only be understood through individual consciousness and behavior. [They] conceive of these levels of analysis as "nested", where organization and institution specify progressively higher levels of constraints and opportunity for individual action* » (Friedland & Alford, 1991, p.243).

Impact of innovation logics evolution on Institutional Rules

Knowledge availability, Innovation Logics and Institutional rules co evolution





Qualitative longitudinal historical study

Research Question

- How interactions between actors (individuals and organizations), on the one hand, and the institutional framework, on the other hand, lead to the evolution of institutional rules affecting the emergence and dissemination of open innovation logics in Bioindustries?

Research Approach

- Qualitatitive longitudinal historical study in a neo-institutional perspective (North, 1990; Powell & DiMaggio, 1991)

Methodological Approach

- Use of secondary qualitative data (Weick, 1979-1993; Stewart & Kamins, 1993)

Qualitative longitudinal historical study

Methodology

Use of secondary data as a source of information implies that (Chabaud & Germain, 2006):

- the content of informations matches the aims and research theme.
- the amount of usable data is important enough to address the issue of research.
- datas are consistent and comparable between them.

Qualitative longitudinal historical study

Selection criterion of the journal

- Be aimed at a wide audience including practitioners, such as researchers, engineers, managers and entrepreneurs to identify the nature of interactions between actors from different sources faced to open innovation logics.
- Addressing technological and managerial aspects in a transversal way. Therefore, the pure academic research papers were rejected because they target only researchers.
- Encompass major markets penetrated by biotechnology (food, health, energy, materials ...) to determine whether there are specific features related to certain sectors.
- To be distributed internationally and process biotechnologies with an international perspective in order to differentiate the emergence and dissemination modalities of open innovation logics and the nature of their various influences on the institutional rules. The impact factor is therefore part of the selection of the journal.
- Cover a period of time sufficiently long to allow a full analysis of the processes of emergence and evolution of open innovation logics.

First selected journal

- Nature Biotechnology

Qualitative longitudinal historical study

Selection methodology of the key-words

- Keywords proposed in ten papers published by different journals were compared with those of reference texts on the subject (Chesbrough 2002-2003-2006 ; Nicol & Hope, 2006 ; Hope 2008 ; Hertzog, 2008).
- The number and nature of items that can be extracted with each keyword has been tested through a research article in the selected journal on a period of 5 years.
- Each item is identified using at least one keyword.
- In most cases, at least two key words identifying the same article providing redundancy and saturation data (Miles & Huberman, 1994).

Qualitative longitudinal historical study

Period and selected numbers of the journal

- Nature Biotechnology numbers selected cover a period of 13 years from January 1998 to December 2010.
- One number every three months was selected to obtain a sufficiently representative selection.

Coding methodology in Nvivo

(1) Date and number of the article to locate the item in time.

(2) Nature of the individuals involved: researcher, manager, engineer, entrepreneur, venture capitalist...

(3) Nature of the organization involved: SME, business major, public research laboratory or private university, Supplier...

(4) Nature of the institution involved: patent agency, state, policy, government agency, lobbying group...

(5) Nature of interactions between individuals, organizations and institutions.

Working Agenda

First Step

- Extraction and coding in NVivo of the identified articles using the selected keywords in the journal Nature Biotechnology
- Secondary data analysis:
- Identification of the nature and the type of interaction between individuals, organizations and institutions
- Characterization the impacts of open innovation logics on intitutional rules in the Bioindustries
- Checking the relevance of this methodological approach

Second Step

(1) Applying the methodology of extraction, coding and data analysis to a second journal
(2) Real Case Study
(3) Comparison
(4) Identification of the key interactional determinants
(5) Characterization of the impact of these determinants on the evolution of intitutional rules in Bioindustries
(6) Conclusion