

THE FRENCH PARADOX: HOW CAN WE EXPLAIN THE ASSIMILATION OF HEALTH BIOTECHNOLOGIES?

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Abstract: *There is in France and more generally in Europe a paradox. In the agro industry business, the use of biotechnology is suspicious and controversy (see for example the emblematic case of GMOs), the subject is little debate in the health sector. Yet, in those two sectors, the production process of biotechnology is the same. How can we explain those differences?*

This article aims to explain the reasons for the acceptance of biotechnology in the business of health. Health professionals interviewed in this study leave use the biotechnology as a tool to improve their practices and benefiting their patients. In doing so, they play a key role to facilitate their consumption by the public.

This article is based on a qualitative and exploratory methodology. Our sample consists of leaders of biotech companies or selling biotechnology and doctors who use them.

Key words: *biotechnology, acceptance, technological assimilation, identity*

JEL Classification Codes: L20, I19

INTRODUCTION

The adaptation of diseases to the drug promotes the emergence of new forms of pathogens increasingly resistant. This phenomenon is causing the rise of new form of infections and loss of effectiveness of antibiotics and antiviral.

The globalization of trade increases the speed and extent of spread of diseases and promoting the transformation of these epidemics pandemics that affect a population so much larger as the example of the "Spanish flu" which made 21 million deaths between 1918 and 1920 (Buisson *et al.*, 2007).

The pharmaceutical industry must develop new active ingredients faster and in greater volume. The adoption of biotechnology has brought production processes suitable for mass consumption and promoted the development of a new strategy for research and development. However, while biotechnologies are in the food sector suspicion and controversy (such as the emblematic case of GMOs), the subject is little debate in the health sector. Yet the production process of biotechnology is the same.

Thus, "Biotechnology is permitted restrictions are in medicine, which cures the disease, then they are dismissed without nuances in agriculture, which might cause. It is a cultural bias quite revealing. The European agrees to include in his body on medical prescription which he refuses to find the plate. Which enters into its veins by injection would be less dangerous than what passes through his stomach." (Neiryneck, 2005). Medical applications were assimilated rapidly, agricultural applications have been subject to investigations, consultations and public

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debates and the moratorium still prevents their use (Neiryneck, *ibid.*). Even when medical biotechnology has been under discussion before use (Claeys et Huriet, 2000), as in the case of research on embryonic stem cells, this has rarely been followed by a ban (Milon, 2006).

In the debate on agricultural biotechnology, the weight of inputs and the dangers are not treated equally. Potential risks monopolize all the attention and obliterates the potential profits. While in the case of so-called red biotechnology (or health), the therapeutic benefits weigh very heavy in the decision to use. This is reflected in the absence of studies specifically examining the acceptance of red biotechnology. This article therefore proposes to establish a first grid explaining this phenomenon.

We seek to explore why the use of red biotechnology is no debate. We thus postulate that the approach is determined by their professional identity (Dubar, 2002): identity of a sectoral, identity associated with the manufacture of biotechnology on the other.

We focused on the relation between the producers of biotechnology with health professionals (ie the relationships Business to Business) as a part of an exploratory qualitative study based on ten interviews.

We conclude that over the identity of actors is being questioned over the controversy on the dangers of biotechnology, including bio drugs, appears. It is in this sense a contamination of the debate on GMOs in the health sector. The assimilation of the innovation process could be affected at a time when it appears crucial to face the global warming & health epidemic are increasing.

I. LITTERACY OVERVIEW

Red biotechnology applications are very diverse. However, they have in common the requirement to meet the standards of quality and safety defined by the public health code. These parameters are controlled by the AFSSAPS in the authorization process of placing on the market in France. Medicines derived from biotechnology and biopharmaceuticals are currently the main market segment of red biotechnology in terms of turnover. From producer to consumer, the actors involved are the laboratories, drug companies, the distributors and wholesalers, hospital and other distributors, health professionals (mainly doctors who prescribe the drugs) and patients.

Strong relationships are essential especially in the innovation process. Thus, researchers working with the hospital to test the efficacy of new active ingredients, patients' associations support research, industry working with surgeons to improve their tools, their materials, their techniques, the finance large private laboratories of R & D programs in the public sector ... Advances in medical biotechnology is therefore characterized by a strong interdependence of the actors. Their relationship is essential to allow or not the assimilation of biotechnology in society.

The concept of relationship seems to be of some evidence: Clarkson (1995) quote "*It is the first condition of being human. It is so obvious that it is frequently taken for granted, and so mysterious that many . . . have made it a focal point of a lifetime's preoccupying passion*".

However, it is often the process around the relationship that are used rather than the relationship itself or the actors who mobilize as outlined in earlier work (Pauget, 2006, Grenier and Pauguet, 2006). Thus, the scope of the strategy involves the concepts of coordination, cooperation, the ethos of the anthropology, sociology those with experience, and the social norms...

More recently, the concept of social network (Degen and Forse, 1994) has highlighted the ability of actors to use these relations. The social network has an intensity (Ahuja, 2000, Lemieux 1999), a direction (Coleman, 1989). However, very little is said about the content of the relationship.

We postulate that this relationship is the foundation on which you can build acceptance of red biotechnology. We using the concept of professional identity (Dubar, 2002). The choice of this concept can be controversial. It was indeed possible to use previous work on recognition of physicians to their environment (Strauss, 1992) to analyze the relationship of physicians with other actors.

In doing so, we would have relegated the producers of biotechnology to a subordinate place, which we believe is not their own. We have therefore preferred to make the opposite choice on more particular producers of biotechnology in their relations with doctors. Identity is perceived at the individual and collective effort as a general representation and positioning of actors in relation to individual goals, group or organization. The identity "is linked to the membership of certain social groups and the emotional and evaluative significance resulting from this membership" (Tajfel, 1992). We postulate that the identity, and more particularly the one related to his profession, is the content structure of the relationship. It gives a sense and a direction to the relationship.

Indeed, as we have previously stated in our previous work (Pauget, 2008), an actor creates and maintains a relationship, not with a view to achieving a common but according to his desire to be recognized. To achieve this recognition, it remains in the group or separates. The sense of belonging created by the creation of identity is reflected in what Halbwachs is defining by the word "thinking with others" (1994). But it is not possible to reduce the phenomenon of identity to the sense of belonging. There is indeed an adaptation of the actor in the process of building the relationship through the mobilization of an identity for himself (how am I positioned in relation to others, Mead, 1934). In addition, any relationship involves a contact with each other and therefore an identity to others (what a picture of me the other me back).

Dubar summarizes this approach in a grid that we mobilize in this article.

The main characteristic of red biotechnology is the way were built manufacturing processes using biotechnologies. They are highly relational. However, two essential peculiarities influencing professional identity of the actors producing or using biotechnology can be used in relation to the literature:

- The first is the technical nature of biotechnology. "They are [...] based on cutting-edge scientific advances in biochemistry, cell biology, microbiology, process engineering and are characteristic of a high-tech industry". (Hache, 2005). Their development has helped to meet the needs of industrial innovation in adapting to the sectors in which they were mobilized. This technicality is associated with a moral. Initially, biotechnology was seen as a possible way to increase the happiness of mankind. They were seen as able to help solve the problems of population, food, health and environment (Bud,1993; Debru, 2003). This vision still corresponded to that of the philosophers of the Enlightenment: scientific progress should contribute to the progress and happiness of a civilization. If of course, these certainties have been largely depleted, they nevertheless continue to be used as arguments in favour of biotechnology.
- The second characteristic is that they are at work in the private capitalist sector. They are therefore determined by the rules that govern this type of economy: search for profitability, development applied to the marketing of new innovative products, speculation.

II. METHODOLOGY

Our field of study lies in the health sector that uses biotechnology. We use the case method (Yin, 1991) in that it allows to integrate the economic and social weight and to better understand the specific organizations that have participated in our study. Our approach is based on a modest inductive approach, we used primary and secondary data.

The primary data consist of semi-structured interviews (see annex). They were recorded and transcribed so as to understand why biotechnology is being used without much friction or polemics. To this end, we had a total of ten interviews from ten different organizations. These are:

- Five companies that are national manufacturer of bio products. We interviewed each of the CEI directly concerned with the problem of assimilation of biotechnology on the market. Their companies produce bio products to the health sector
- Five doctors in charge of hospital or clinical services that all use bio (mainly drugs and prostheses). They are all located in the north-eastern France. The choice fell on those responsible for services because we believe they were best able to take a comprehensive view of their responsibility to share the use of biotechnology in medical practice. Several specialties are represented, including cardiology, surgery (especially gastrointestinal), obstetrics.

The questionnaire was the same because we have built a sufficiently general to allow the expression of views which enlighten us in different ways but methodologically comparable vision of biotechnology in the health sector. We want to understand, certainly ever exploratory how actors produce and use biotechnology for their assimilation.

Our study focuses on the producers (the biotech companies on the one hand) and physicians who are intermediate users of biotechnology. We analyze as well the "Business to Business" (B to B) the first part of the value chain of the drug. We postulate that in this phase that we can better analyze why the use is not a problem to producers and to health professionals. We analyzed the data and coded interviews according to the approach advocated by Miles and Huberman (1991).

Our coding is formed by a matrix to determine the nature of professional identity for oneself or others against the two other variables influencing the biotechnology sector.

Our secondary data consist of various materials. They both study reports parliamentary studies Inserm as brochures or pharmaceutical analysis ... This data can be divided: those dealing with the production of biotechnology in the health sector of a share and use their assimilation by the general public. They complement our primary data.

This approach is part of a larger research project including end users, (patients) to gather their perceptions on these innovative products. Data were collected among the general public (ten) to the point against our assumptions and analysis but they were not included in this article. This research project considers biotechnology as an autonomous business ecosystem and whose codes and relational models deviate sometimes practices commonly accepted by society. Our posture intervention research (David, 2000) aims to reduce the gap to allow the expression of an informed debate in society and not dogmatic about the use of biotechnology.

III. RESULTS AND DISCUSSION

We note that there is in the light of our results two fields that can explain the assimilation of red biotechnology in society: the first is related to the changing structure of the health sector, the second based on the perception that producers and doctors of nature bioproduct they are from their point of view, a new range of tools among others.

The structuring of the health sector made strong interdependencies was built around the figure of the doctor. In our interviews, they develop a discourse that is taken by producers of biotechnology, which revolves around the regulatory field of health. From this fact, the majority of respondents, it is not possible to do "anything" (Excerpt from interview). The use of bio is not regarded more or less dangerous than other products.

On the ethical level, the importance of perceived risk is assessed according to specialty physicians and the sphere of application of bio-considered. Thus, cardiac and digestive surgery,

doctors appear less affected by ethical issues in obstetrics. Regarding drugs, the origin of the active ingredient is described as negligible in terms of the effectiveness of treatment. Thus, in practice, very few perceived differences appear between the use of bio products and use of products. What is important primarily for the doctor, the quality of the relationship with the patient and comfort meet the technology used. One doctor summed up this thinking: "I would say that I work in a specialty in which the biotechnology ... including the use of biotechnology does not lead to a debate too ... uh ... an ethical debate. In the sense that the ... in treating cardiac arrhythmias, one of the arteries leads uh ... there is not too much trouble. After if you start in obstetrics or medical specialties other than.. uh .. we can have an ethical debate that is much more important and more difficult. The only ethical debate that you can have the use of biomaterials in cardiology is to know at what age it should stop, how far to go. But this is not the product itself that is at issue is the use in some people. ...So there are some products of biotechnology which begs the question of the use in general "(Excerpt from interview, Doctor 1).

Unlike the agricultural biotechnology sector, where lack of trust among stakeholders leading to the expression of extreme positions, postures recorded among participants in this study are rather homogeneous whether producers or doctors. Doctors say they are confident in a relatively protective medical sector without ignoring the potential risks are an inappropriate use of bioproducts, "Yes, everything that is effective, the same adage in medicine, all that is as for drugs, all that is very efficient and also potentially very dangerous. The more you are efficient, we can act and it is potentially more dangerous. "(Excerpt from interview, Doctor 2).

This insurance prescribing is justified by the strong dependence of designers bio product doctors and hospitals. Indeed, an interaction of these actors is essential to development and the development of new therapies. Combined with strong regulatory constraints, these reassure doctors about the quality and safety of treatments they prescribe: "The information is much more ... they can not give information in the same way ... it's pretty regulated. But to meet and possibly on hand to explain things, it can be easily "(Excerpt from interview, Doctor 3).

In logic of business to business ", the physicians who prescribes, play a central role as they determine which products should be used under what circumstances. They are the ones who shape the discourse that there are almost equivalent with the producers of biotechnology.

However, the purpose of these manufacturers, mainly for specialists, is technical. It combines the advantages of bio with the needs of prescribing physicians. Of all respondents, distributed bio products are indicated for the treatment of diseases with high unmet need previously (vaccines, cancer, infectious diseases, autoimmune diseases, and bio-compatible implantable). When intellectual property rights exist, they make the captive market of users. It is therefore, the only therapeutic option available, the best alternative technique developed. The discourse of producers who have understood that this generates a strong attractiveness for bio, focuses on the contributions of their innovations. In their relationships with prescribers, these benefits are the cornerstone of the marketing strategy used by pharmaceutical. This action is sometimes reinforced by the organization of visits to plants greatly appreciated by physicians.

Based on our study, it is difficult to determine the scope and intensity of interaction between producers and doctors on the postures adopted. Despite a higher level of extension, doctors have a perception of biotechnology similar to the growers. This result reflects the complete assimilation of medical biotechnology available in professional practices. In addition, doctors and producers develop biotechnology as a toolbox that improves health. The use of this instrument is characterized by the mobilization of three types of arguments:

- 1) Biotechnology is old and therefore inherently low emissions. The decline can predict the side effects listed or against their use: "The first manipulation biotechnology ... we are acquired when it was ... when we studied the embryogenesis and when we examined the histology [...] because already at that time then, but I speak of 60 years, they are

- "manipulation" that did. So I feel what is called biotechnology currently is a small industrial side, it may be a little pejorative, but it is my feeling. But as a purist, I would say we have done already biotechnological manipulations, although there are 50 "(Excerpt from interview, Doctor 3).
- 2) The biotechnology companies are involved in scientific and technical development. In this sense, it perpetuates the scientist view of science promoted by the Enlightenment over biotechnology scientists are, the more they can find new therapeutic approaches, more progress resulting benefit to patients. Doctors echo of this vision: "Uh, I mean by this that there was a shift from a technique that lasted 17 or 18 centuries and a century it has become a science and medicine in half a century scientific medicine hyper, hyper-specialized, avant-garde ... "(Excerpt from interview, Doctor 3).
 - 3) The third argument is more specifically used by the producers because it is oriented towards the needs of clients according to a capital "to health which seems logical, we have a number of drugs that may be produced either by bacteria or plants [...] if we have new technologies to modify plants, bah, so you can acquire new characteristics that may be useful in terms of production, in terms of approach, in terms conservation [...] So it was useful in relation to it "(Excerpt from interview, Producer 1).

DISCUSSION

Whether from the perspective of both producers and doctors, we were struck by the convergence of speech as if a speech could not emerge from the producers of red biotechnology. Framed largely in a regulated medical field and regulated biotechnology are to them one more tool in a therapeutic practice for patients. Considering the use, doctors and producers think exactly the same thing.

For doctors, biotechnology is a toolkit that assists and improves their medical practice. Biotechnology does not transform their professional identity inherited from their work: it is an identity for itself that is mobilized.

In contrast, producers mobilize others for an identity oriented towards the organization of production. They can mobilize only very fragmentary speech centred on mastery of the biotechnology sector, like biotechnology did not own a field, but just one field of application for doctors.

In total, the trust relationship that has developed between the practitioners of biotechnology and health professionals focused on the doctor, because it is a legitimate figure. In the health sector, institutions have recovered and institutionalized this link and thus the assimilation of biotechnology.

The new trends:

We note however, both in terms of our secondary sources as primary changes in several ways. First, the status of the physician is weakened (Kervasdoué, 2003). His word is less legitimate. Thus, the nature of drugs prescribed may be questionable. However, the figure of the physician is central to the assimilation of biotechnology.

Secondly, we see a desire among some of producers of biotechnology would "educate" their end users without necessarily going through the intermediary figure yet legitimate doctor. Thus networks laboratories patients are emerging to explain the properties of drugs directly to patients. So is this the case of certain diseases. This aims in a context of welfare state financial crisis, and generic products. However, this discourse underpinned by logic of capital (a marketing vision of health care) creates new relationships and representations, parallel to those we have presented. It seems necessary to explore this avenue of research, not contained in our

exploratory sample to find out how these relationships affect the uptake of biotechnology by patients. They act in addition to or in opposition of the doctor-patient relationship? Do they or do they hinder the assimilation of biotechnology?

Finally, we noted the emergence in our sample of suspicion towards biotechnology. The doctor 4 said this:

"For there any sectors where biotechnology advance that it helps in certain disease and there are other areas where we see it in biotechnology .., can be seen particularly in the sperm in men, is currently fashionable, it became increasingly compared to what the man had a few years ago so we can consider that biotechnology and modern developments currently reducing the number of sperm in humans, we are going to disappear "(extract from interview).

There is a contamination of the debate on agricultural biotechnology to medical biotechnology.

CONCLUSION

In France, our relation to biotechnology is not the same after that we talk about agricultural biotechnology or those related to health. However, there is a paradox that medical biotechnologies are the only ones allowed. We tried to explain this apparent contradiction through this exploratory study.

These are the bodies (physicians) and institutions (hospitals) that allow the medical use of biotechnology. Lived as a therapeutic aid, they are well accepted. But this vision of biotechnology is related to trust in the figure of the doctor. However, it is questioned. We see through the results of our questionnaires, and more broadly through the media debate in France, the debate swirling contaminates agricultural biotechnology field of health. There is a suspicion that emerges vis-à-vis health-related biotechnologies.

However, according to a swing of the pendulum, there is a risk that the stigma affects all red biotechnology. And instead to look at their use on a case by case - and judging from their potential harmfulness all-biotechnology or rejected. What could happen if like the green biotechnology (e.g. GMO), the public refused to eat? What if such a drug was dangerous because it stigmatized was designed and produced from biotechnology?

The model of therapeutic innovation of the pharmaceutical industry increasingly relies on the use of biotechnology. The market for medicines derived from molecular biology is experiencing a growth rate in value twice that of the overall market. In 2006, biopharmaceuticals account for 25% of global drug pipeline (Abecassis and Coutinet, 2008). Two times faster than that recorded in the medicines (Leem, 2005), the proliferation of "blockbusters" in biopharmaceuticals is often cited by those interviewed. If societal reasons will challenged the employment of biopharmaceuticals in its entirety, would we be able to imagine alternatives, while the number and recurrence of epidemics or pandemics, accelerating? It is likely that not.

It would therefore seem appropriate to obtain an informed debate and to create a new representation of biotechnology red, less related to legitimate and figures based on knowledge co-constructed by stakeholders. It should nevertheless bear in mind, as pointed out by a doctor that any drug is dangerous or not built from biotechnology, and that any risk can never be excluded. Or do we prefer the biotech scapegoat cathartic rejection of science that has failed in his attempt to become a reality the vision of the progress promised by the philosophical vision of science born in the XVIIIth century?

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Annexe 1

A propos de vous

Q1 Quelle est votre profession ?				
Q2 Quel est votre âge ?				
Q3 Quelle est la date de votre entrée dans les biotechnologies ?				
Q4 Quelle est la date de votre entrée dans votre société ?				
Q5 Depuis quand travaille-t-elle dans les biotechnologies ?				
Q6a Comment avez-vous connu les biotechnologies ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Par un professionnel	Par	Par	Autre :

Q6b Quelles sont vos fonctions au sein de votre entreprise ?				
Q6c Exercez vous d'autres fonctions ?	Membre d'un autre conseil d'administration	<input type="checkbox"/>		
	Elu des chambres de commerces et d'industrie	<input type="checkbox"/>		
	Membre d'une association	<input type="checkbox"/>		
	Représentant du personnel	<input type="checkbox"/>		
	Autre(s), Précisez :	<input type="checkbox"/>		
Q7 – Exercez vous une autre fonction dans les biotechnologies ?	Oui <input type="checkbox"/>	Non <input type="checkbox"/>		
Q7 a : Si oui préciser :				
Q7b – Avez-vous quitté l'une de ces fonctions ?	Oui <input type="checkbox"/>	Non <input type="checkbox"/>		
Q8a -Si oui, pour quelles raisons ? (plusieurs réponses possibles)	8-1 Par contraintes de temps	<input type="checkbox"/>		
	8-2 Par éthique personnelle	<input type="checkbox"/>		
	8-3 Par désaccord personnel	<input type="checkbox"/>		
	8-4 Autre(s), Précisez :	<input type="checkbox"/>		

A propos des biotechnologies

Comment d'une manière générale jugez vous les biotechnologies ?				
Q9 – Pensez vous que les biotechnologies soient bénéfiques pour l'Homme ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Non	Plutôt non	Plutôt oui	Oui

Q10 Comment définiriez vous les biotechnologies ?				
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Q11 – Utilise-t-on les biotechnologies dans le secteur de ?				
A – L'énergie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	NON	Plutôt non	Plutôt oui	OUI
B – Le transport	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	NON	Plutôt non	Plutôt oui	OUI
C – La santé	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	NON	Plutôt non	Plutôt oui	OUI
D - l'agro alimentaire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	NON	Plutôt non	Plutôt oui	OUI
Q12 Pourquoi utilise-t-on les biotechnologies dans ces secteurs d'activités ?				

Le questionnaire total représente six pages et cinquante et une question. Certaines questions contiennent des sous thème ou de multiples réponses comme dans le cas de la question 11. L'ensemble s'articule autour des trois variables retenues dans notre article (Cf. partie I).