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*Genetically Modified food and feed: traceability and labeling in the public debate*

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**Abstract**

Focus groups with stakeholders of agro-food chain, and meetings with citizens were organized in the Trento Autonomous Province. UE regulation on food labeling was discussed. A general non-acceptance of GMO products was confirmed. The adoption by European Union of the label system for GM food and feed identification resulted a valuable response to the consumer's requests of self-assurance and of trust in the promoter of the innovation. Citizens, however, resulted not fully familiar with this system, and expressed an ethical approach on the GMO question. Besides, the need of participation in the decision-making process resulted significant.

**Key words:**

*Agro food chain, decision-making process, Focus groups method, Genetically Modified Organisms (GMO), innovation governance, labels, risk perception, traceability, Tropos methodology.*

## Introduction

The transfer of agrobiotech research from laboratory to application and market has been raising a whole range of collective fears and social rejection (Eurobarometer, 2001 and 2002, Marris, 2001).

Public response to biotechnological innovations is quite strong, involving various levels of interest, roles and actors within the whole society. Moreover, each group engaged in the debate aims to play an active role in the ongoing discussion. Citizens seem to be principally worried of possible and yet unknown long term risks to health and ecosystems, stakeholders are concerned by market consequences, and institutions face the responsibility of the innovation governance (Martinelli, 2004). Besides, a crucial factor of the opposition to genetically modified food and feed seems to be a distrust feeling in the decision-making process that leads to the permission to grow and sell biotech products, in particular when industries are involved (Eurobarometer 2001 and 2002).

A lack of information affecting the “*lay-public*” has commonly been adduced as motivation for the rejection against agrobiotechnology applications, according to the *paradigm* “more knowledge - more acceptance” (Batista *et al.*, 2000). This statement, however, proved recently to be wrong since a deeper knowledge of a question did not result directly related to a more public approval (Scholderer & Frewer, 2003). This seems to be particularly true in the case of nuclear power and genetically modified organisms (GMO). Here, in fact, ethical concern, trust in the technology promoters and utility perception resulted crucial in the public consensus (Bucchi & Neresini, 2002 and 2004; Martinelli, 2004; Frewer, 2003).

Citizens’ perception of the risk related to a technology application has been analyzed by several Authors (De Marchi & Tallachini, 2000; Slovic, 2000; Cerroni, 2003). Among them, in the view of deeply analyzing the public debate on GM products, we support a multidisciplinary approach based on a synthesis of psychology, sociology, experimental economics, and ethics. Technically, a risk has been defined as “*the probability of occurrence of a definite hazard and the magnitude of the consequences of the occurrence*” (Harding, 1998). However, the social view of a certain risk proved to be strongly affected by a personal emotional feeling (DeMarchi *et al.*, 2001). This individual component of the risk has also been defined as “*dread risk*”, i.e. an activity out of the individual control, that is unfamiliar, involuntary, potentially catastrophic, and unfair (Wilkins, 2001).

Accordingly, Sandman distinguished the risk in two distinct components: *hazard* and *outrage*, being the first the risk technical component, and the second the non-technical one (Sandman, 1999). This latter includes emotional elements. Emotive factors are those components of risk perception that cause fear, anger, defensiveness and frustration (*outrage*), and have been described as the principal determinant of a perceived hazard (Sandman, 1995).

The feeling of *outrage* has been explained as the result of subjective reasoning patterns and unconscious motivations (*heuristics*) developed by the individuals in the view of better manage choices in the presence of risks (Tversy & Kahnemann, 1982). The sighting of the relevance of the emotions in the consumers' behaviors and of the psychology in the decision processes started a new approach in the economics that lead to the formulation of an innovative "Nobel-worth" branch of the research (*experimental economics*) (Kahneman & Tversky, 1974 and 1979; Kahneman, 2002). Accordingly, citizens should be regarded as individual entities with own feelings rather than simple consumers motivated by mere rational market rules.

Because of their intrinsic complexity, decisions involving risk management cannot be taken without considering the public involvement. Institutions should carefully take into account the demand of participation coming from Society. As already proven in the social conflict management, in fact (Fondazione Bassetti – Observa, 2003; Fondazione Bassetti – Poster, 2002; Bucchi & Neresini, 2004; Pellegrini, 2005), the transfer of biotech to the everyday lives requires a decision-making process based on democratic rules, where the high level of a technique copes with the public legitimacy (Slovic, 1999).

This approach to the innovation governance is the basis of the "deliberative democracy", a precious tool for legitimating choices that involve the whole range of actors of the society (Fishkin J.S., 2000; Pettit, 2001; Habermas, 1989). Moreover, in the view of allowing the citizens to actively participate in a decision process (i.e. to "*make educated choices*" among the various options they can front), the principle of the "Informed Choice" procedure proved to be promising (Spoel, 2004). Here, citizens need to be fully informed about all the different implications of a certain question. This latter is the crucial principle of the General Food law (Reg. 178/2002/EU, art. 8) and constitutes the framework of the European Union policy in the field of food safety. The principle also characterizes the recent regulations on genetically modified food and feed and on traceability and labeling of products (2003/1829/CE and 2003/1830/CE). Here, labels and a control of each step of the production chain are important tools. Labels would enable consumers to choose or reject goods on the basis of transparency

and awareness, whilst producers and distribution must follow precise rules in the aim of an effective and responsible attribution of responsibilities.

During the year 2004, complete application of European law was still in progress in Italy. We judged this fact as a favorable opportunity for assessing on the Society the various levels of agreement during rule implementation. Thus, we carried out a qualitative research in the Trento Autonomous Province, in the view of assessing reactions, opinions, attitudes and feelings of the various actors of the agro-food chain (citizens, consumers, technicians, scientists, lab workers, farmers, producers, representatives of non governmental organizations) involved in the matter. We wanted to find answers to central questions involving the social debate on biotech application in the agro-food chain, such as trust, concerns, beliefs and expectations.

Our goal was to verify priorities and critical points perceived by the Society, rather to test the technical aspects of the law application. The final aim was providing local institutions with guidelines for managing the policy on food and feed traceability on the basis of the informed choice principle (Reg. 178/2002/EU, art. 8 and 10). According to the qualitative research methodologies, and starting from very different contexts and points of views, we wanted to investigate how labeling regulation is faced both at group and individual levels, and which factors are crucial in the framework of an informed choice approach.

Besides, we wanted to assay the suitability of the tools offered by the deliberative democracy approach (Pettit, 2001) in the view of an improved public perception analysis.

Along the year 2004, we organized two focus groups with selected stakeholders operating in the feed and food management and production (February), and two public meetings with citizens (June). When our analysis was completed, a final meeting for all the participants was organized.

The research has been conducted in the framework of an integrated project (*Detection of Genetically Modified Organisms in the agro-food chain - OSSERVA3*) supported by the Trento Autonomous Province, that is studying the traceability management of genetically modified organisms at broad spectrum, from the analytical technology to the normative assessment, the communication, and the knowledge dissemination.

## **Methods**

Our study is based on focus groups analysis (Powell & Single 1996), while Tropos methodology was assayed for the selection of the various actors (Marin *et al.*, 2004).

A first step of our research aimed to deeply understand the point of view of the stakeholders, i.e. people who work, study or directly deal with the biotechnologies applied to the agro-food chain. A preliminary detailed planning phase was necessary for selecting and recruiting this group of actors (Marin *et al.*, 2004; Curini, 2003). They were delegates of public institutions, of private and public analysis laboratories, of farmers, breeders and industry associations and trade-unions, and representatives of Consumer and environmental associations. This selected group was divided in two categories, according to the respective involvement on food or feed production, analysis and management.

The first focus group dealing with the food chain (*Adoption of EU Regulations in the food sector*) was held on February 28<sup>th</sup>, 2004, while the second one, concerning the feed production (*Adoption of EU Regulations in the feed sector*) took place on February 29<sup>th</sup>, 2004.

During the meetings, after a short introduction of the participants, the conductors and the moderator, the stakeholders were firstly instructed on the research goals. Then, the crucial points and innovations of the EU Regulations on genetically modified organism traceability and control of food and feed (1829/2003/CE and 1830/2003/CE) were reviewed by an expert of our project staff. The following discussions focused on two main questions: “*Do you think that the current EU regulations on food (feed) traceability and labeling adequately guarantees consumers?*”, and “*Which measures would you eventually propose for improving law application in the view of a better consumers’ safety, guarantee and self-confidence?*”. Each meeting lasted for about two hours and a half, and was entirely videotaped. Discussions were moderated by an expert in social sciences. Main issues and statements emerging from the discussions were recorded by a second researcher. Finally, conclusions were collegially validated.

The second part of our research aimed at analyzing the perceptions and point of views of the citizens. We specially wanted to know their beliefs and perceptions of risks related to genetically food and feed consume, and their trust in the institutions. The discussions were organized on the base of a public debate and a dialogue with experts of the matter.

The sites of these two events, that took place respectively on June 16<sup>th</sup> and 17<sup>th</sup>, 2004, were selected among two medium-size municipalities of the Trento province. Levico Terme was chosen for its agriculture and tourism vocations, being renowned for its fruit production and for its landscape attributes. Rovereto, on the other side, was selected for its cultural vocation, being the site of an university and a renewed museum of modern art. For these reasons, the

two conventions respectively happened at the municipality and at the museum of science of those cities.

In both cases, the session started with a presentation by the moderator of the research and of the scheduled agenda. Then, three experts on genetically modified organism traceability concisely presented some of the most relevant technical aspects of the question (laboratory analysis, regulation, production and distribution issues). Besides, environment and consumer safety were shortly introduced by the representatives of an environmentalist association, and of a consumer union, respectively. Finally, the core part of the meeting (i.e. the discussion between public and experts) took place. For deeply studying the debates, the integral transcription of the speeches were analyzed. Every line, paragraph, or other section of the text was coded for relevant themes, and to each code a working definition was assigned.

The final meeting took place at the Istituto Agrario of San Michele all'Adige in the spring of the year 2005. Here, the results of our research were presented and discussed. A DVD with a short documentary on the happening was given to the participants as a present for their kind contribution.

## **Results and Discussion**

### *Focus group method*

In our experience, focus group analysis resulted a suitable approach for investigating the opinion of the various actors involved in the debate on GM food and feed use, on the territory. First of all, we have to stress a noticeable sense of interest and a cooperative attitude by the participants in the happenings we organized. In particular, stakeholders admitted a consistent curiosity in our research and took part with interest in an experience of deliberative democracy (Bosetti & Maffettone, 2004) they never experimented before. A Focus Group, accordingly, is not a mere method of interviewing people in a group setting. The technique, in fact, offers the opportunity to get face-to-face with individuals who are the closest subjects to an investigated topic. Moreover, a major quantity of aspects can be faced compared to the traditional *one-on-one* interview procedure.

Literature reports several definitions of the focus group method. Among them, organized discussion (Kitzinger 1994), collective activity (Powell et al 1996), social events (Goss & Leinbach 1996) and interaction (Kitzinger 1995) identify at best the contribution that focus groups give to the social research (Gibbs 1997). According to Powell (Powell & Single 1996), a focus group is "*a group of individuals selected and assembled by researchers to*

*discuss and comment on, from personal experience, the topic that is the subject of the research*". In this view, this method relies on interactions within a group involved in topics supplied by the researcher (Morgan 1997).

In our experience, accordingly, we were able to obtain a deep insight and a valuable data production following the interactions among the participants.

The methodology has also been named "*the focused group interview*" (Merton & Kendall, 1946), for stressing its peculiarity, i.e. the criteria for a group selection and the procedure of the discussion conduction. Accordingly, participants should have a specific experience and/or opinions on the topic under investigation; besides, the interview should be able to extract the participants' subjective experiences related to predetermined research questions. Compared to the individual interviews, aiming to obtain individual attitudes, beliefs and feelings, focus groups elicit a multiplicity of views and emotional processes within a group context. The traditional interview approach, however, offers an easier control to the researcher: during a focus group conduction, in fact, the moderator's inexperience may result in a take-over by the participants. On the other hand, we believe that the focus group enables the researcher to gain a larger amount of information in a shorter period of time. Moreover, it is particularly useful in the cases of power unbalances between the participants and the decision-makers or the "experts", and in the view of exploring the degree of consensus on a given topic (Morgan & Kreuger 1993).

### *Tropos methodology*

A second method we applied in this research regards the criteria for the stakeholders selection.

The huge amount of available information on biotechnology may increase the communication difficulty within the various categories involved in the debate (Marin *et al.*, 2004). Besides, an information overload and a possibly distorted communication make matters quite confusing. As a result, there is a need of a rational organization of the information, and a precise identification of the most suitable subjects that can be rightly considered "stakeholders".

The tool we have chosen for handling this problem is a specific methodology named *Tropos* (<http://www.troposproject.org>), conceived in the context of the so called *requirement engineering*, a sub-discipline of the *software engineering*. This was initially proposed by Prof. E. Yu and Prof. J. Mylopoulos of the Toronto University, and currently is also wildly exploited at the University and at the ITC-irst of Trento (Bresciani *et al.*, 2004; Bresciani & Sannicolò, 2002). *Tropos* is an Agent oriented Software Methodology, based on the analysis

of the actors, goals and relationships involved in a specific context. In the case presented in this paper, the context is defined within the communication of agrobiotechnology field.

With *Tropos* we formalized with diagrams the most important relationships and needs supporting the final organization of the communication system concerning the debate on GM agrofood (Fig. 1 and Fig. 2). Starting from the study of the existing debate on agrobiotechnology, we defined categories of a topic relevance in the debate (i.e. scientists, farmers, breeders, citizens, institutions, environmentalists, consumer representatives, etc.), and for each category we described specific interests and goals. As a result of the overall analysis, the various actors were precisely portrayed, and their specific behaviors and choices were suitably depicted on the basis of their identities, goals, and mutual dependencies.

### *Analysis of the actors*

After the meetings, a deep analysis of the validated opinions recalled during the events and a careful examination of the videotapes, were necessary for an exhaustive evaluation of thoughts, beliefs and emotions of the various actors who took part to our happenings.

The complete transcription was in depth analyzed. Every line and paragraph of the text was coded for relevant themes. As themes were defined, a working definition was assigned to each code. Thus, code definitions was continually challenged, and often new codes were identified for better fitting the text, whilst rarely used ones were discarded. A constant comparison among categories and codes was continuously effected.

Besides verbal communication, the observation of the nonverbal behaviors, resulted crucial for a deeper interpretation of the participants' meanings and feelings.

Focus groups with stakeholders and meetings with the lay citizens as well, confirmed a general non-acceptance of the GMO products. Worth stressing, different motivations of this attitude merged clearly in the two groups. Above all, while stakeholders admitted that their choice was based on market motivations, citizens expressed a concern based on a complex combination of emotional, political, cultural and ethical aspects. Besides, stakeholders showed familiarity with the matter. Citizens, at the opposite, appeared dazed and worried on their own competence in understanding the labels. Labels, accordingly, were perceived difficult to fully understand. Furthermore, they showed a strong feeling of "outrage" against the GM technology application. A crucial factor of their opposition to GM food and feed seemed to be a distrust feeling in the decision-making process that leads to the permission to grow and sell GM products, in particular when industries are involved.

Both groups judged the EU regulation on traceability and labeling a promising tool toward an enhanced defense of the consumer's right. Both groups, on the other side, revealed a notable feeling of diffidence related to doubts on the Authorities' effectiveness in managing the control activity.

In addition, stakeholders – in particular farmers and breeders - resulted strongly worried by an eventual GMO contamination risks.

An interesting observation concerns the behavior of the two groups. Stakeholders, in fact, faced the debate with a “problem solving” approach, were able to properly respect the agenda of the debate, and expressly focused on the technical questions concerning the correct application of the UE regulation (duties and rights posed by the law, laboratory analysis, food and feed processing, consumer's safety, environment management, coexistence between GM- and not-GM cultures). Citizens, at the opposite, tended to take part to the discussions with a more passionate, yet outraged attitude. Thus, moderator's role was quite critical in managing the debate level. Moreover, lay-public tended continuously to diverge the discussion from the principal theme of the debate (UE regulation on food labeling) and to direct it to more wide issues concerning the whole humanity, such as world famine, biodiversity defense, multinational resources exploitation, long term consequences of GMO spread etc. These observations recall the analysis of the risk perception proposed by Sandman (Sandman, 1999) who stresses the relevance of the “non technical component” and the related feeling of *outrage* in a public debate on a technology application.

An other relevant point concerns the perceptions of the risk and benefit balance on GMO product consumption. Stakeholders seemed to be confident on the safety level of EU authorized GMOs, and their resistance to GMO commercialization appeared more exactly related to a fear of putatively low market value related to these products. This observation is in line with the studies by Gaskell (Gaskell *et al.*, 2004) who demonstrated that “*the Achilles heel*” of GM food is not so much the misperception of scientific risks, but rather the perceived absence of benefit” and that “*without the perception of an improvement on the status quo in terms of quality, price or other attributes there is simply no incentive to deliberate further on the issue*”.

Citizens also expressed serious worries about possible effects on human and animal health, and a strong perception of benefit absence associated to GM product consumption. European consumers of the last social surveys (Eurobarometer, 2001 & 2002), similarly, resulted strongly against the “intrusion” of GM foods in the every day lives, arguing a lack of proofs on their safety and on their superior quality compared to conventional food.

Accordingly, in our experience, stakeholders proved to be skeptic about the market opportunities offered by the GMO products. For this reason, they expect the local institution would support the non-GM choice on the whole territory. Accordingly, in the view of better qualifying the local agrofood production with an added value, Autonomous Trento Province recently deliberated the release of a Non-GMO label. This will be assigned to goods with GM component thresholds lower than the percentages established by the UE regulation (LP 4/2003). Stakeholders of our focus groups, however, expressed the need of an extra aid for an effective prevention from GM accidental contaminations, and for a severe segregation between GM and non-GM cultures. They suggested to develop a data base of the entrepreneurs, and to establish an institutional system for the coordination of the various supply chain's rings. Moreover, the definition of an archive with the relevant information on the traceability questions was perceived as crucial for the sake of transparency.

## **Conclusions**

Our experience shows that the choice of European Union to adopt the label system for identifying the food and feed products containing GM components is the clearest response to the consumer's requests of self-assurance and of trust in the promoter of the innovation. Citizens, on the other hand, resulted not fully familiar with this system, and a general feeling of diffidence on the effectiveness of the law application appeared clearly during the meetings. Trust, worth stressing, is quite a hot matter since the acceptability of a technology transfer proved to be strongly associated to this feeling. (Bucchi & Neresini, 2004).

We also observed the merging of an ethical approach coming from the lay citizens when the GMO question is faced.

Besides, the need of participation in the decision-making process resulted significant. The experience of the environmental conflicts, similarly, confirms that every transfer of a technology to a territory needs to be managed with particular care and expertise. Here, in fact, the consensus of the population, based on a transparent information and the involvement of the various actors, proved to be crucial for avoiding fatal oppositions (Rabe, 1994).

Finally, stakeholders and citizens expressed a considerable feeling of incommunicability and distance by the scientific community. In our experience, accordingly, there is a considerable lack of experts linking together a solid scientific formation with a deep skill in the communication processes. Therefore, we believe that the scientific community has to pay a more convinced attention to the communication aspects of risk management. This would

surely enhance the debate level on agrobiotechnology applications, and help the public decision-making process.

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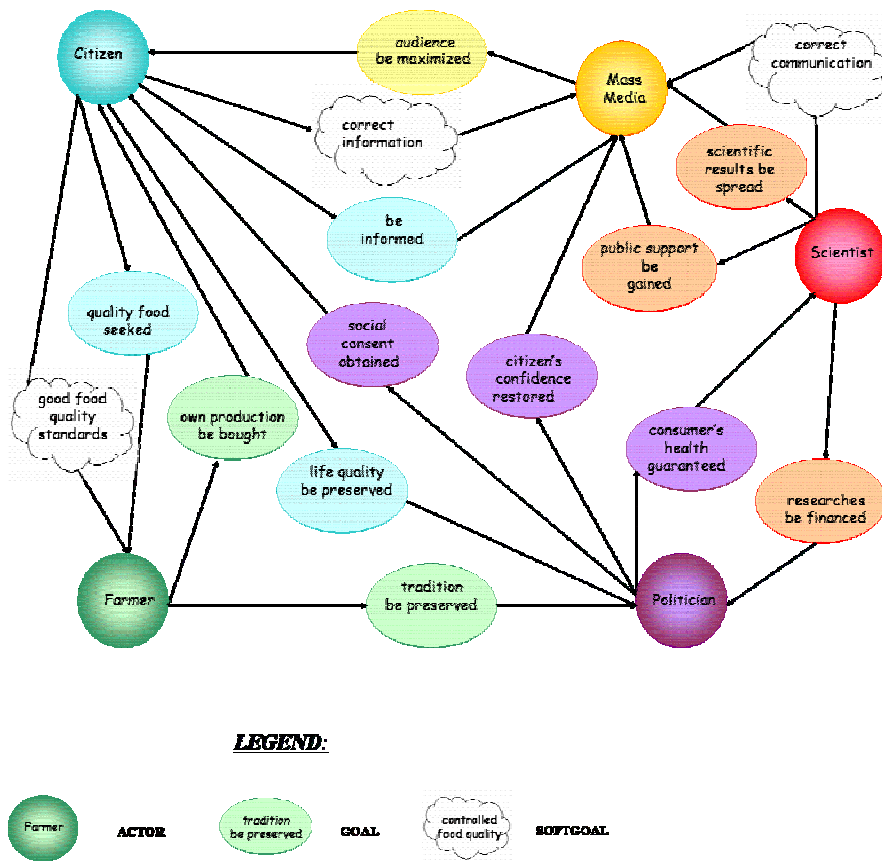
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# Figures

Figure 1 – Schematic representation of a Tropos Actor diagram



**Figure 2 – Illustration of a Tropos Actor diagram applied to the GMO traceability in a general agro-food chain.**

