GENETICALLY MODIFIED ORGANISMS: RISK PERCEPTION AND WILLINGNESS TO BUY GM PRODUCTS

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This study uses consumer survey data collected in different countries to examine the link between risk perception and willingness to buy genetically modified (GM) food. This article outlines a number of factors that influence the risk perception of genetically modified organisms (GMO): public knowledge and attitude, the role of media and stakeholders, social economic considerations, confidence in the institutions responsible for decision-making and ethical concerns. These “non-health and non-environmental” risk assessment factors as well as safety and environment concerns influence how societies assess and perceive risk for a technology like gene engineering.

According the results of this study, the high risk associated with GM foods as perceived by the respondents seems to be the main obstacle to the consumer’s acceptance of GM food and willingness to purchase such kind of food.

Keywords: GMO, risk perception, willingness to buy.
JEL codes: I18, L66, O13.

Introduction

Risk is always the risk of something to someone. Moreover, that risk is perceived not solely by technical parameters and probabilistic numbers, but in our psychological, social and cultural context. Individual and social characteristics form our risk perception and influence the way we react towards risks. Our risk perception is attenuated or amplified in a typical pattern described by the psychometric paradigm (Slovic, 1987).

One of the hottest topics of discussion in our days is gene engineering. We can consider that history of GMO started in 1973 when the first GMO was obtained - an E. coli bacterium. Since that time many food plants and crops are being genetically modified, introducing a new trait to the plant which does not occur naturally in this species (resistance to certain pests, diseases or environmental conditions, so called first generation of GMO) or altered in such a way to control gene expression so the crops produce higher concentrations of known nutrients and disease-fighting compounds (second generation of GMO).

Analyzing the risks of GMO it is important to recognize that the potential risks of GMO is proportional to the potential harm GMO could cause under definite circumstances. It is clear that this probability is not the subject to pure scientific analysis. What we can consider as harm or danger to a large extent determines not by objective scientific analysis, but by the public value criteria. For example, the gen of the pig inserted into GM plant perceived as harm to the Muslims and the Jewish, regardless of GMO safety based on scientific opinion and data available. Also we can consider differently probability of GM crop to spread into the environment or transfer its
transgenes intersecting with taxonomically close related weeds and/or wild plants. This possibility is not considered dangerous in case if GMO does not significantly affect the dynamics of any species in the environment, thereby deranging the natural ecological balance. However, according to other, more radical "green" point of view the dissemination of transgenes into the environment itself can be considered as evil-as genetic contamination of the environment, irrespective of the impact of these transgenic organisms on the ecosystem.

Assess the likelihood that GMO will really get under circumstances in which the exposure could occur is as complex as this probability depends on many factors difficult to analyze (from adopted agricultural practices and ending with proportion of the shadow economy and compliance with the laws and regulations).

According to EU Regulation No.178/2002 safe food is the food, which, under normal or foreseeable conditions of use and at each stage of production, processing and distribution does not cause adverse effects to human health, life or environment.

Such risk factors as biological, chemical or physical determines food safety. Nowadays, in the supermarkets it is almost impossible to find food containing not one of food additives or flavorings. Although mentioned substances are considered safe, some of them can cause allergic reactions, for example, sulfites used as preservatives can cause severe reactions in sulphite-sensitive asthmatics.

As well as microbiological agents occurred in the food naturally from plants, environment or produced by the product itself is capable to cause both toxic and pathogenic responses.

Also, many plants themselves contain contaminants which may cause toxic effects in humans due to different circumstances. For example, the potatoes contain solanine and chaconine which in large quantities can cause poisoning and even death. If anyone today would like to get permission for placing on the market of potatoes as novel food (according EU regulations) it would take several years to obtain it due to their high content of glycoalkaloids (Robinson, 2002).

Assessment of the potential risks of GM food is always performed in comparison with conventional products. According EFSA guidelines (2011) each of the following aspects is considered for all GMO applications:

1. Molecular characterisation of the GM product, taking into account the characteristics of the donor and recipient organism;
2. Compositional, nutritional, and agronomic characteristics of the GM product;
3. Potential toxicity and allergenicity of the GM product;
4. Potential environmental impact following a deliberate release of the GM product and taking into account its intended uses either for import, processing or cultivation.

Besides safety and environment aspects there are also socio-economic concerns, public knowledge and attitude, the role of media and stakeholders, confidence in the institutions responsible for decision-making and ethical concerns which shapes consumer perception of risks caused by GMO.
Methodology of the research

This study summarizes available information and scientific data on GMO risk perception and identifies the key indicators that generate the willingness to buy or to avoid GM products. Many kind of different literature and scientific data were analyzed to find out public risks perception in different parts of the world and comparative analyze was performed to see the differences among countries considered.

Results

The willingness to buy or to avoid GM products has been studied in a number of surveys taking into account the level of knowledge, socio-demographic variables, perception of the risks and benefits linked to agricultural biotechnology, trust in the information and/or the actions of certain actors, social and political values, etc.

For example, the effects of Italian and United States (US) consumers risk perceptions, knowledge and awareness of GM foods, and trust in government agencies on willingness to buy GM foods was examined by universities in US and Italia (Harrison, 2004). Results indicated that effects of risk perception of GM foods to human health and the environment are similar between urban consumers in Italy and US. Higher levels of perceived risk decrease the likelihood of purchase in both countries. However, Italian consumers were found to be more sensitive to the potential risks that GM foods may pose to human health and the environment, relative to the US consumer. In general, Italians were also less likely to purchase GM foods relative to US consumers. It was also found that confidence in competent authorities involved in decision making and control process impact willingness to purchase GM food. Education, age and gender produced mixed results. It was concluded that beliefs regarding risk perceptions and trust in regulatory agencies play an important role in consumer opinions toward GM foods in both countries.

According Chen Xi (2006) it is possible to conclude that the positive perception towards GM foods in China stems from more urgent needs for the improvement of food availability and nutrition. Additionally, perceived risk is smaller due to trust in government, relatively positive attitudes toward health and environment and positive perceptions of science.

The results of the study conducted by Xiaoyong Z. at al (2010) showed that the Chinese acceptance and willingness to buy GM food is much higher than in many other countries around the world. The study revealed that 14% of respondents saw the benefits of the development of second generation of GMOs, which can help to improve food quality, nutritional value, taste, etc. Approximately 26% of the Chinese did not support the use of GMOs in food production at all.

Although China already has a comprehensive agricultural GM biosafety regulatory and monitoring system, the biosafety evaluation and approval procedure require more transparency to enable consumers to better understand biosafety issues and improve their trust in government’s ability to regulate GM technology and to allow only GM technologies that are safe to human health and to the environment to be introduced.
The results of a study by Chern S. W. et al. (2002) investigating willingness of students in Japan, Norway, Taiwan and the US to pay for GMO products indicated that there are notable differences in the attitude and perception of GM foods across these countries. Although students are not representative of all consumers nevertheless, the student surveys offered useful data for a cross-country comparison. The results revealed that American and Taiwanese students were more favorable to GM foods than Norwegian and Japanese students. It was found out that in all of these countries were willing to pay more in order to avoid GM foods. Furthermore, the majority of students in all four countries supported a mandatory labeling of GM foods.

The findings in Australia (Brown, 2005) indicated that consumer risk perceptions act as an antecedent to external information search and willingness to buy. Therefore, the more a consumer sees risk in GM food the more likely they are to search for information. However, risk also acts to diminish the willingness of consumers to buy GM food.

A study by Krystallis et al. (2007) contrasted consumer and expert perceptions concerning several dimensions relevant to GMOs, and found significantly differing views and attitudes. The survey was conducted in four different European countries indicating the different expert and consumer perspectives on food risk management, in order to assess the participants' reactions to these. It was found that, though there were areas of agreement between the experts and consumers (for example, they agreed that consumers lack relevant knowledge, that food safety is a shared responsibility and that scientific uncertainty cannot be completely avoided), there were other areas where disagreement remained (for example, on the acceptability of economic interests in food risk management and the role and quality of media reporting).

Conclusions

1. The consumer acceptance toward GM foods and willingness to purchase them are sorely affected by risk perception which depends and is influenced by consumer level of education, the role of media and stakeholders, social economic considerations, confidence in the regulatory institutions, ethical concerns, freedom of choice (mandatory labelling) and possible benefits of GM foods.

2. Among all, the high risk associated with GM foods as perceived by the respondents seems to be the main obstacle to the consumer’s acceptance of such foods. People weigh risk information as more important than benefit information, thus the difficulty of selling benefits against possible risks.

3. In many studies respondents mention lack of credible information sources which reinforces the necessity to educate the general public to be more aware of GM foods with more objective scientific information.

4. Also, the result pointed to the importance of GM food labeling, implying the need to provide the consumer with more information on GM foods so that the consumer confidence can be established. Moreover, the price factor was significant in determining consuming GM foods in some countries, suggesting that lower price can be a useful tool to stimulate GM food buying.
5. It was also found that confidence in regulatory authorities involved in decision making and control process impact willingness to purchase GM food in number of countries.

References