

# ASPECTS ON CONSUMERS ATTITUDE TOWARD GENETICALLY MODIFIED FOODS AMONG YOUTH

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## Abstract:

*Advances in food biotechnology and food science in the early 1990s have opened the gates of new markets for genetically modified foods. A broad dispute over the use of foods derived from genetically modified organisms and other uses of genetic engineering in food production in terms of key scientific researches, their impact on health and eco-systems, food safety and food security, labelling and regulations, traceability is still lasting. Beside the scientifically, technical, ethical and regulators arguments, the economical aspects of the genetically modified food market is influenced by the social acceptance of it. Consumers' perception and their attitudes are different and depending on many factors. A survey of youth as undergraduate students of Constantin Brancoveanu University from Romania revealed certain differences in attitudes regarding the genetically modified foods that may be partially explained by the consumers' information. Referring the consumer behaviour, this study showed rather a tacit attitude of acceptance of the genetically modified food goods than a vehement rejection.*

**Keywords:** *GMOs, consumer behaviour, genetically modified foods, consumer attitude, youth, food consumption.*

**JEL Classification:** M39, P36, Q19

## 1. Introduction

Crop plants, farm animals, and microorganisms have become main subjects to genetic engineering. The transition from traditional breeding techniques to artificial selection was gradually developed since last century. At the beginning artificial selection consisted of organisms that exhibit specific traits, which were chosen to breed subsequent generations but limited to naturally occurring variations. Afterwards genetic engineering techniques allowed for an adequate control over the genetic changes introduced into an organism such as the genetically modified organisms (GMOs) can comprise genes from one species into a completely unrelated species. Nowadays Genetically Modified Organisms are defined as "organisms in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating and/or natural recombination" (World Health Organization, 2014). Today many industries stand to benefit from gene technology research. GMOs applications are developed and used especially in agriculture and food industry, as well as in pharmaceutical and medicine ones.

Maize with increase insect resistance, modified soybean with herbicide tolerance, canola with altered fatty acids composition was a few success stories taken into account by the promoters of GMOs usage. Genetic engineering in agriculture permits increased crop yields, reduced need for pesticides, and crop protection, developing plants that grow faster and tolerate better many environmental stressors (Takeda & Matsuoka, 2008). The outcomes for farm animals are obviously focus to yield increment and exhibit resistance to some diseases. Some benefits of modern biotechnology in food area refer to improving the efficiency of food production and cut costs for food processing, enhancing food composition in nutrients, reducing its allergenic potential, ensuring a certain food quality, and not last a greater food security globally (Sirbu, 2004).

Despite the fact that the variety of GMOs uses provides many benefits to humans, further scientific research have suggested that foreign gene expression may induce certain alterations for the natural state of an organism, sometimes with unknown consequences in

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terms of changing the organism's metabolism, growth rate etc. The concerns on risks surrounding the GMOs have appeared not only about genetically modified organism itself, but also related to possibility of exposure to new allergens or transfer of undesirable genes or changes of the natural environment in which that organism proliferates. Since 1970-1980s the scientific controversies blew up towards rich argues on topics as food safety or environmental issues (Devos *et al*, 2008). Those arguments for and against GMOs using have been continued to public debates, and finally have pushed policy-makers to act. However, advances in food biotechnology and food science in the early 1990s have opened the gates of new markets for genetically modified foods as well.

The pathway governments have regulated GMOs or/and genetically modified foods varies as respects the capacity building and regulatory provisions. Regulations for genetically modified foods usually regulate GMOs as well, taking into account food safety assessment, consumer health, environmental risks, control and trade-related issues (Reg. EC no. 1829/2003; etc.). In view of keeping under control any unintended effects which could result from gene technology, specific systems have been set up for an appropriate evaluation of GMOs or genetically modified foods by using specific assessment tools and procedures. For example, Codex Alimentarius Commission (as joint FAO/WHO intergovernmental body) developed principles for the human health risk analysis of genetically modified foods since 2003.

A broad dispute over the use of foods derived from genetically modified organisms and other uses of genetic engineering in food production in terms of key scientific research, their impact on health and eco-systems, ethics, food safety and food security, cost/benefit evaluation, labelling and regulations, traceability is still lasting. Although many issues under debate on uses of biotechnology and the marketing of genetically modified foods are similar spread around the world, the consumers' behaviour related to GMOs acceptance differs from region to region or from a country to another. Beside the scientifically, technical, ethical and regulators arguments, the economical aspects of the genetically modified food market is influenced by the social acceptance of it.

Consumers have different attitudes to genetically modified foods often with societal, historical or religious connotations. Also variation in risk perception or interpretation about relative risks and benefits of GMOs exists among different countries, cultures and individuals within countries at different times and within various contexts (Frewer *et al.*, 2004). For example, in comparison with United States, the European Union was known for its anti-GMO stance before 2010, but policies and attitudes in Europe have started to change afterwards (Benson, 2011). However, many European consumers still worry about potential risks of GMOs; reason for what the key words in their food demand are: green, safe, health & wellness products (Euromonitor, 2013).

Consumers' perception and their attitudes are different but depending on many factors. A lot of works has tried to explain how consumers form their attitudes and make decisions with regard to genetically modified foods. It seems that the general attitudes and values towards nature and technology have influenced the perceived risks and benefits of the modern biotechnology, and finally affected their purchase decisions (Bredahl, 2001; Frewer *et al.*, 2004). Also risk perceptions and risk preferences were found to be significant determinants of acceptance of genetically modified foods, which has important implications for explaining consumer behaviour (Lusk & Coble, 2005). It was outlined that education and communication may influence risk perceptions, too. For example, some authors (Grimsrud *et al*, 2004; Huffman *et al*, 2007) reported that self-reported knowledge about biotechnology increases willingness to accept for genetically modified foods, whilst higher levels of formal education decrease the acceptance for these genetically modified foods. Also, psycho-social and cultural factors affecting the perceived risk of genetically modified foods have been assessed, and implications of cultural theory for risk

communication and decision making about genetically modified food were highlighted into scientific literature (Finucane & Holup, 2005).

The aim of this investigation based on survey of undergraduate students is to give insight into the behaviour of younger Romanian consumers as respects their attitudes toward genetically modified foods.

## 2. Methodology

An in-depth survey was assayed based on questionnaire and interview. Data was collected from sample of 62 Romanian students from an undergraduate economic course at Faculty of Management Marketing in Economic Affairs in frame of Constantin Brancoveanu University.

The survey has followed a classical marketing scheme according to an interview face-to-face. The questionnaire consists of a number of questions related to genetically modified foods: general information, prior beliefs on assessment of potential risks, range of foodstuffs, goods labelling, and reasons for purchasing. Data analysis was performed by Statistical Package for the Social Sciences (SPSS 11.0) for Windows.

The consumers' structure yielded from sample collection is introduced in table 1. Overall the sample is not representative for general population in neither Romania nor Ramnicu Valcea area, but the purpose of our study is different, namely it addressed to youth with a higher potential to be more educated consumers (as focus group).

**Table 1. Descriptive statistics for the sample (N = 62).**

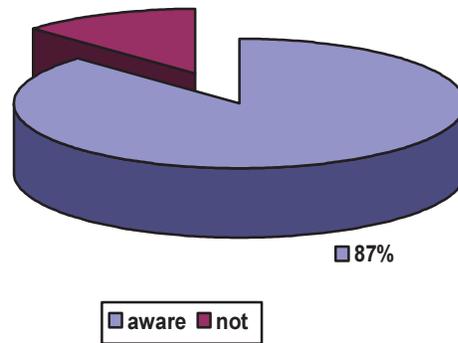
Variables	Frequency (%)
Gender	
Female	44 (70.97)
Male	18 (29.03)
Urbanization	
Urban (towns: Ramnicu Valcea, Dragasani, Horezu)	26 (41.94)
Rural	36 (58.06)
Age	
Less than 20 years old	40 (64.52)
Between 20 and 25 years old	14 (22.58)
Above 25 years old	8 (12.90)

Descriptive statistics for the sample shows a higher percept of females. Although the gender seems to be unbalanced, that is obvious in terms of higher amount of women students who effectively attend the university courses. The ratio between rural and urban residence is also justified based on population structure at county level. As depicted in table 1, above 64% is youth less than 20 years old, because the survey was made on first-year students in university. Because they are students we did not take into account the following variables: incomes and educational level. However, during interview running we found out that 4 students have already completed other higher education.

## 3. Results and discussion

This sample presents an appropriate means of comparing differences in attitudes among younger consumers with regard to genetically modified foods.

The very first question in the survey specifically related to basic knowledge about genetically modified foods was: "Do you know what genetically modified food is?". After analyzing the responses received we observed that most subjects knew what genetically modified foods are, consumer information being achieved mainly through audio visual sources. As is shown in figure 1, the awareness of genetically modified foods by consumers is indicated at a high level of 87.10% whilst remain percent was not aware at all.



**Figure 1. Awareness of genetically modified food by consumers**

If we compare the results with previous ones of Sirbu (2004b) it seems in last decade the awareness of genetically modified food by students as consumers increased with a rate of approximate 28%, outcomes explained part by a facile access to information and on the other hand quantitative increment of younger students than 20 years old (at Constantin Brancoveanu University – Ramnicu Valcea), that means a segment of younger population with a general behaviour more oriented to communication.

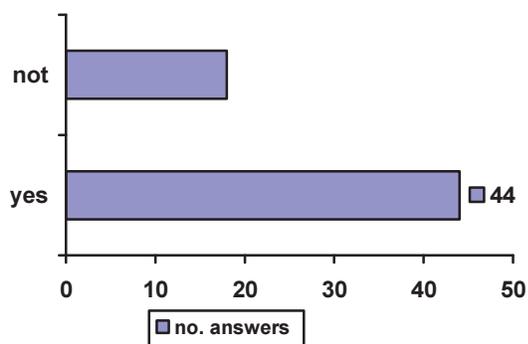
At the questions “Do you eat genetically modified food?” and “Do you buy genetically modified food?” the aggregate answer showed that food consumption structure reflects their awareness as a whole. Only 9.67% is percentage of those who answered negatively to these questions. However, data analysis underlined a particular fact. Although there was registered self-reported knowledge, the respondents were not strongly positive on accurateness of their prior information as respects genetically modified foods. Therefore, approximate half of subjects from studied sample (percent of 48.39%) mentioned “I do not know”. This attitude is more related to traceability and communication rather than willingness to accept for genetically modified foods.

When they were asked about purchasing intent for genetically modified food goods only for reason that these food commodities are cheaper with 20 to 40%, the majority held a negative answer. Only 9.68% of subjects strongly agreed that they watched on money value. Evaluative responses may express a very positive attraction for food commodity itself beyond price based on public perception that is apart of ranges of conventional foodstuffs goods.

According to the cross tabulation analysis results the relatively high concern about range of food goods related to their origins or specific qualitative features is a function of the age. In this case the attitude of students is due to perception of risks and information rather than money. The fact was proved by assessment of answers received to another question, namely: „Generally, are you concerned about provenience of foodstuffs?” (see figure 2).

By assessing of association between demographic variables (as gender and ages) and willingness to accept for genetically modified food in consumption, results indicated that male respondents are more reticent to these foodstuffs but then they admit as having less reliable knowledge on this topic, in general.

When students had to choose a few reasons why they eat or/and buy genetically modified foods a half of respondents admitted they did not know in a sufficient and reliable measure which are the risks and benefits related to these foodstuffs. Even so, many of subjects did not limited to this answer and had expressed their interest as a formed attitude towards health and/or environmental issues as well.



**Figure 2. Concerns about origins of genetically modified food**

The main reasons that influence the eating and/or buying decision for genetically modified (GM) foods are introduced in table 2. No matter which kind of own knowledge about genetically modified foods is done, however there is a trust related to food commodities regulation and labelling as meaning that 45.16% respondents are willing to accept for these foodstuffs only because they are labelled as so. Therefore the response of younger consumers to genetically modified foods labelling is significant and the youth has developed a positive attitude toward these goods just because the information is transparent and correct. Consequently, consumer beliefs about the acceptability of labelling food policies are very important in terms of acceptance of genetically modified foods. But that does not mean consumers can not have opinions or attitudes different from one genetically modified product to another or become more tolerant about genetic modification of agro-foods.

Regarding consumer behaviour, the subjects have supported subjective and vague attitudes towards a certain lifestyle associated with health, safety and environmental aspects. The consumer attitude and perceptions have been polarized between two main issues, but more important has been reflected by the interest on health aspects. As we mentioned previously, there is not a very in-depth understanding of scientific and technological background with regard to risk management and genetically modified foods. However, students' attitudes to health and environment items were broadly spread in terms of emotions and perceptions. If we refer to biotechnologies approach in food area and the meaning of "impact" our focus group has more a sceptical than ambivalent attitude towards genetically modified foods. But this kind of sensibility is not necessary a signalling an ongoing social request, but more a Romanian perception on impact dimension related to notion of risks taken in it.

**Table 2. Descriptive statistics**

Reasons that influence the eating and/or buying decision for genetically modified (GM) foods	Frequency (%)
GM food is safety in consumption (food safety)	6 (5.0)
I know the risks and benefits regarding GM food	16 (13.33)
I do not know the risks and benefits regarding GM food	32 (26.67)
GM food has impact on environment	12 (10.0)
GM food has impact on health (for long term)	26 (21.67)
Goods are labelled appropriate as GM food	28 (23.33)

Although many respondents have expressed concerns about their health status towards genetically modified foods, proportion of those who agreed that they watched also to food safety is lower. The difference in reasons that influence the eating and/or buying decision for genetically modified foods between those who did or did not know the risks and benefits was significant.

When we asked about the range of genetically modified foods which the students have consumed intentionally or unintentionally, the following categories of products have been nominated:

Table 3. Potential consumption of genetically modified foods

Categories of products	Genetically modified foods
food itself is a living organism genetically modified	tomatoes, pepper soybeans, potatoes, different fruits (strawberry,...), meat, fish
food contains a genetically modified living organisms (GMO)	yogurt containing lactic acid bacteria, fermented cheese
food contains isolated or treated products, from inactivated GMO	ketchup, bread, salami and other meat products, mashed potatoes, jam, stewed fruit

Obviously, range of genetically modified foods introduced in table 3 does not reflect actual consumption, but provides a few clues about perception of sample associated with identity and availability of these goods on market, as well as a certain willingness of acceptance in the diet. Also there are a very narrow proportion of respondents that have preferred to remain vague by giving answers such as “I am not sure” or “I do not know”.

Frewer *et al* (2004) pointed out that trust in information sources involves increasing transparency in decision-making process. Moreover public trust is built in by a substantial effort made by all key stakeholders to direct resources towards increasing confidence. The scope of our investigation is not focus on this kind of empirical analysis, but the selection of information sources based on consumer perception of generic beliefs of trust has been taken into account. Consequently, the next question has arisen: “Which are most trustful information sources you used?” Information about genetically modified foods, risk assessment or other topics related were taken from audio visual sources, prints (in written press, newsletters, flyers,...), as formal education outcomes or retrieved from social groups (family, friends,...).

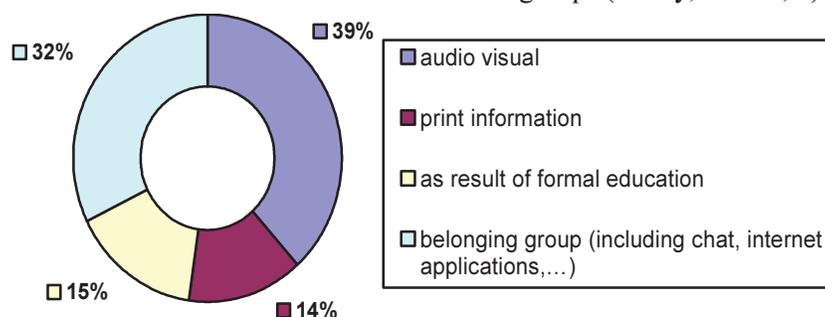


Figure 3. Distribution of information sources about genetically modified food

The distribution of information sources (see figure 3) has shown that the main spring for these kinds of topics is still audio visual followed by an increased contribution of belonging group in which knowledge transfer is shared face-to-face or by using different devices (on-line, wireless,...).

#### 4. Conclusion

A survey of youth as undergraduate students from Constantin Brancoveanu University from Valcea - Romania revealed certain differences in attitudes towards genetically modified foods that may be partially explained by the consumers' information. Although most participants in the survey have demonstrated an awareness of genetically modified foods, they agreed that were conscious about reliability of information sources, especially of audio visual ones. But then labelling is an important source of information in the market which developed a

valuable trust for genetically modified foods. Also as it pointed out the contribution of sharing information belonging to a group has substantially increased in Romania today.

Referring the consumer behaviour, this study showed rather a tacit attitude of acceptance of the genetically modified food goods than a vehement rejection. This irresolute attitude is much related to communication rather than willingness to accept or reject for genetically modified foods.

Younger consumer attitudes toward genetically modified foods are complex. The investigation has underlined that certain request information on traceability and qualitative traits of these food goods is a function of the age. That means a lot of youth are expected to retrieve much available information on interest topics and are more concerned about risks perception. The respondents have supported subjective attitudes towards health, safety and environmental aspects sometimes having more a sceptical than ambivalent attitude towards genetically modified foods.

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