



COMPARATIVE ANALYSIS OF GMO RISK PERCEPTION GAP BETWEEN EU CONSUMERS AND LATVIAN EXPERTS INVOLVED IN GMO DECISION MAKING PROCESS

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Abstract. Abstract. This research is the first step to provide comparative analysis of genetically modified organisms' (GMO) risk perception gap between EU consumers and EU experts involved in GMO decision making process. The aim of this paper is to provide information just of Latvian experts involved at decision making process, this study covers Latvian experts' point of view, finds out main reasons and outline main factors associated with risk perception of GMO. To compare risk perception gap this paper summarizes also the main factors that influence EU consumers' risk perception towards GMO: health and safety aspects, impact on environment, social economic considerations, public knowledge and attitude, the role of media and stakeholders, confidence in the institutions responsible for decision-making and ethical concerns. According information and data available and taking into account author's prepared surveys and obtained data comparative analysis of GMO risk perception gap between EU consumers and Latvian experts has been performed. As a result conclusions have been conducted to better understand differences between risk perception among different players in the field of GMO.

Key words: *EU, decision making, GMO, risks assessment, risk perception*

JEL code: D81, D91, I18, O31, Q18

Introduction

The purpose of this research is to find out risk perception gap between EU consumers and Latvian experts involved in GMO decision making process. Comparative analysis of available data of EU consumers' risk perception was summarized to compare it with data obtained from survey on opinion of Latvian experts.

In order to better understand consumers' preferences it is necessary understand level of risks and benefit perception. Encountering for the first time with new product it is clear that the consumer will look upon with suspicion. This situation confronts the people with an uncertainty before purchase and expected negative results create risk perception.

In the market where supply of products is huge there is a dilemma for consumer to decide between tested and new product, between certainty and possible risk resulted from the new technologies. Research results showed that perceived benefits had the most important influence on consumer purchase decisions, such as environmental impact and health related concerns (Fortin and Renton, 2003).

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Research results and discussion

This study summarizes available information and identifies the key factors that generate GMO risk perception. Many kind of different literature and scientific data were analysed to find out public risks perception in different parts of the world and comparative analyse was performed to see the differences among countries considered.

Before conducting of survey the hypothesis was posed that risk perception among different players in the field of GMO differs because of level of knowledge. Although according Miller and Conko, 2000, concerns regarding GMO cannot simply be imputed to a lack of consumer knowledge in biology.

According Kayabasi, A. and Mucan, 2011, the attitudes and perceptions of the consumers towards GM food have nine dimensions: the perceived environmental risk, the perceived benefit, long-term effects on human health, risk for the world, attitudes towards labelling, attitudes towards purchase, attitudes in terms of cultural- spiritual and moral values, perception of knowledge level and the perceived risk respectively. The most explanatory factor is the possible risks of GM food on human health in the long term. The least explanatory factor solution is the attitudes towards cultural- spiritual and moral values. Additionally another important result provided by the research is that the consumers do not have sufficient information regarding GM food. It was found out what consumers have medium level of knowledge about gene technology.

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).

One of the reasons of European consumers' opposition to GMO is that their advantages in food production are often considered to be weak or non-existent, while their risks are considered to be substantial. Risk perception causes a stronger influence than benefit perception (Moon and Balasubramanian, 2001).

Consequences of genetic engineering are not directly observable and difficult to control. Acceptability thus depends on many factors related to perception of risks and to the importance of benefits that justify or offset them. But risk perception of GMOs have been extended to a very wide field, including many socio-economic or political aspects, knowledge of the risk and familiarity with it, scientific uncertainty, controversy, delay in the appearance of undesirable consequences, advantages – or disadvantages – for the person exposed etc. (Bonny, S., 2003).

The research by Marris, C. et al. reveals a more complex picture, in which the distinctions often made between 'real risk' and 'perceived risk', between 'risk' and 'ethical' concerns, or between 'scientific' and 'non-scientific' concerns, are blurred.

1. Methods

The first stage of an EU experts' survey was conducted during January, 2013. The relevant experts from Latvia involved in GMO issues were selected and interviewed. The experts were selected taken into account their activities in the field of GMO. These experts are mostly researchers at local universities and experts from state administration.



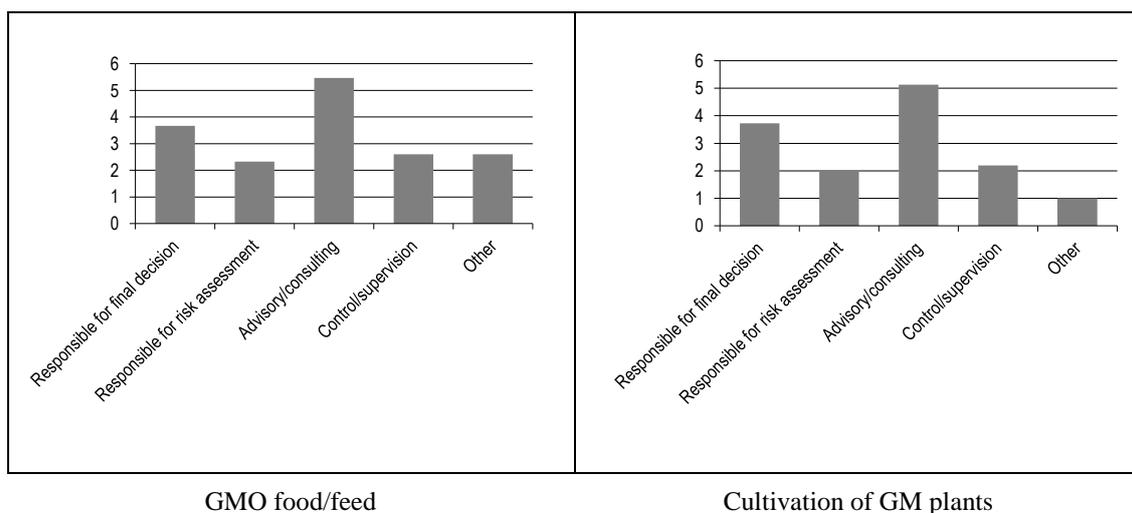
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The experts were asked to complete survey of 21 questions that elicited information about role of expert's institution in decision making process, opinion towards use of GMO in food/feed and cultivation, risks and benefits of GMO, satisfaction with the process of issue of permission, public access to information on different aspects of GMO and public ability to interpret and understand scientific information.

Most of the selected experts were first contacted personally. After briefly informing them about the purpose of the survey, incentives to participate were offered in form of a free copy of the final report. It was assumed that the results would interest them since they also revealed how other experts assess GMO decision making process and different aspects of GMO. They were also assured that their views would be kept confidential. The selected experts then either accepted or refused to participate. 19 questionnaires were distributed and 15 were returned. Refusal to participate in the survey can be explained by the sensitivity of the GMO issue in some groups of population.

The first two questions were about role of expert's institution in decision making process towards GM food/feed and cultivation of GM plants. In responding, the participants had to choose one of four options (plus "Other") and to assess level of involvement on a scale from one to ten; "one" indicated "not involved at all", respectively; "ten" indicated "strongly involved", respectively. Figure below shows the aggregated results regarding general role of expert's institution at decision making and rate of involvement in different processes. The y-axis shows the rating scale from one to ten and the x-axis lists the four main segments at decision making process (plus "Other").



Source: author's calculations based on expert (n=15) survey results obtained on January, 2013

Fig. 1. Role of expert's institution in decision making process and rate of involvement

The first results collected from survey were used to compare and find out the gap of risk perceptions between Latvian experts and EU consumers regarding GMO. Parallel to experts' survey an analysis of risk perception of EU consumers was carried out using information available and different scientific data sources.

2. Results

To compare the gap of risk perceptions between Latvian experts and EU consumers regarding GMO, the series of questions were analysed. The full survey is available from the author upon request. The questions regarding experts' opinion towards use of GMO in food/feed and for cultivation as well as



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towards risks GMO can cause to human/animal health and environment allows us to make some conclusions regarding experts' risk perception.

First of all answers to 2 of the questions were analysed to compare official opinion of institution involved in decision making process with personal opinion of expert employed by this respective institution. The results in Table 1 show that official opinion of institution involved in decision making process is not defined in many institutions (regarding food – in 46.7% cases, regarding feed – 40% and regarding cultivation – 33.3%). Hence we may conclude that experts often express their personal opinion instead of an official one during decision making process towards use of GMO in food/feed or for cultivation. Table 1 shows that institutions in 26.7% consider that decision regarding use of GMO in food and feed should be taken based on case by case approach. We also can observe that attitude regarding cultivation of GMO in 53.3% cases are negative and institutions are very cautious on this score.

Table 1

Official opinion of institution of Latvia involved in decision making towards use of GMO

Official opinion	Food		Feed		Cultivation		Other uses	
	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent
In favour	2	13.3	3	20.0	-	-	2 (contained use)	100.0
Case by case	4	26.7	4	26.7	1	6.7	-	
Against	1	6.7	1	6.7	8	53.3	-	
Don't know	1	6.7	1	6.7	1	6.7	-	
Official opinion not defined	7	46.7	6	40	5	33.3	-	
Total	15	100.0	15	100.0	15	100.0	2	100.0

Source: author's calculations based on expert (n=15) survey results obtained on January, 2013

From Table 2 we can see that experts mostly have defined their personal opinion towards use of GMO in food/feed and for cultivation, there are just some cases experts haven't defined their attitude. From results obtained we can observe that more than half of experts 53.3% don't support cultivation of GMO like their institutions, but if we compare official opinion of institutions and personal opinions of experts towards use of GMO in food/feed we can conclude that opinions vary. Just 13.3% of institutions support use of GMO in food and 20% in feed in comparison with experts' support – 26.7% regarding food and 33.3% regarding feed. Analysing data obtained it is visible that experts are more supportive regarding use of GMO in food and feed in compare with official opinion of institutions and both – institutions and experts are more cautious regarding cultivation of GM plants.

Table 2

Personal opinion of experts towards use of GMO

Official opinion	Food		Feed		Cultivation		Other uses	
	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent
In favour	4	26.7	5	33.3	2	13.3	2 (contained use)	100.0
Case by case	4	26.7	5	33.3	4	26.7	-	
Against	4	26.7	3	20.0	8	53.3	-	
Don't know	3	20.0	2	13.3	1	6.6	-	
Total	15	100.0	15	100.0	15	100.0	2	100.0

Source: author's calculations based on expert (n=15) survey results obtained on January, 2013



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Besides personal opinion regarding use of GMO in food/feed and for cultivation the experts were also asked to express their opinion regarding risk GMO can cause to human/animal health and to environment (Table 3).

Table 3

Expert's personal opinion regarding risk GM food/feed can cause to human/animal health and environment

Expert's opinion regarding risk of GM food/feed to human/animal health	Frequency	Per cent	Expert's opinion regarding risk of GMO to environment	Frequency	Per cent
Safe as its conventional counterparts	3	20.0	Safe as its conventional counterparts	1	6.7
More safe than unsafe	3	20.0	More safe than unsafe	-	-
Depends on case by case	7	46.7	Depends on case by case	7	46.7
More unsafe than safe	1	6.7	More unsafe than safe	2	13.3
It can cause significant risk to human health	1	6.7	It can cause significant risk to environment	5	33.3
Total	15	100.0	Total	15	100.0

Source: author's calculations based on expert (n=15) survey results obtained on January, 2013

Almost half of experts 46.7% think that it is not possible to consider risk of GMO equipollent, they are sure that it is complex issue and every GMO should be assessed case by case.

Just one of the experts is sure that GMO food/feed can cause significant risk to human or animal health and 5 of experts are sure that cultivation of GMO can cause significant risk to environment. Mostly experts are cautious assessing possible risk of GMO. 20% of experts are sure that GM food and feed are safe as its conventional counterparts and 20% think that it is more safe than unsafe. Different picture is in the field of cultivation where 33.3% experts think that GMO can cause significant risk to environment.

Main statistical indicators there examined regarding responses on question – what is a role of your institution in decision making process towards GM food/feed and cultivation of GMO. Involvement in decision making process is described using the mean, median and extreme values in Table 4 and Table 5.

Table 4

Main statistical indicators of the experts' responses on question – what is a role of your institution in decision making process towards GM food/feed?

Statistics	Responsible for final decision	Responsible for risk assessment	Advisory/consulting	Control/supervision	Other
Number	15	15	15	15	15
Mean	3.67	2.33	5.47	2.60	2.60
Median	1.00	1.00	6.00	1.00	1.00
Mode	1	1	1	1	1
Variance	10.524	6.095	10.695	11.400	11.400
Range	9	9	9	9	9
Minimum	1	1	1	1	1
Maximum	10	10	10	10	10

Source: Author's calculations, evaluation scale 1 – 10, where 1 – not involved at all and 10 – strongly involved



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As it is visible from Table 4 and Table 5 the mean role of institution in decision making process towards use of GMO for GM food and feed is 3.67% – for final decision, 2.33% – for risks assessment, 5.47% – for advisory and consulting and 2.6% – for control and supervision. Mostly inquired experts are involved in GM food/feed decision making process as advisors and consultants. Expert evaluation's on question – what is a role of your institution in decision making process towards GM food/feed? covers all possible range of all statements, arithmetic means differ from 2.33 till 5.47 but still the most of experts gave the lowest evaluations which is indicated by mode (Table 4).

Table 5

Main statistical indicators of the experts' responses on question – *what is a role of your institution in decision making process towards use of GMO for cultivation?*

Statistics	Responsible for final decision	Responsible for risk assessment	Advisory/ consulting	Control/ supervision	Other (please, specify)
Valid	15	15	15	15	15
Mean	3.73	2.00	5.13	2.20	1.00
Median	1.00	1.00	5.00	1.00	1.00
Mode	1	1	1	1	1
Variance	12.067	6.000	11.838	10.029	.000
Range	9	9	9	9	0
Minimum	1	1	1	1	1
Maximum	10	10	10	10	1

Source: Author's calculations, evaluation scale 1 – 10, where 1 – not involved at all and 10 – strongly involved

Analogical situation is in the field of cultivation of GM plant where the mean 3.73% of experts are involved in final decision, 2.0% – in risks assessment, 5.13% – in advisory and consulting and 2.2% in control and supervision. Although arithmetic means of expert evaluations differ from 2.0 till 5.13, most of the experts gave the lowest evaluation which is indicated by mode (Table 5).

Analysing data obtained from Tale 4 and 5 we can conclude that every single expert is mostly involved in one area at decision making process towards use of GMO for food/feed or cultivation. It explains why modes for all areas in both tables are 1.

Conclusions

The survey results presented in this paper is just the first step towards investigating of risk perception gap between EU consumers and EU experts involved in GMO decision making process. This paper:

1. Represents the first research of its kind investigating opinion of Latvian experts involved at decision making process on GM food/feed and cultivation of GM plants:

The survey results show that official opinion of many Latvian institutions involved in decision making process is not defined. Latvian experts often express their personal opinion instead of an official one during decision making process towards use of GMO in food/feed or for cultivation. Latvian experts mostly have defined their personal opinion towards use of GMO in food/feed and for cultivation, there are just some cases experts haven't defined their attitude. Analysing data obtained it is visible that experts are more supportive regarding use of GMO in food and feed in compare with official opinion of institutions and both – institutions and experts are more cautious regarding cultivation of GM plants. Almost half of experts think that it is not possible to consider risk of GMO equipollent, they are sure that it is complex issue and every GMO should be assessed using case by case approach.



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2. Examines the EU consumers' risk perception:

According to data obtained and literature analysed EU consumers' risk perception depends and is influenced by many different factors: 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 GMO.

Among all, the high risk regarding human health and environment associated with GMO as perceived by the respondents seems to be the main obstacle to the consumer's acceptance of such products. People weigh risk information as more important than benefit information, thus the difficulty of selling benefits against possible risks.

Comparing existing data there seems no doubt that Europeans are more sensitive to the potential risks that GMO may pose to human health and the environment. Consumers from European countries are highly suspicious and their indisposition to buy GM products, in these countries, rooted in centuries of traditions and agricultural practices.

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

Also, the result of the studies analysed pointed to the importance of GMO labelling in all countries, implying the need to provide the consumer with more information on GM products so that the consumer confidence can be established. Moreover, the price factor was significant in determining consuming GM food in some countries, suggesting that lower price can be a useful tool to stimulate GM food buying.

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.

3. Compares the gap of risk perception between Latvian experts and EU consumers:

For this moment it is not possible to provide full picture towards risk perception gap between EU consumers and EU experts involved in GMO decision making process as just results from Latvia are obtained and analysed. From previous studies and data available we know that consumers tend to reject the use of GMO in food production (Bredahl, L.). Latvian experts in this study are somewhat positive towards use of GMO in food and feed and many of them consider that GM food/feed is as safe as conventional products or more safe than unsafe. Mostly experts are involved in advisory and consulting issues and these data could indicate that experts have become familiar with gene engineering technology and are more open and educated in these questions and are able to see also benefits this technology can provide to consumers.

Respondents are clearly more concerned about use of GMO for cultivation as consider GMO can cause significant risk to environment. It is also necessary to take into account that there is no any deliberate release into environment in Latvia and Latvian experts have more theoretical knowledge than practical experience. Competent authority of Latvia – Food and Veterinary Service has not received any application regarding developing of GMO field trials. Therefore Latvia has quiet limited experience regarding assessment and activities in the field of deliberate release into environment. And it could favour cautious attitude among experts regarding cultivation of GMO.

In general estimating experts' attitude towards risk GMO can cause to human/animal health and environment we can conclude that it is based on case by case principle. Almost half of respondents are sure every single GMO have to be assessed individually.

Bibliography

Bonny, S., 2003. Why are most Europeans opposed to GMOs? Factors explaining rejection in France and Europe, *Electronic Journal of Biotechnology* ISSN: 0717-3458, Vol. 6, No. 1.



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- Bredahl, L., 2001. Determinants of consumer attitudes and purchase intentions with regard to genetically modified foods: Results of a cross-national survey. *Journal of Consumer Policy*, 24, pp. 23-61.
- Fortin, D. R. and Renton, M. S., 2003. Consumer Acceptance of Genetically Modified Foods in New Zealand, *British Food Journal*, Vol. 105, No: 1/2, pp. 42-58.
- Kayabası, A. and Mucan, B., 2011. An Empirical Study of Consumer Attitudes and Perceptions Toward Genetically Modified Foods (GMF), *European Journal of Social Sciences*, Vol. 25, No. 1.
- Krystallis, A., Frewer, L., Rowe, G., Houghton, J., Kehagia, O., Perrea., T., 2007. A Perceptual Divide? Consumer and Expert Attitudes to Food Risk Management in Europe, *Health Risks and Society*, 9(4), pp. 407-424.
- Marris, C.; Wynne, B.; Simmons P. and Weldon, S., 2011. Public Perceptions of Agricultural Biotechnologies in Europe. Final Report of the PABE Research Project commissioned by the EC, 9 pages.
- Miller, H.I. and Conko, G., 2000. The science of biotech meets the politics of global regulation. *Issues in Science and Technology*. Fall, Vol. 17, No. 1, pp. 47-54.
- Moon, W. and Balasubramanian, S.K., 2001. Public Perceptions and Willingness-To-Pay A Premium for Non- GM Foods in the US and UK, *AgBioForum*, Vol. 3-4, pp. 221-231.
- Wes Harrison, R., Boccaletti, S. and House, L., 2004. Risk Perceptions of Urban Italian and United States Consumers for Genetically Modified Foods, *AgBioForum*, 7(4), pp. 195-201.