



Case Study on „Genetically Modified Organisms (GMOs)“

Case study introduction
“Genetically-modified organisms (GMOs) are non-naturally occurring plants, animals, and microorganisms whose genomes have been altered intentionally or artificially. The modification is typically achieved by inserting a gene from another, often unrelated, organism into the DNA of the host, with the intention of introducing a new trait.”

Since the end of the 20th century, genetically modified organisms (GMOs) have gained public attention and have become a subject of conflicting opinions. Disputes exist not only within the community of scientists and experts, but also within the general public. Conflicts focus on three main concerns: (1) effect of GM-derived foods on human health; (2) impact of GM crops on environment and biodiversity; and (3) overall socio-economic impacts of GM-focused agriculture.

The case study on „Genetically Modified Organisms“ focuses on the evolution of the regulatory context around GMOs and the ensuing policy discourse in Bulgaria. It further investigates and demonstrates the relevance of the precautionary principle to GMOs and its integration within legislative and broader debates in the country. The case study

focuses on GMOs' use as food and feed, which is where the majority of current controversies are. It aims to explain how legislative decisions are influenced, or not, by arguments of precaution and science. The case study also demonstrates how, very often, these arguments were challenged by a great degree of uncertainty and socially constructed perception of risks.

Relevance to the precautionary principle
Risks of GMOs have been studied from multiple perspectives but uncertainties and complexities still remain, particularly in regard to the consequences of using GMOs as food and food ingredients. It is not entirely possible to determine the extent and likelihood of possible harms, which strengthens the scientific uncertainty. Therefore, regulations that are at least partially premised on insufficient and

Potential impact
The case study on GMOs presents some mostly typical benefits and risks associated to GMOs.

Selected benefits	Selected risks
<i>Agriculture:</i> Increased yields of GMO crops, ensuring against food shortages in times of expected decrease in arable land globally, and growing global population.	<i>Genetic contamination/ Interbreeding:</i> The novel trait may disappear in wild types.

evolving knowledge of their subject, should recognise this state of scientific uncertainty and ignorance and follow a precautionary approach.

Legal and regulatory documents at the international level addressing the relevance of the precautionary principle to GMOs are: United Nation's Rio Declaration on Environment and Development from 1992, Cartagena Protocol on Biosafety to the Convention of Biological Diversity, and EU Directive 2001/18/EC. In Bulgaria, the Law on Genetically Modified Organisms addresses the precautionary principle as „prioritising the protection to human health and the environment in the face of probable potential adverse impacts regardless of existing economic interests or the absence of scientific proof“.



Selected benefits	Selected risks
<i>Economy:</i> Increased income for producers due to increased yields of GMO crops.	<i>Competition with natural species:</i> Faster growth of GMOs can enable them to have a competitive advantage over the native organisms, causing ecological and economic damage.
<i>Nutrition:</i> Certain genetic modifications enrich certain nutrients or substances with proven therapeutic effects or highly regarded health value.	<i>Ecosystem impacts:</i> Ecosystem damage and destruction as a result of changes in a single species.
<i>Enhanced food qualities:</i> Certain modifications have been aimed at improving the appearance of products or delaying ripening (i.e. in tomatoes) to allow longer shelf life.	<i>Unpredictable and unintended effects:</i> Gene transfer may bring about unexpected changes in the structure and function of the recipient organism.
<i>Enabling therapeutics:</i> There is ongoing research into altering specific plants (rice, soybeans, maize, and potatoes) so that they can produce specific antigens as a vaccine for certain diseases.	

- Key uncertainties**
- » Technological process of genetic modification might be well-developed and understood, but uncertainty about the outcome and consequences of modification remains.
 - » When it comes to regulatory decision-making, legislators take account of science and the range of possible risks, along with the pressure of public and private interests.
 - » Uncertainty in regulatory decision-making on GMOs has two dimensions: (1) there is a lack of confirmed information/knowledge about the regulated subject and (2) taking decisions based on incomplete/missing information results in uncertainty with regards to the future implications.

In conclusion, considering the continuing uncertainty of the impact of GMOs on human health and the environment, reaching the same level of understanding between scientists and consumers/general public remains a strong challenge yet to be overcome.



Further information

Applied Research and Communications Fund
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For the **references** used for the case study, please look into the full report available at:
www.recipes-project.eu/results/case-study-2-genetically-modified-organisms-gmos

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