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17 The Role of Mass Media and Lobbies in the Formulation of GMO Regulations

Mauro Vigani

Introduction

The adoption of new crop varieties obtained through genetic modification (GM) as a means of enhancing agricultural productivity and food security is determined by the domestic biotechnology and biosafety regulations on the cultivation and commercialisation of genetically modified organisms (GMOs). Most of the developed countries are already equipped with full and detailed GMO regulations, but many less developed countries (LDCs) are still in the process of formulating such regulations.

While deciding about GMO regulations, governments are driven by several socio-economic factors and by the preferences of different groups in society. The political equilibrium is mediated by the mass media and more specifically by the structure of the media market (Vigani and Olper, 2015). Not only do the mass media play a pivotal role in influencing regulation preferences of consumers, but also the structure of the media market can affect which social groups are targeted by the media outlets (Vigani and Olper, 2013).

This double aspect of the mediation role of mass media in shaping GMO regulation is studied in a literature that cuts across two main disciplines. The influencing role of mass media on consumer preferences is mainly covered by social science analyses (e.g., Frewer *et al.*, 2003; Vilella-Vila and Costa-Font, 2008). The link of mass media markets with the political equilibrium between the different groups of a society is captured by theoretical and empirical political economy analyses (e.g., McCluskey and Swinnen, 2004; Vigani and Olper, 2013).

This chapter discusses the role of mass media in the formulation of GMO regulation in developed and developing countries, distinguishing two major approaches: the social science and the political economy approach. The chapter also presents socio-economic indicators on quality of regulation, mass media and the restrictiveness of GMO regulations in developed countries and in LDCs.

A Critical Review of the Theoretical Approaches: Social Science vs. Political Economy

The Social Science Approach

The social science approach uses the type and amount of news consumed by the public to study how the communication strategies of mass media influence the public perception of risks and the formation of attitudes towards GMOs.

In the social science framework, mass media have an intermediary role. They operate as preferential two-way 'channels' of communication: from government to the public and from the public to government (Gaskell and Bauer, 2001). This intermediary role makes the media a major forum of the public sphere in modern societies.

The intensity and duration of the influence of mass media on public attitudes towards GMOs is a function of five main factors:

- (i) public trust in the institutions and information sources
- (ii) prior attitudes of the public on GMOs
- (iii) the media bias in reporting risks
- (iv) the heterogeneity of media reporting
- (v) the importance of communicating the benefits of GMOs along with their safety.

Public Trust in Institutions and Information Sources

If those responsible for risk assessment are distrusted, members of the public feel insecure about the effectiveness of risk detection and management even though the procedures implemented may be scientifically rigorous. The issue of public trust does not concern exclusively the authorities, but also any source delivering information on potential risks associated with GMOs, such as industry, NGOs and consumers' groups.

Public trust is a function of two factors (Frewer *et al.*, 2003): the 'competence' of the information source (the expertise of the communicator and his/her ability to disseminate information) and its 'honesty' (the extent to which a communicator will be truthful).

Mass media can affect public trust if they fail to communicate the competence and honesty of the information source. For example, media can choose to deliver knowledge through experts and by demonstrating a genuine concern for the public welfare over special interests (Kim *et al.*, 2015; Gaskell *et al.*, 2004).

However, public distrust is associated with the perception that an information source is deliberately distorting information, promoting biased views of relevant issues or protecting certain interests. Information sources such as consumer organisations, environmental groups and scientists are often considered more trustworthy than the biotech industry and government (Costa-Font *et al.*, 2008).

Prior Attitudes on GMOs

Strong and established prior attitudes help to explain the stability and resistance to change in attitudes towards GMOs. If the public has pre-formed attitudes about a new technology, this can influence the interpretation of the technology's potential risks as

communicated by the source of information (Frewer *et al.*, 2003), despite the competence and honesty of the source.

Regarding GM crops, prior scepticism can derive from people questioning the point of modifying the genetic makeup of plants. 'Is it necessary when there is plenty of food in the shops?' 'Why change the character of food when it is already good and wholesome?' The answers to these questions are difficult to convey to people who do not experience scarcity in quantity and quality of food (Gaskell *et al.*, 2004).

Instead of being convinced of a new point of view, people are more likely to assess information to see whether it aligns with the view they already have. If it does not, it is more likely that they will change their opinion about the information source rather than change their attitudes towards the technology (Frewer *et al.*, 2003). Petts *et al.* (2001) suggest that the media can amplify or attenuate risk perception only if the message captures or resonates with a pre-existing public mood.

Media Bias in Reporting Risks

The 'pluralist theory of the media' (Harrop, 1987) suggests that the media's reporting of news is biased by its own agenda, meaning that people working in the media determine 'what is/what is not news' and prioritise particular items of news. The media bias is linked to several aspects of a media outlet's agenda. Journalists and editors may adjust the story frame to their ideology and knowledge limitations, thereby characterising the potential socio-political and ethical implications of a story (McCluskey *et al.*, 2016).

A second potential source of media bias is incorporated in the number and type of stories published. Negative media coverage of biotechnology, for example, was related to an increase in negative public opinion in the USA (Nisbet and Lewenstein, 2001), Spain (Vilella-Vila and Costa-Font, 2008) and Kenya (Lore *et al.*, 2013). Therefore, the media can promote a few sets of ideas over others, effectively limiting the debate by making particular choices (Botelho and Kurtz, 2008).

Also the wording and the structure of the storytelling may contribute to the production of biases. Journalists are seldom entirely neutral in their choice of events and words (Holmgreen and Vestergaard, 2009), and those choices can contribute to the formation of public attitudes (Lore *et al.*, 2013). This is particularly relevant when considering information on biotechnology, which is a field characterised by great controversy and strong conceptualisations, with extensive use of metaphors (Ventura *et al.*, 2016). For instance, the discourse used by opponents of GMOs frequently invokes the contrast between natural (good) and artificial (bad), using metaphors of disease and pollution, and deploys terms such as 'infected' and 'polluted' against 'pure' and 'free' (Cook, 2004; Holmgreen and Vestergaard, 2009).

Media can be exploited by groups skilled in creating media-friendly events and campaigns. Activists can strategically portray environmental and food safety issues as 'emotional dramas', in order to attract public attention and harness the eagerness of politicians to please those activists who portray themselves as acting in the public interest. The objective is to shift consumers' preferences and to build consensus in order to be able to exert more pressure on governments, as well as obtaining external funding (Aerni *et al.*, 2015, 2016).

In the case of GMOs the media are often saturated with messages from lobby groups, leading to the publication of stories that can be contradictory to their normal stance. For example, in the UK some newspapers that are normally very pro-business, such as the *Daily Mail*, can adopt anti-GM rhetoric, while independent pro-science media organisations such as the Science Media Centre generally adopt a more pro-GM view.

Heterogeneity in Media Reporting

There are two main sources of heterogeneity: the heterogeneity within the public and that across geographical areas.

Consumers of mass media have heterogeneous perceptions of risks and benefits depending on individual characteristics, e.g., age, gender, education, income level, religion and ethnicity. These characteristics can influence an individual's level of scientific knowledge, their propensity to use particular technologies, and their moral and ethical considerations (Costa-Font *et al.*, 2008). Although differences among individuals are evident across countries and cultures, consumer heterogeneity can be even larger within the same country and among the different groups within a society (Frewer *et al.*, 2003).

Also the narrative structure, or information frame (Vilella-Vila and Costa-Font, 2008), which influences public perception, can be different across countries and regions, owing to geographical and historical circumstances. Differences in media framing have been reported between the USA and the EU (Gaskell *et al.*, 1999) and between member states within the EU (Vilella-Vila and Costa-Font, 2008), but also within single countries such as the UK (Botelho and Kurtz, 2008), South Korea (Kim *et al.*, 2015) and Kenya (Lore *et al.*, 2013; DeRosier *et al.*, 2015).

Communicating Benefits to Increase Acceptance

Public attitudes towards a given product or technology are linked to its perceived risks and benefits. If the risks are not intolerably high, the perception of a new technology will predominantly reflect the benefits of its adoption. Thus, benefits are more important than risks in determining willingness to consume new products or adopt technologies (Costa-Font *et al.*, 2008). People will tolerate risks, however, if they perceive direct benefit to themselves, but not to other groups, such as producers or industry (Frewer *et al.*, 2003).

In the case of agro-biotechnologies, it is frequently argued that consumer rejection comes from the type of GM products initially introduced on the market, such as herbicide-tolerant and insect-resistant crops. These crops have direct benefits to farmers, such as higher productivity and lower use of inputs, but consumer benefits are mainly indirect (such as reduced food costs) and might not be sufficient to counterbalance the perceived risks.

The benefits with the greatest potential to improve consumer acceptance of GM crops are sustainability (less use of energy and release of pollutants during production), food security (new crop varieties to reduce hunger in LDCs) and health claims (the presence of functional ingredients). However, these benefits are not always efficiently communicated, and consumers often see only the potential risks of GMOs. Without the perception of an improvement in terms of quality, price or other attributes, there is simply no incentive to accept GMOs (Gaskell *et al.*, 2004).

Framed in another way, at the base of the public rejection of GM crops and food is not so much the misperception of scientific risks, but rather the perceived absence of benefit for consumers.

The Political Economy Approach and the Importance of the Media Structure

When it comes to deciding on new regulations, individual attitudes are translated into preferences for more permissive or restrictive rules on the use and consumption of GMOs. Individuals are organised in different groups (e.g., consumers, producers, industry), each with different policy preferences (derived from the perceived benefits of GMOs) and lobbying strength. Moreover, policymakers can be driven by egoistic objectives, such as maximising the number of votes they can attract, instead of aiming for public benefits and safety.

During the policymaking process, the mass media transfer the preferences of the civil society to governments. Simultaneously, governments use the mass media in a top-down manner to seek public support and to avoid public dissatisfaction. Mass media are, therefore, bidirectional mediators between policymakers and voters.

Mass Media Competition

As with any other commercial enterprise, a private mass media company aims to maximise profits, attempting to increase the amount of news sold by providing consumers with information that is of interest to them. Mass media companies operate under increasing economies of scale as the average cost decreases with the amount of news sold. Once the fixed cost of producing a TV programme, a website or the first newspaper has been borne, the variable costs of an additional viewer or reader are relatively small. These economic conditions induce private media to transmit news that is of interest to large groups of media consumers, which is also valuable to advertisers (Strömberg, 2001). Therefore, the policy programmes targeting the largest group of voters are diffused in greater quantity and more detail, potentially altering the political competition and ultimately introducing a bias in public policy (Strömberg, 2004).

In developed countries the producers' group (farmers) is typically smaller than the consumers' group, which is mainly concerned with food safety issues. In (agriculture-based) developing economies the farmers' population is relatively large, and private media are more likely to promote agricultural innovations and policies that favour farmers (Vigani and Olper, 2014).

The 'Bad News' Hypothesis

In order to increase sales, mass media companies can adapt the narrative of news in such a way as to make their news products more attractive to consumers. McCluskey and Swinnen (2004) observed that the marginal value of an item of news with negative welfare effects is higher than the marginal value of an item of news with positive welfare effects, meaning that private media have incentives to deliver 'bad' news, which will increase the consumption (and hence profit) of media more than will 'good' news.

In many LDCs mass media are often owned by the state, and governments have incentives to reduce public concern and risk perception in order to reduce public discontent and opposition (Curtis *et al.*, 2008). Consequently, consumers in LDCs may be less exposed to negative media coverage concerning GMOs, while in rich countries consumers are more exposed to coverage of risks related to GMOs. This has been confirmed empirically: positive media coverage of GMOs is found in Kenya (Lore *et al.*, 2013; DeRosier *et al.*, 2015), but negative coverage in Spain, the UK and South Korea (Vilella-Vila and Costa-Font, 2008; Botelho and Kurtz, 2008; Kim *et al.*, 2015).

It is important to mention that there are significant exceptions to the 'bad news hypothesis'. Lobby groups can deliberately manipulate media in order to build public support in their campaigns. To this end, negative information can be overhyped on certain innovations (e.g., GM crops), while positive information can be overhyped on others (e.g., new medical biotechnologies).

The Internet as a Source of Information

For a large proportion of the population, especially the youngest group, the internet is the main source of information. So it must be noted that the internet has some peculiar characteristics.

In the internet borders are removed and news is globally accessible, provided that there is no language barrier. Internet users are not only 'consumers' of news, but also have the opportunity to engage with sources through commentary sections or social networks. Moreover, the extremely low initial costs of a website allow the creation of a vast variety of sources: established mass media companies (e.g., newspapers, TV stations), NGOs and private individuals.

Although anybody can put information on the internet, not everybody is a trustworthy source. The numerous possibilities for interacting can facilitate the diffusion of ideological and unverified information, and the fact that it is difficult to assess the source's competence can reduce trust in internet news, especially by the older generations. This suggests that, despite it being cheap to get started, it takes time to become an established and trusted internet source, unless the source has already acquired credibility through traditional media.

Moreover, the low initial costs and the diffusion of portable devices (e.g., tablets, smartphones) allow a mixed form of communication, which can be written text, images or videos. Information biases can easily be introduced by negative images that accompany unbiased text (Ventura *et al.*, 2016).

GMO Regulation, Media Freedom and Quality of Regulation

This section discusses the international differences in GMO regulation, considering the quality of regulatory systems and media freedom for a sample of 15 LDCs (Argentina, Bangladesh, Brazil, China, Colombia, Guatemala, India, Indonesia, Kenya, Peru, the

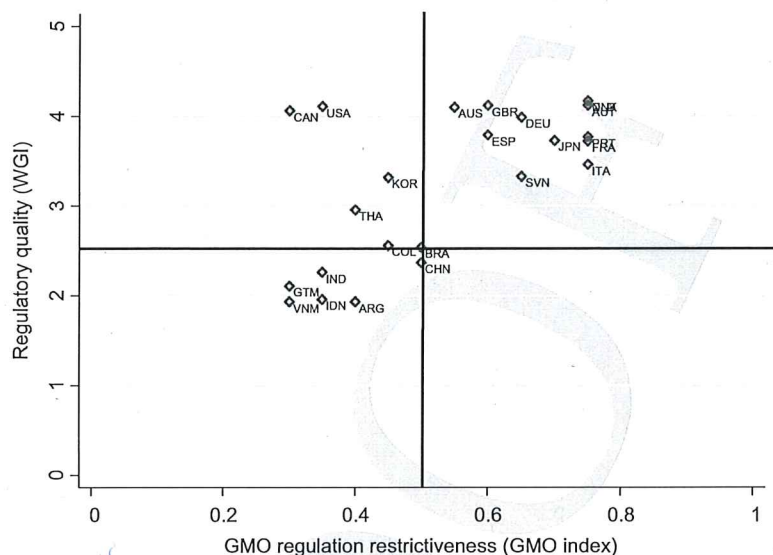


Figure 17.1. Distribution of countries by regulatory quality and restrictiveness of GMO regulation in 2009. (Regulatory quality index from Worldwide Governance Indicators (<http://info.worldbank.org/governance/wgi/index.aspx#home>); GMO index from Vigani and Olper (2013).)

Philippines, Thailand, Vietnam, Zimbabwe and Zambia) and 15 developed countries (Australia, Austria, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, Portugal, Slovenia, South Korea, Spain, the UK and the USA).

GMO regulation has several components: approval, traceability, coexistence and labelling. Approval can concern the cultivation of GM crops and/or commercialisation of GM food and feed, and it can include a comprehensive environmental and health risk assessment (e.g., China and Guatemala). Traceability can be limited to ensuring the preservation of the identity of products (e.g., Australia and the USA) or it can include records tracking GM products along the entire supply chain (e.g., Japan). In order to ensure the coexistence of traditional, GM and organic crops, some countries provide detailed rules on segregation of fields (e.g., the EU). Labelling of food and feed products can be voluntary (e.g., the Philippines) or mandatory. When it is mandatory, labels can be applied to products containing less (e.g., Russia) or more (e.g., South Africa) than 1% of GM ingredients.

Figure 17.1 shows the distribution of countries by regulatory quality and restrictiveness of the GMO regulation. The index of regulatory quality captures the public perception of the ability of the government to formulate and implement sound policies and regulations (Worldwide Governance Indicators). It can be used as a proxy for the quality of institutions and government responsiveness. The GMO index measures the restrictiveness of GMO regulations (Vigani and Olper, 2013).

The distribution of the countries in the two upper quadrants of Figure 17.1 shows a contraposition between North American and EU countries. Despite having institutions of similar (high) quality, they have opposite GMO regulations: voluntary labelling

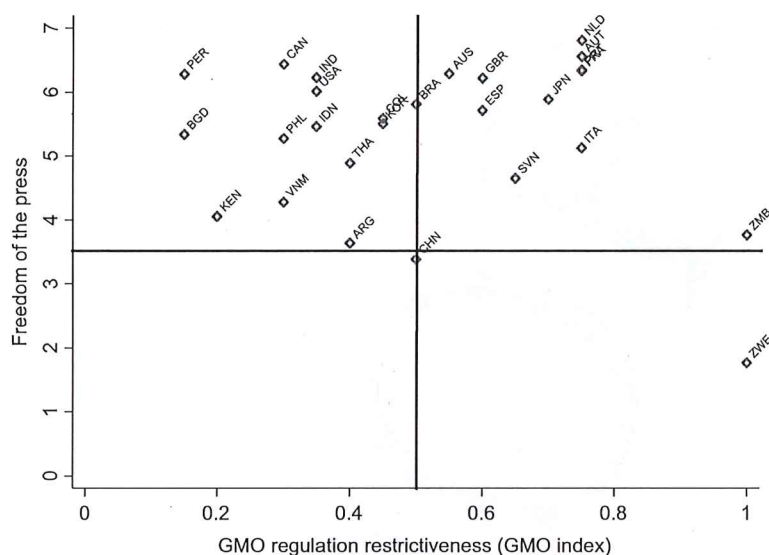


Figure 17.2. Distribution of countries by freedom of the press and restrictiveness of GMO regulation in 2009. (Freedom of the press index from Freedom House (<https://freedomhouse.org>); GMO index from Vigani and Olper (2013).)

and no coexistence rules in the USA and Canada; full traceability, coexistence rules and labelling at a threshold of 0.9% in the EU. This reflects the opposing approaches of these two blocks of countries towards GMOs (substantial equivalence to non-GMO products in North America; while there is strong opposition by European consumers), which indirectly can affect the GMO regulation applied by governments in trade partners, especially in those LDCs which are seeking access to the EU market.

The countries at the intersection of the two axes of Figure 17.1 (Colombia, Brazil and China) have a relatively low quality of regulation, but a relatively high restrictiveness of GMO regulation. In these countries the perception that the government has a relatively low level of ability to formulate and implement policies can affect the level of public trust in the competence and honesty of institutions, making the public ask for more restrictive rules governing approval and risk assessment.

In the bottom-left quadrant of Figure 17.1 there is a cluster of LDCs with GMO regulations that impose few restrictions. As stressed by the political economy literature, in LDCs farmers are the largest group, and media can have incentives to provide information on agricultural technologies with a positive coverage.

In Figure 17.2, countries are distributed by the GMO index and the freedom of the press index, which captures the degree of freedom of mass media in each country, and the efforts made by the authorities to ensure this freedom (Reporters Without Borders).

Almost all the countries are in the two upper quadrants, but at a similar level of press freedom the EU countries have more restrictive GMO regulations than the rest of the world. This contraposition can reflect the media market structure. In the top-right quadrant there are mainly developed countries in which private media have the majority

of the market share. Private media outlets can pursue the objective of maximising their profit by providing 'bad' news that confirms and exacerbates the prior negative attitude towards GMOs. This can lead the majority of consumers to ask governments for more restrictive labelling and coexistence regulations. In the top-left quadrant there are mainly LDCs, in which the media market is typically dominated by public outlets controlled by governments. Governments can have incentives to reduce public concern and opposition to GMOs that can be beneficial for the agricultural sector.

Along with LDCs, the USA and Canada are in the top-left quadrant of Figure 17.2. Their less restrictive regulation of GMOs could be due to the fact that the influence of agricultural lobbying groups on the political outcome is stronger in these countries than it is in the EU, and such groups consequently have more influence on the media sector, which can thus be persuaded to inform civil society about the benefits of GMOs. The better-informed society can then ask the government for regulations benefiting farmers. In contrast, in the EU the lobbies that seem to be the most effective are consumers' groups, green organisations and associations of organic producers, which mainly act in favour of restrictive GMO standards (Aerni *et al.*, 2015; Vigani and Olper, 2013).

New Challenges: The Communication and Regulation of New Plant Breeding Techniques

New plant breeding techniques (NPBTs), especially genome editing, are emerging, and their regulation has yet to be decided in many countries. A key aspect for regulating genome-edited crops is the need to consider their differences from GMOs. While conventional genetic modification relies on the insertion of exogenous DNA to obtain new characteristics in crop varieties, genome editing exploits new 'molecular scissors' to cut and alter the existing genome of plants (Jones, 2015). The main question for regulators is whether genome editing differs from existing techniques and how the resulting products should be classified according to current definitions of a GMO (Lusser *et al.*, 2012).

The importance of regulating these innovative techniques involves actors at different stages in the food chain. Plant breeders can have an enlarged breeding toolbox, meaning a faster breeding process and earlier returns from R&D investments (Lusser *et al.*, 2012). Consumers can receive foods with improved nutritional value, fewer allergens and a longer shelf-life, reducing food waste. Farmers can obtain high-quality plant varieties tolerant of climatic stresses or diseases, reducing the need for crop protection and contributing to more sustainable production.

Mass media attention to genome editing was triggered in April 2016, when the US regulators allowed the cultivation and sale of a white button mushroom and a corn variety obtained with genome editing. According to the US authorities, these crops are not GMOs, hence they did not fall under the restrictive GMO regulation.

The debate in the EU is still largely unresolved, and it is expected that the EU's position will influence the policy outcome of many other countries that intend to align their legislation with that of the EU. The fact that the US decision could have set a

precedent for other NPBT crops opened the media's gates for stakeholders who want their voices to be heard by the EU policymakers. Two groups of stakeholders are facing each other in the media arena.

The first group is mainly composed of green NGOs and organic associations. They posit an equivalence between NPBT and genetic modification, using the expression 'new GMOs' to evoke the negative perception that the term GMO has on some consumers, and they would like the EU GMO law to be fully applied to NPBT. The arguments used to oppose NPBT are not different from the anti-GMO rhetoric: 'NPBT are just another attempt at selling GMOs to consumers'; 'NPBT present a real risk to the environment and human health'; 'an intense lobbying intrusion by US representatives pushed Brussels to disregard GMO rules' (EurActive, 2016a, 2016b).

The second group is composed of scientists, farmers' associations and agribusiness representatives, aiming for a case-by-case risk assessment that is based on scientific criteria and proportionate to potential risks. This group uses a more articulated communication to support NPBT, addressing a variety of socio-economic arguments. First of all, classifying NPBT as GMOs is inappropriate because there is no introduction or presence of exogenous DNA in the final plant (Jones, 2015). Moreover, the mutations generated by NPBT are indistinguishable from those arising in nature (Jones, 2015), therefore the new mutation techniques should fall under the already-existing exemptions for classical mutagenesis. Second, the agricultural sector is in need of innovative traits to ensure farmers' competitiveness and global food security. Third, biotechnology regulation in the EU should evolve hand-in-hand with the scientific knowledge of plant genomes, otherwise plant research and modern crop breeding in the EU will continue to fall behind the rest of the world. If NPBT does fall under the GMO regulations, it would create a further barrier to innovation in plant breeding, with serious negative impacts on the EU's small and medium enterprises engaged in plant breeding, leading to loss of jobs and growth (EurActive, 2016a, 2016b).

The current media interest in NPBT is based on the assumption that commercialisation is imminent. However, data on actual adoption of NPBT are still lacking (Lusser *et al.*, 2012). Apart from the two US crops mentioned above, to date there has only been a herbicide-tolerant canola obtained through genome editing approved in the USA, which is expected to enter the Canadian market in 2017 (Jones, 2015).

Conclusions and Recommendations

The news delivered by the media can affect the capacity of consumers to make informed choices about GMO regulations. In order to improve public attitudes, a well-targeted strategy of communication of risks and benefits is required. It is erroneous to assume that the benefits of GMOs are self-evident; on the contrary, there are benefits to consumers that should be better communicated, especially the lower pressure on natural resources and the increased content of functional ingredients and nutrients for food and nutrition security.

However, it is important to note that the effects of mass media tend to be temporary and limited in magnitude. Therefore, providing information on the benefits of GMOs might not be sufficient, but this can be coupled with best practice in science communication that takes into account the level of public trust in institutions and the lobbying activity of organised groups.

Past experiences of communication on GMOs can be useful for responding to future challenges to plant breeding and biotechnologies, especially given that nowadays key decisions need to be taken with regard to the regulation of NPBT in many countries.

To summarise, some suggestions for a good media communication strategy are as follows: (i) people should be informed not only about potential risks, but also about benefits, in an objective manner; (ii) consumers should obtain their information from honest and competent organisations not representing special interests; and (iii) information should be provided by authoritative public figures in a clear and persuasive manner. Appropriate communication strategies are even more sensitive today, given the enhanced accessibility of information provided by the internet.

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