

# **The behaviour of the albanian consumer towards genetically modified products**

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*Abstract: Population growth has made food sufficiency impossible, and the lack of Food has led to the search for alternative ways of providing it. Genetically modified organisms have been seen as a solution to one of the world's biggest problems today. The study of consumer behavior is crucial for orienting the offer of different products. This aspect is also essential for products containing genetically modified organisms, foods created by organisms whose DNA has been altered using genetic engineering and molecular biology techniques. In studies done in different countries, consumers are skeptical of these products. The results of our work go along the same lines, which show that consumers do not tend to go towards GMO products and do not have enough information about them. In this study, we will try to answer our main research questions: How well do consumers know genetically modified foods, and what is their attitude towards GMOs? Are Albanians sufficiently informed about them, and what is their approach to these products?*

*Keywords: product, consumer behavior, genetically modified organisms*

# 1 Introduction

Genetically modified organisms have been seen as a solution to one of the world's biggest problems today. Population growth has made food sufficiency impossible. According to the World Bank report (2020), nearly 690 million people - or 8.9 percent of the global population- are hungry. Food insecurity can worsen the quality of nutrition and increase the risk of various forms of malnutrition, potentially leading to undernutrition and overweight. The cost of healthy meals is unaffordable for more than 3 billion people in the world (World Bank 2021)

As mentioned above, the lack of Food leads to the search for alternative ways such as GMOs. The part of genetic technology that combines hereditary material (genes) from different organisms (plants, animals, and microorganisms) is called recombinant DNA technology or genetic engineering. The organism that arises from a combination of genes is a genetically modified organism (GMO). Food containing or derived from a genetically modified organism constitutes genetically modified Food (WHO 2021). Using DNA recombination technology, an organism is created with specific desired properties in food production to achieve resistance to insects and viruses, tolerance to herbicides, and improved nutritional value of Food.

New technologies affect people's decision-making trends. Changes arise through new processes and products, often improving some dimensions of living and making others worse. In many cases, costs are uncertain in the form of a probability of a threat, usually referred to as risks. This is because new technologies are associated with scientific uncertainty, considering that not all social and individual consequences of their initiation are fully known.

Moreover, innovations impact people's social life, generating conflicts with their previous views and values. This is particularly important in the case of Food and nutrition, when people are faced with daily decisions about how to eat better (Barrena et al., 2009). A consumer's perspective on introducing new GMO products (which are added to pre-existing products) largely depends on the existing information in the system. Therefore, releasing more information about food-related risks shapes people's perception of risk. Consequently, people act on perceived risks, carefully balancing benefits and costs, both in the short term and especially in the long term. Given that the long-term effects are not known with certainty, we will usually refer to these effects as risks, given that there is some information about individuals to form an expectation or a probability of the risk qualitatively. The same can be applied to benefits, which mainly influence product acceptance based on individual subjective knowledge (Boccaletti, S. & Moro, D, 2000)

GMO products are products that are not very familiar to Albanian consumers. The main goal of this paper is to analyze consumer preferences towards GMO products through a survey. The paper continues as follows: in the second chapter, the theoretical background and the review of the literature are analyzed, which includes data on the definition of genetically modified organisms, the benefits and risks that come from them, as well as the main approaches that different authors have

proposed. In the third chapter, the methodology followed for conducting the study is analyzed, where the survey of 50 consumers in the city of Tirana was used as the primary method, as well as the research question and the hypotheses of the paper. In the fourth chapter, we present the analysis of the results, which we showed in survey data reports; in the fifth chapter, we have the conclusions drawn from the study.

## **2 Literature review**

Technological advances in food production are considered inevitable changes in today's food industry, and many new foods or food ingredients consumed worldwide have been produced through genetic modification since the mid-1990s. However, most consumers remain uninformed about genetically modified foods; thus, it is natural that they do not fully understand the scientific basis of their technology, including its potential benefits and risks. Previous studies of this technology show that consumers perceive this as more of a threat than a benefit. The attitude towards a product is based on knowledge about the product itself and its attributes, called bottom-up attitude formation (Bech-Larsen & Grunert, 2003). However, attitudes do not depend only on one specific product but on a good part of them. The more people are aware of GMOs, the more they perceive the benefits to outweigh the risks; however, they are generally unaware of whether or not they consume GMO foods. This result is consistent with many other studies, which found that despite consumers' somewhat greater information about GMO products and their expected benefits, they nevertheless maintain a negative attitude toward GMO foods. This theoretical model has been empirically supported by several studies such as (Moon, 2001) and (Sawhney M. et al., 2004), etc., which state that consumers associate, as a whole, more negative thoughts than positive ones for agro-biotechnology. In addition, evidence suggests that individual behaviors are driven by personal perceptions or beliefs about risks rather than technical assessments of risk provided by experts (Frewer et al., 1998).

### **2.1 What are genetically modified organisms?**

GMOs result from DNA recombination procedures, biotechnological procedures that allow genetic improvements of Food or organism. This 'recombination' can be accomplished by moving genes from one organism to another. GMO (Genetically Modified Organism) refers to a living organism whose genetic material has been modified by humans through genetic engineering techniques (Cunningham et al., 2001).

## 2.2 Advantages and risks of GMO use

### *Advantages:*

With an ever-increasing global population and an estimate that a child dies of hunger every two seconds, this technology holds great promise as it benefits farmers and society worldwide. The positive sides of genetically modified crops are:

- better taste
- increase in nutritional values
- resistance to diseases and pests
- rapid production of crops.

Seeds are genetically modified for many reasons, including improving insect resistance and generating healthy crops. This can reduce the risk of crop failure and make crops more resistant to extreme weather. The technology could eliminate seeds and produce a longer shelf life, which allows "safe transportation for people in places where there is no access to high-nutrition foods." Environmental benefits: fewer chemicals, time, and machinery because soils need crops, which can help reduce environmental pollution, gas emissions, and soil erosion.

Better nutrition: "By modifying certain foods in terms of minerals or vitamins, companies can supply much-needed nutrients and help fight malnutrition around the world," according to the Food and Agriculture Organization of the United Nations. They also state that one of the positive sides of GMOs is that farmers can produce Food with more calories (Galán et al., 2008).

### *Risks:*

The researchers warn that there are no long-term, large-scale analyses to prove genetically modified foods safety (GMOs). They draw attention to several potential risks.

- Allergic reaction: if a gene, which produces a protein that causes allergic reactions, ends up in, for example, cereals, people suffering from food allergies could be exposed to a significant risk.
- Greater poisonous ability: some experts think that genetic modification could enhance the natural poisons of plants in unforeseen ways. When a gene becomes active in a plant and gives the desired effect, it can produce natural poisons. Toxicity is also caused by toxins released by plants resistant to insects or herbicides. Resistance to herbicides is due to the insertion into the deoxyribonucleic acid (DNA) of plants, a gene of bacterial origin that confers resistance to herbicides (IYIZOBA, H. J. C, 2016).
- Antibiotic resistance: as part of the genetic modification of plants, scientists use marker genes to determine whether the desired gene has been successfully introduced. Since most marker genes confer resistance to antibiotics, scientists fear that this may contribute to the growing problem of antibiotic resistance. But other scientists argue that these marker genes are genetically arranged disorderly before use, reducing this risk.

- Damage to the human organism: in this case, the consumer, by eating Food with GMOs, is getting a new DNA that has not been fed with before and thus risks damaging not human DNA but damages the permanent bacteria of the digestive system by thus causing significant disturbances in the process of food digestion. Human studies show that genetically modified Food can leave behind material after consumption, possibly causing long-term problems. For example, genes inserted into genetically modified soybeans can transfer the DNA of bacteria that live inside us, as well as insecticide toxin produced by genetically modified corn has been found in the blood of pregnant women (Harward University Blog 2015)

### 2.3 Objective and subjective knowledge of consumers

Consumer knowledge influences their attitudes toward GMO foods and other consumer goods. Previous studies showed a positive relationship between consumers' understanding of GMO technology and their attitude toward GMO foods (Boccaletti, S. & Moro, D, 2000). Consumer knowledge of this technology also relates to consumer perception of the benefits and risks of GMO foods. It is essential to regulate biased perceptions and intentions regarding these products (Curl et al., 2015). When consumers have a high level of involvement in a particular product category that is an area of personal interest, their product knowledge increases. Further, increased consumer knowledge typically increases the likelihood of seeking new information as part of the decision-making process within the product category.

Consumer knowledge is divided into objective and subjective because of the difference between what consumers think they know something and what they know. This change can affect consumer attitudes and purchase intention toward foods. Knowledge, namely accurate information about channels collected over a long period by consumers, memories, and current understanding of the consumer, have a close relationship with the ability of consumers to select products (Park & Lessig, 1981).

In contrast, subjective knowledge is based on direct experience by consumers and the interpretation of these experiences and suggests a close relationship between product choice and subjective knowledge. Although objective and subjective knowledge is related, previous studies have shown that objective knowledge is rarely the same as subjective knowledge. Leung et al. (2013) reported that although subjective and objective knowledge is interrelated, they cannot be replaced and should be measured separately. Some studies have shown that these two compounds have a weak or moderate relationship. According to Kruger & Dunning (1999), despite having little objective knowledge, consumers may think that they have sufficient knowledge; moreover, although the level of their objective knowledge may be high, they may sometimes judge by subjectivity. Therefore, measuring the two constructs separately and identifying the imbalance between them will help

determine which type of knowledge influences consumer responses to GMOs, providing more complete insights into the food industry.

Given that genetically modified organisms are a relatively new phenomenon, the number of studies conducted concerning consumer preferences and information about them is limited. Most European consumers do not have a particularly positive attitude toward GMOs (Bonny, S., 2003). Different elements are formed based on this attitude. Below is an overview of the main determinants of consumer attitudes towards GMOs (mainly) in European countries. It is essential since the impact of these attitudes on consumer purchase intentions regarding the description of genetically modified food products is high. According to the attitude model of Grunert et al. (2000), attitudes toward GMOs are determined by the perception of risk and benefits. In turn, beliefs about (potential) risks and benefits are powerfully explained by consumer knowledge and more general attitudes (e.g., attitude toward technology, consumer trust in government, and food producers) rooted in socio-economic, demographic, and cultural characteristics. The Fishbein model (1963) suggests that, under certain conditions of high involvement, an individual's attitude toward an object is determined by the sum of the beliefs they have about the consequences or attributes of that object weighted by how they are evaluated and are commonly referred to as outcome beliefs and outcome estimates. Involvement is the perceived degree and personal importance accompanying product choice (Akpyomare et al., 2013). Multi-attribute models, such as Fishbein's, assume that consumers use formal learning as a hierarchical effects approach in which beliefs lead to their purchase behavior and attitudes.

Regarding the risk side related to GM (genetically modified) Food, consumers mainly perceive the possible risks for human health and the environment (Bereano, 1999). On the other hand, consumers' ethical concerns focus on internal beliefs that GM is wrong (Frewer et al., 1998). Such situations are more significant concerning whether animal or human DNA is involved rather than plant microorganisms. Another aspect that consumers are concerned about is the religious acceptability of these products. For Christians, there is a concern for the integrity of God's creation and humanity's relationship with God. Muslims and Jews focus on the prescribed diet and worry if genetically modified Food contains genes from animals whose meat is forbidden, such as pigs (Thomson, 2003). Another ethical concern concerns the right to choose freely as consumers. For example, vegetarians should be able to avoid food products produced from genetically modified plants into which genes have been transferred from animals. Another issue related to GMOs is dealing with the position of the Third World.

Some disagree that using technology in Food will reduce food shortages and malnutrition in developing countries. Third-world countries lack the financial resources to establish GM applications that can benefit their populations, and it is unlikely that foreign multinationals will spend time or money on altruistic research to help them (Nielsen et al., 2003). Evidence on attitudes has become more evident in European countries since the publication of the Eurobarometer after 1991. Interestingly, evidence suggests some reluctance to introduce foods, reflecting

recent Eurobarometer surveys (Gaskell et al., 2004), revealing evidence of an ongoing progressive resurgence in human support for GMOs from 1999 to 2002. Surprisingly, a return to skepticism has been noted in the following years. This evidence reveals a division of European consumers along several dimensions, mainly classified into three groups regarding their perception of GMOs: optimistic, pessimistic, and undecided. In addition to this general attitude, national differences are also remarkable. It found that support for GMOs was observed by 2002 in only four countries - Spain, Portugal, Ireland, and Finland.

However, this changed in 2005, when the top supporting countries were - Spain, Malta, Portugal, the Czech Republic, Ireland, Italy, and Lithuania. Indeed, in a recent study in Ireland using cluster analysis techniques, it was found that there was still a significant segment (25%) that could best be described as anti-GMO products and others (20%) who had complex reservations about the wholesale introduction of GM products (O'Connor et al., 2006). (Grunert et al., 2000b) when analyzing product attitudes confirms the negative attitude of Nordic populations toward GMO products. The same conclusion has been reached in several surveys of consumers in Poland, who generally distrust genetic modification, primarily when it may occur in food products (Szczurowska, T, 2005).

### **3 Methodology used**

The main research question of this study is:

How well do consumers know genetically modified foods, and what is their behavior towards GMOs?

Based on the above data, we propose the hypotheses of the study:

H1: Albanians are not sufficiently informed about GMOs

H2: Consumers generally have a negative attitude toward GMO products.

The methodology used to realize this work is based on a questionnaire developed concerning consumers' knowledge about products that contain genetically modified organisms. The questionnaire was completed by 50 consumers of the city of Tirana. It includes questions about consumers' information about GMO products and the advantages and disadvantages they think these products bring. The central part of this paper is the data provided by the questionnaire, which is divided into two sections. The first section includes questions related to the age, gender, educational level, and income level of the respondents. The second section contains inquiries about how well consumers know GMO products, where they got information about them, and how consumers prefer them.

### **3.1 Results and interpretations**

The studies conducted in Albania about genetically modified products are not numerous, and the information consumers possess is limited. However, from studies conducted in other countries, a reluctance of consumers to consume GMOs has been noticed. We analyze the survey results to see if this also happens in Albania.

According to the answers to this questionnaire, it turns out that more than half of the participants usually consume organic Food, that is, about 56% of them. At the same time, 31% of them do not know what they are consuming since they have no guarantee that the information they are given is entirely accurate. About 13% of them stated that they consume conventional foods and that none have chosen GMO foods, at least not with their knowledge.

We conclude that 43% of the participants have enough information on GMO products from the obtained results. However, about 44% of the majority expressed little knowledge but would like to know more. Meanwhile, only 13% said they did not have enough information, and none of them knew about GMO products.

An exciting finding of this questionnaire is that the primary source of obtaining information is the Internet, surpassing even television or radio and the press. This shows the ease of information reaching people in the Internet age.

We also learned from this survey that consumers against GMO products dominate. They represent about 53% of the participants, while some of them were undecided about GMO products, i.e., 16% of them. While those in favor of these products makeup 31% of the consumers asked.

Also, this survey highlighted the willingness of the participants to buy GMO products. About 40% say they believe sometimes, while only 2% said they always buy. At the same time, the majority, or 58%, stated that they do not buy at all or are unaware of the lack of security.

According to the answers received, 40% of the consumers asked had no opinion regarding the difference between GMO plants and traditional plants. 56% said the differences make them think, while the remaining 4% believe there is no difference between these two types of plants.

Also, from the answers received, we found that most (47%) consumers are against GMO technology. While 37% say, they can accept this technology if they know its benefits, and 16% say they agree.

Regarding the importance of these products for the future, consumers have answered that it is essential for the future, seeing at what levels technology is advancing today. However, some think that these products will not be necessary in the future.

Regarding the fact in which aspect GMO products would have the most impact according to the results of the survey, we see that the majority think that the effect will be on health, in second place is the impact on the economy and then the positive language that will have in the environment.



According to the answers received, 55% of the participants in this survey did not consume GMO products at all during the Pandemic, while only 18% answered that they did, and 27% did not know if they finished GMO products.

Regarding whether they will use GMO products in the next few days, the consumers answered as follows: equally, 42% say that they will not consume or are not sure, and only 16% say that they will consume.

### **Conclusions**

Population growth has led to increased food shortages, and GMO products have been seen as one of the alternative solutions. When consumers are faced with new products, studying their behavior toward them is essential. In this context, this study would be critical because it reveals the preferences of Albanian consumers toward GMO products. The study was conducted by developing a survey in the city of Tirana.

Referring to the results achieved by this study, we can reach the conclusions that:

- Consumers show a reluctance to consume GMO products.
- Most consumers know about GMO products, but not enough, and want to learn more. The Internet is the primary source of this information, which shows why most have little knowledge.
- The information that consumers want to know more about is the impact of this technology on human health. Consumers do not feel safe, which is shown in the results that most of them are against GMO technology.
- According to this result, we conclude that the most significant impact of this technology will be on the economy and the environment due to the non-use of Herbicides and Insecticides.

At the end of the analysis, we could prove the two hypotheses raised at the beginning. Albanians are not sufficiently informed about GMOs, and about 44% answered that they want to know more about GMOs. We also confirmed that 53% of consumers surveyed are against GMO products.

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