Effect of the information on the intention of GM food consumption

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Abstract

This work is focused on the study of consumption acceptance towards GM foods, analysing the level of knowledge and perceptions about them. Conjoint Analyses will be used to determine the importance of different attributes on purchase intention and. GM food consumption intention will be measured as well as the effect of information on consumption intention.

Keywords: GM foods, information effect, conjoint analysis.

Introduction

Thanks to the application of biotechnology to crop growing, new food products have been obtained. As a consequence a great debate about production and consumption risks and benefits have aroused. Since the appearance of these new foodstuffs several studies have been made to analyse their acceptance among the consumers in the world (Bredahl, 2001; Verdurme and Viaene, 2003; Frewer *et al*., 2004) and particularly in Spain (Cámara *et al.*, 2002; Noomene and Gil, 2004; Sánchez and Barrena, 2005).

The total area of GM crops keeps growing all over the world and Spain is not an exception with an increase of more than 80% with respect to the last year. In 2004, GM crops in Spain occupied 58,000 ha., most of this area located in the region of Aragon, and principally growing the *Bt* corn (ISAAA, 2004). In addition, Spain is the only EU country where GM crop area has increased in the last year. In spite of the opposite trend to this kind of products, numerous requests to the Ministry of Environment exist to make voluntary liberations for other varieties (MMA, 2003).

Industry interest on GM food commercialisation faces up to market reality, since in all the EU is almost impossible to find GM foods for nourishing consumption. However, different signs point out to the introduction of these foods in markets. Discussion is now focused on the public opinion since contradictory voices regarding food security (Cook *et al*, 2002; House *et* al, 2004; Wilcock *et al* 2004) rise up, spreading distrust among consumers (Hernando, 2002; Rowe, 2004). At this point, it seems interesting to find out if consumer is willingness to purchase these foods, of which attributes the purchase intention depends on, and how information influences purchase intention.

This work is focused on the study of GM food consumer acceptance. We aim to analyse population's level of knowledge and perceptions, the initial purchase intention and the preference structure on a hypothetical purchase of GM foods. We wonder how the information will affect purchase intention and whether it is possible to distinguish different segment of consumers regarding GM food attitudes.

Objectives

The objectives of the work are the following:

a) To determine Alicante population's level of knowledge about GM food products.
b) To estimate the relative importance of different attributes and attribute levels on purchase intention of GM foods.
c) To establish consumer segments according to the consumption intention of GM foods.
d) To determine the influence of information on GM food purchase intention in each segment.

Methodology

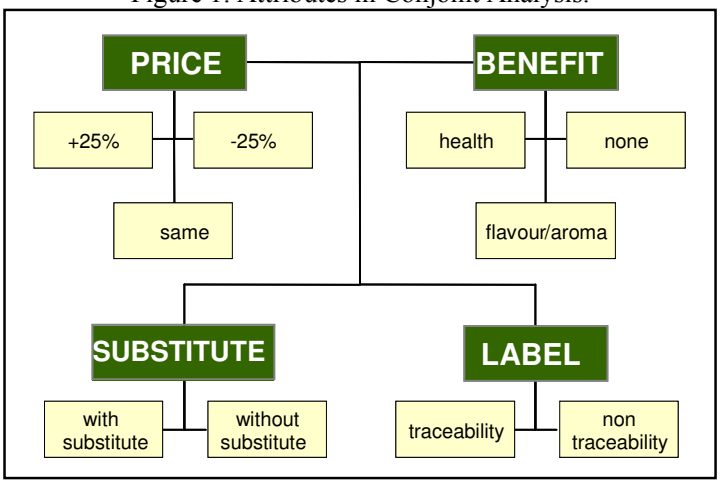
A personal survey was conducted between April and June 2004 (Table 1). The sample consisted of 465 consumers living in the province of Alicante (Spain) and was selected by a stratified random sampling taking into account gender, age and type of habitat (rural or urban) with an error sample of 4.6% (level of confidence of 95.5%).

Table 1. Technical data of the survey

Universe	Consumers over 18 years old
Geographical scope	Alicante
Sample size	465
Sample error	4.6%
Level of confidence	95.5%
Sampling	Random stratified according to gender, age, and type of habitat (rural or urban)
Date	April-June 2004

The level of knowledge about GM foods and the measurement of the consumption intention were analysed with descriptive methods. Conjoint Analysis was used to determine the relative importance of different attributes which influence purchase intention. These attributes and their levels are "price" (+25%, same as conventional, -25%), "existence or absence of substitutive" (with substitutive, without substitutive), "type of benefit" (health, flavour/aroma, none) and "label information ("traceability, without traceability") (Figure 1).

Figure 1. Attributes in Conjoint Analysis.



During the implementation of Conjoint Analysis, participants were asked to evaluate the purchase intention of different hypothetical GM foods on a scale from 1 to 10. These hypothetical products are formed by combining the levels of the four attributes. The combination provides 36 products which were an excessive number to evaluate, so orthogonal design was used to reduce the number of products to 9 which represent the total number of combinations (table 2).

Table 2. Hypothetical products obtained through orthogonal design.

Price	Substitute	Benefit	Label
Same as conventional	Yes	Health	Traceability
+ 25% conventional	No	Health	Without traceability
+ 25% conventional	Yes	None	Traceability
Same conventional	No	None	Traceability
- 25% conventional	No	Flavour/aroma	Traceability
- 25% conventional	Yes	Health	Traceability
- 25% conventional	Yes	None	Without traceability
+ 25% conventional	Yes	Flavour/aroma	Traceability
Same conventional	Yes	Flavour/aroma	Without traceability

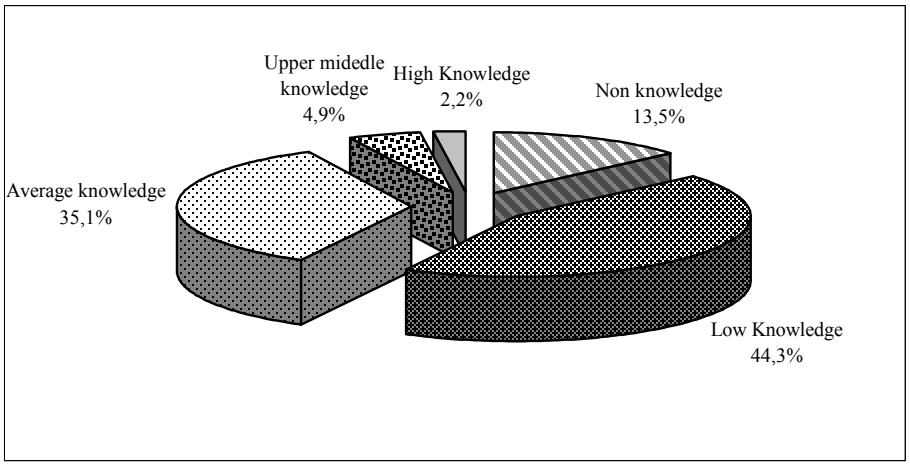
A direct segmentation was conducted by using the GM food consumption intention. The characterisation of these segments was made on the basis of demographics, life styles and consumer opinions about GM foods. Life styles and consumer opinions have been obtained through factor analysis.Finally, an experiment was included with the aim to evaluate the influence of information on the GM food purchase intention. The sample was divided into two groups of similar size, keeping constants the sampling characteristics in both sub-samples. First, all of them were asked to indicate the initial GM food consumption intention, then they were showed a leaflet with information. This information contained both advantages and disadvantages about GM food production and consumption. Two models were considered (one for each sub-sample). In the first one, advantages refer to the better properties and the healthier characteristics of GM foods. In the second one, advantages concern the more environment respectful techniques used in GM food growing. Disadvantages were the same for both models. Afterwards they had to submit again the consumption intention, with the aim to check if it has been modified. The objective was to determine the influence of the type of positive information on the consumption intention, since the negative information remain similar in both models.

Results and discussion

Descriptive analysis

Descriptive results show that a 13.5% of the sample has heard about these products but has no knowledge about them, a 44.3% has low knowledge, a 35.1% medium knowledge, a 4.9% medium-high knowledge whereas only a 2.2% has a high knowledge about GM products (figure 2).

Figure 2. Sample distribution according to the level of knowledge about GM products.



The sample socio-demographic profile is displayed in table 3.

Table 3. Sample socio-demographic profile.

		Sample	Population
Gender (%)	Male	40.9	48.9
	Female	59.1	51.1
Age (%)	18-24 years	28.2	12.9
	25-34 years	21.9	20.6
	35-49 years	20.0	26.6
	50-64 years	19.4	19.9
	> 64 years	10.5	19.9
Type of habitat (%)	Rural	43.9	47.6
	Urban	56.1	52.4
Family incomes (%)	< 600 €	8.4	
	600-900 €	11.8	
	900-1500 €	38.3	
	1500-3000 €	31.4	
	> 3000 €	10.1	
Activity (%)	Housekeeper	17.2	
	Businessman	7.7	
	Wage-earner	32.3	
	Retired	7.5	
	Student	33.5	
	Other	1.7	
Level of education (%)	None	3.2	
	Primary	29.0	
	Secondary	26.9	
	Universtity	40.9	

Preference structure at GM food purchase

With the aim to determine the relative importance of four attributes on GM food purchase intention, a specific product has been considered, sweet corn. Results show that the most valued attribute is the type of benefit with a relative importance (R.I.) of 33%, following by the price (26% of R.I.), next the existence/absence of substitute (21% of R.I.) and finally the label information (20%), gaining the highest utilities the health benefits, the lowest price, the absence of substitutive and the information about traceability (figures 3 and 4).

Figure 3. Relative importance of GM food attributes on purchase intention

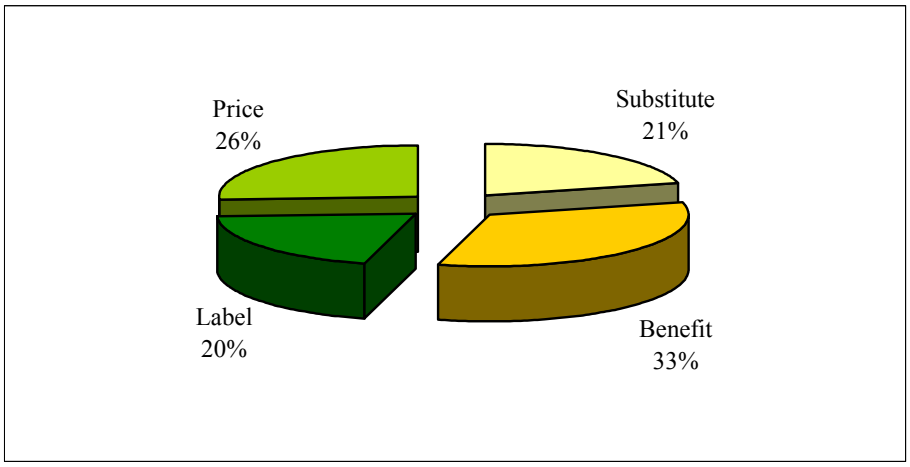
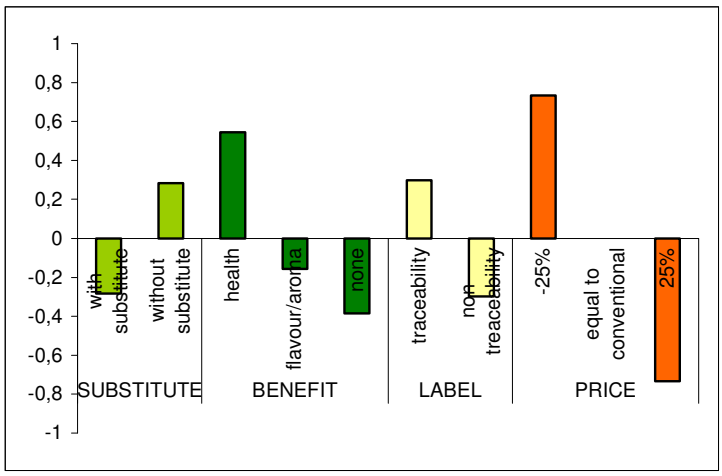


Figure 4. GM food attribute level utilities



Segmentation according to the initial willingness to consume GM foods

A direct segmentation was made taking into account the willingness to consume GM foods. Two segments were considered. The segment not willing to consume is the biggest one with the 58% of the sample. The segment willing to consume is composed of 42% of consumers.

With the aim to get more information about the profile of these consumers, significant differences were searched with respect to sociodemographics, lifestyles and opinions about GM foods. The main differences are related to age, monthly family incomes, type of habitat, level of education, opinion about GM foods and lifestyles (table 4).

First segment has a similar distribution than the average when paying attention to demographics. However, there is a slightly higher percentage of old people, low incomes, people living in rural areas and people with primary education. These consumer distrust about GM foods and are concerned about their effect on health and the price, and they do not believe that these products are similar to conventional. This explains the reluctance to consume GM foods.

The segment which is willing to consume is characterized for being a youth population, for having a higher percentage of people with high incomes, for living in urban areas and for having a higher proportion of individuals with university education. They trust GM foods and are not concern about their effect on health. They consider these products similar to conventional and secure for consumption. Finally, they are consumers with low interest about scientific research.

Table 4.Socio-demographic and functional profile of consumer segments according to the willingness to consume GM foods.

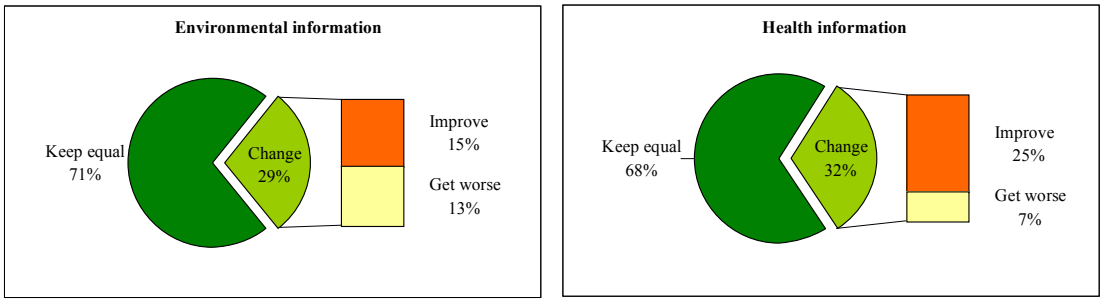
DESCRIPTIVE/FUNCTIONAL VARIABLES	Segment 1 NOT WILLING TO CONSUME (57.8%)[1]	Segment 2 WILLING TO CONSUME (42.2%)[1]	TOTAL POPULATION
Age* **			
18-24 years	24.5%	33.2%	28.2%
25-34 years	20.4%	24.0%	21.9%
35-49 years	21.6%	17.9%	20.0%
50-64 years	20.8%	17.3%	19.4%
> 64 years	12.6%	7.7%	10.5%
Monthly family incomes* **			
< 600€	9.7%	6.6%	8.4%
600-900 €	13.4%	9.7%	11.8%
900-1500 €	40.9%	34.7%	38.3%
1500-3000 €	28.3%	35.7%	31.4%
> 3000 €	7.8%	13.3%	10.1%
Type of habitat* **			
Rural	47.2%	39.3%	43.9%
Urban	52.8%	60.7%	56.1%
Level of education* **			
Without education	4.5%	1.5%	3.2%
Primary	32.0%	25.0%	29.0%
Secondary	26.0%	28.1%	26.9%
University	37.5%	45.4%	40.9%
Lifestyles			
Health / Food	0.022	-0.031	
Environment concern	0.013	-0.018	
Information and Science**	0.090	-0.124	
GM foods opinion			
Distrust**	0.086	-0.117	
Health effect*	0.203	-0.278	
Similar to conventional*	-0.293	0.402	
Security / Regulation**	-0.086	0.119	
Price**	0.095	-0.130	

Influence of information on purchase intention

Figures 5 and 6 show the results about the influence of information on GM foods consumption intention. As it was mentioned before, the sample was divided into two sub-samples which received different type of information regarding GM foods benefits. One sub-sample was informed about benefits related to health and the other about environment benefits. With the aim of providing objective information, GM food problems were also shown, being similar in both sub-samples. Results are shown for both segment, the one which would not consume GM foods, and the one which would consume it.

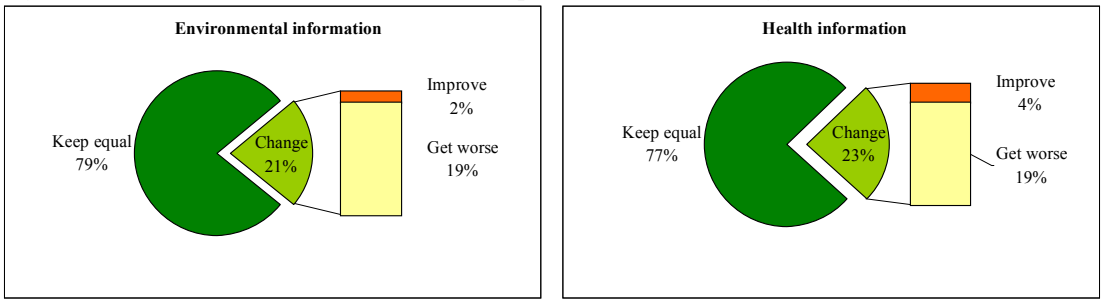
Results show that, in the segment that is not willing to consume (figure 5), the information about health benefits has a more positive influence than information about environmental benefits, since in the first case, a 25% of consumer's willingness to consume improve in contrast with a 15% in the second group. Nevertheless, a 70% of consumers keep equal the unwillingness to consume this kind of products.

Figure 5. Information influence over GM food purchase intention. Segment not willing to consume.



In the segment that is willing to consume GM foods (figure 6), the influence of information is negative. There is a clear worsening of willingness to pay both when benefits refer to health and when are related to environment. In both cases, a 19% of consumers who were initially willing to consume, are reluctance after being informed. It seems to be clear that information about disadvantages prevail against positive information.

Figure 6. Information influence over GM food purchase intention. Segment willing to consume.



Conclusions

Nowadays, the debate about GM food advantages and disadvantages keeps attention. Different organizations and associations with conflicting interests struggle to highlight goodness or damage of these products. Meanwhile, scientific community keeps researching on the health, environment and economy GM food repercussions. Final consumer is, as always, the main harmed, since the absence of clear and checked information drives to a great ignorance and distrust.

In this work, it has been analysed which is the level of knowledge and initial acceptance of these type of foods, which is the preference structure in a GM food hypothetical purchase and which is the influence of information on GM food acceptance. Moreover, the profile of consumer willingness and not willingness to consume has been determined.

The most relevant results indicate that more than a 50% of the population has heard about GM foods but they are ignorant of advantages and associate risks. The structure of preferences state that, these products would have a certain acceptance if they offered health benefits, had low prices and were correctly labelled, that means, with information about traceability. Besides, they have to be products which only might be produced with biotechnology, because with the same advantages, consumer will always prefer conventional production.

Results from this work do not permit to conclude that the influence of information is positive. When mix information is presented (that means, with advantages and disadvantages), a high percentage of the population do not modify his initial opinion, and when it is modified, in general, it is done in a negative direction, that is, individuals who were willingness to consume, give up being. Regarding the type of information, it has been checked that the information concerning healthy effects and better properties has a higher influence that information about the environmental benefits. This is

probably due to the current food security debate and the consumer sensibility about the relationship between food and health.

Finally, the segment of consumer who is willingness to consume is formed by young people, with medium-high incomes, with high studies, who consider these foods similar to those produced conventionally and secure for consumption.

To conclude, we want to highlight a limitation about the experiment aiming to measure the information effect: results might have been influenced by the order in which information was provided, since advantages were presented always before disadvantages. After reading disadvantages interviewers had to submit again their willingness to consume GM foods without a time of thinking. We wonder if results might be different if the question had been delayed enough time to ponder advantages and disadvantages and if advantages had been presented after disadvantages. In future works, we'll try to combine differently the information and to modify the order of presentation in the different sub-samples.

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