

## EFFECT OF INFORMATION ON THE RISK PERCEPTION OF FOOD ADDITIVES – A QUANTITATIVE SURVEY IN HUNGARY, SPAIN AND ROMANIA

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### ABSTRACT

Consumers might feel aversion to food additives due to unreliable and controversial information received and their low level of knowledge.

The aim of our study was to evaluate the judgement and acceptance of different groups of food additives before and after providing information in three European countries (Hungary, Spain, and Romania).

For this purpose a self-administered questionnaire was developed and filled out via Internet in the three countries. 437 completed questionnaires were collected in Hungary, 348 in Spain and 386 in Romania. Data were analysed with SPSS 17.00 statistical software.

The following food additive groups were perceived as the most hazardous ones: “preservatives” in Hungary, “bulking agents” in Spain and “colourings” in Romania. However as the less hazardous group “antioxidants” was indicated in the countries. After providing specific information Hungarian and Romanian respondents showed more positive opinion about the listed groups of food additives, while Spanish participants did not at all. When natural and artificial food additives were analysed separately it was observed that respondents confounded “antioxidants” with the nowadays popular healthy compounds – which have the same name –, because after information provided both the natural and artificial groups got more negative acceptance.

The findings of this study highlighted that the communication methods have to be adapted to the countries’ characteristics. Consumers’ confidence could be enhanced by better and more targeted information supply about the groups of food additives, furthermore in some cases the term “natural” could increase the level of acceptance.

### 1. INTRODUCTION

Consumers often have negative feelings about food additives which are probably due to the incomplete and not specific information. In our questionnaire survey it was found that respondents reported high level of knowledge about food additives (Hungary: 87.6%, Romania: 92.5%, Spain: 84.2%). However when detailed knowledge was analysed, this was not detected as far as mixed and ambiguous level of knowledge was detected. Members of the Hungarian survey reported the highest level of detailed knowledge, while Spanish respondents the lowest. 89.1% of the Romanian participants and 81.7% of the Hungarian respondents knew properly that “Food additives are not consumed in themselves, just added to foodstuffs” while just 64.7% of the Spanish ones thought the same. 70.7% of the Hungarian participants were aware of the statement that “Preservatives are food additives” while 64.5% of the Romanian and 61.2% of the Spanish respondents knew it well. Our hypothesis was that appropriate information could reduce the uncertainty and could increase the acceptance of the different groups of food additives, thus questions were developed and inserted into the above-mentioned questionnaire.

## 2. MATERIALS AND METHODS

A self-administered questionnaire was developed in 2009 in Hungary, in which participants were asked to judge the level of hazard of different groups of food additives on a 1-5 Likert scale (1: not hazardous at all, 5: really hazardous), respectively. Following the analysis of the results of 400 filled questionnaires a concise and more targeted questionnaire was designed. Some groups of food additives were excluded, mainly those where participants could not evaluate exactly the level of hazard, thus the rate of “do not know” answers were too high (e.g. “sequestrants” (41%) and “anti-caking agents” (19.5%)).

In the concise questionnaire respondents first were asked to judge the level of hazard of different groups of food additives on a 1-5 Likert scale (see above). Later on in another question some information was provided about the same additive groups (short definitions with examples, e.g. “Preservatives are substances which prolong the shelf life of foodstuffs by protecting them against deterioration caused by micro-organisms (e.g. sorbic acid in dried fruits and sodium-nitrate in cured meat products”) and participants were asked to evaluate their acceptance (1: absolutely accept, 5: absolutely reject). Definitions of the “European Parliament and Council Directive No 95/2/EC on food additives other than colours and sweeteners” were used. In some cases (“antioxidants”, “colourings” and “sweeteners”) the acceptance of artificial and natural groups was detected separately.

The questionnaire was translated into Spanish and Romanian, too and filled out in Hungary and Romania via Internet and on paper (N= 200) and via Internet in Spain. Altogether 437 fully completed questionnaires were collected in Hungary, 348 in Spain and 386 in Romania. Results were collected in 2011 (Hungary: spring-summer, Spain: summer-autumn and Romania: autumn-winter). Data were analysed by the SPSS 17.00 statistical software.

## 3. RESULTS

### 3.1 Level of hazard before providing information

On the basis of the respondents judgement the most hazardous food additive groups were different in the three countries, “preservatives” in Hungary, “bulking agents” in Spain and “colourings” in Romania. “Bulking agents” resulted amongst the three most hazardous groups in all countries. However the less hazardous food additive group was “antioxidants”. Favourable judgement of “antioxidants” was probably due to the fact that respondents confused this food additive group with the nowadays popular healthy food components. “Packaging gases and propellants” proved to be a really hazardous food additive group for Romanian participants, significantly ( $p \leq 0.001$ ) more hazardous than for Hungarian and Spanish respondents. Results showed that Hungarian participants felt the biggest difference between the listed risk factors, while Spanish respondents the smallest (Table 1).

Table 1. Judgement of different groups of food additives (1: not hazardous at all, 5: really hazardous)

	Hungary	Spain	Romania
Antioxidants	1.86	2.19	2.17
Acids	2.55	2.86	3.96
Acidity regulators	2.76	2.76	3.76
Gelling agents	2.82	2.83	3.81
Sweeteners	3.07	2.83	3.85
Packaging gases and propellants	3.19	3.36	4.07
Raising agents	3.36	3.13	3.79
Flavourings	3.50	3.06	4.18
Bulking agents	3.36	3.45	4.16
Colourings	3.64	3.12	4.39
Preservatives	3.68	3.06	3.73

### 3.2 Level of acceptance after providing information

#### 3.2.1 Groups of food additives

After providing information according to the participants the most hazardous groups were “artificial colourings” in Hungary and in Romania, while “bulking agents” still remained in Spain. “Natural antioxidants” was considered as the less hazardous group by the Hungarians and Romanians surveys, and “natural colourings” according to the Spanish respondents. Due to the provided information, acceptance of the listed groups of food additives was significantly ( $p \leq 0.001$  or  $p \leq 0.05$ ) higher – except of “antioxidants” – than previously in Hungary and Romania. Spanish participants showed significantly ( $p \leq 0.05$ ) higher acceptance level in case of some groups like flavourings and gelling agents, however significantly ( $p \leq 0.001$  or  $p \leq 0.05$ ) lower regarding e.g. “preservatives” and “acids”. “Packaging gases and propellants” got significantly ( $p \leq 0.001$ ) higher acceptance after the information providing in the three countries and in Hungary its’ level of acceptance was still significantly ( $p \leq 0.001$ ) higher than in Spain and Romania.

Table 2. Acceptance of different groups of food additives (1: absolutely accept, 5: absolutely reject)

	Hungary	Spain	Romania
Natural antioxidants	2.03	2.26	2.26
Artificial antioxidants	3.10	3.25	3.04
Natural colourings	2.07	2.14	2.34
Artificial colourings	3.26	3.19	3.07
Natural sweeteners	2.21	2.37	2.32
Artificial sweeteners	2.83	3.07	2.83
Acids	2.28	2.74	2.71
Preservatives	2.45	2.38	2.58
Packaging gases and propellants	2.59	3.08	2.90
Gelling agents	2.59	3.11	2.58
Acidity regulators	2.61	2.92	2.77
Raising agents	2.85	3.20	2.83
Bulking agents	2.98	3.42	3.01
Flavourings	3.14	3.31	3.02

The acceptance of “antioxidants” – both artificial and natural – was lower after providing information in the countries concerned, so it was obvious that participants

previously confounded it with the healthy components. In all cases when the acceptance of artificial and natural groups was analysed separately, natural ones got significantly ( $p \leq 0.001$ ) higher acceptance than the artificial ones (Table 2).

### 3.2.2 Effect of “natural” and “artificial”

In order to transform consumers’ judgements into distances and to provide a visual representation of the plots’ proximities a multidimensional scaling was done. Hungarian participants had significantly more negative attitude regarding natural ( $p \leq 0.05$ ) and artificial ( $p \leq 0.001$ ) “antioxidants” after the provided information. Thus it can be said that they mistook “antioxidants” as food additives for the group of healthy components. The opposite tendency was observed in case of “colourings” (natural and artificial  $\leq 0.001$ ) and “sweeteners” (natural  $p \leq 0.05$ , artificial  $p \leq 0.001$ ). “Antioxidants” got the highest acceptance amongst the natural food additives, while “sweeteners” the lowest (significantly lower than “antioxidants” ( $p \leq 0.001$ ) and “colourings” ( $p \leq 0.05$ )). “Artificial colourings” was significantly ( $p \leq 0.001$ ) the most accepted artificial food additive group in contrast to “antioxidants” and “sweeteners” (Figure 1).

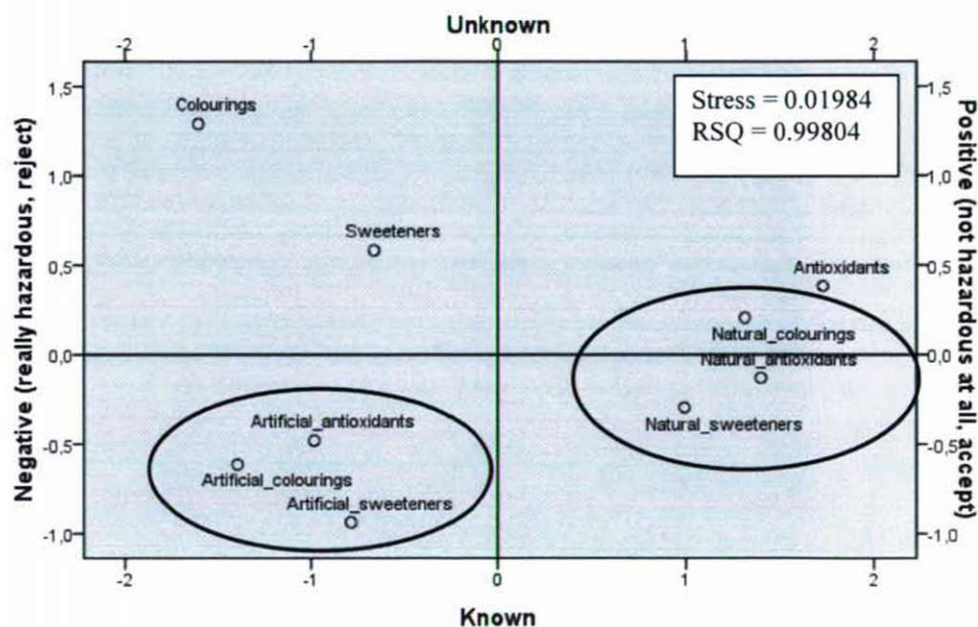


Figure 1. Effect of information on the acceptance – Hungary

“Artificial and natural antioxidants” were significantly ( $p \leq 0.001$ ) more negative after the provided information according to the Spanish participants. “Natural sweeteners” and “natural colourings” got significantly ( $p \leq 0.001$ ) more positive evaluation after the information supply, while their artificial pairs got more negative feedbacks (“artificial sweeteners”  $p \leq 0.05$ ). Within the group of natural food additives’ acceptance significant ( $p \leq 0.001$ ) difference was found between “colourings” and “sweeteners”. Regarding artificial additives “sweeteners” got significantly ( $p \leq 0.05$ ) lower level of acceptance than “colourings” and “antioxidants” (Figure 2).

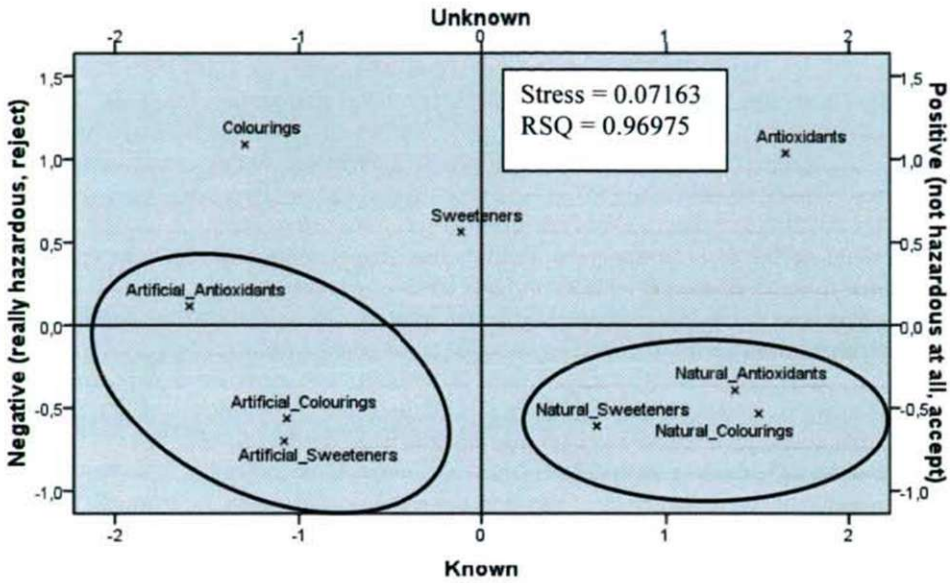


Figure 2. Effect of information on the acceptance – Spain

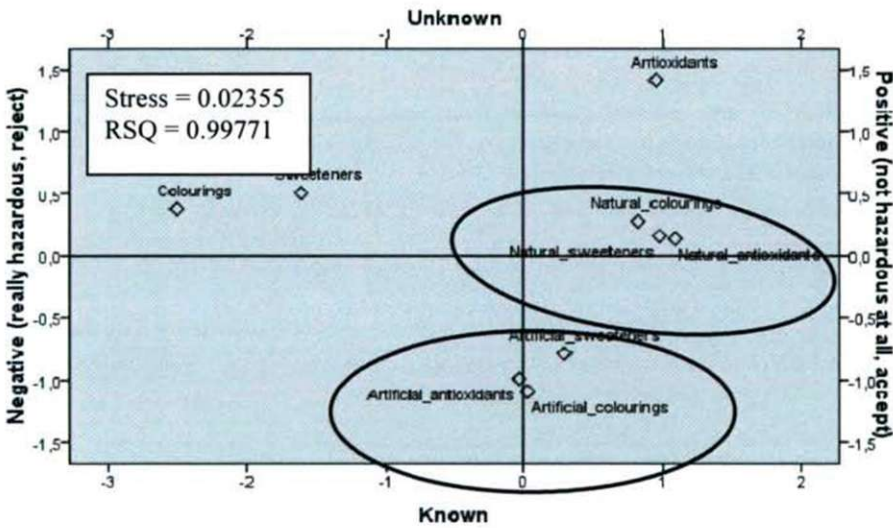


Figure 3. Effect of information on the acceptance - Romania

As it was observed in Hungary, Romanian respondents also gave significantly ( $p \leq 0.001$ ) more negative evaluation to “natural and artificial antioxidants” after the provided information, while “natural and artificial sweeteners” and “colourings” got significantly ( $p \leq 0.001$ ) higher values. Amongst natural food additives Romanian participants did not found significant differences. In case of artificial additives “sweeteners” got significantly ( $p \leq 0.001$ ) higher acceptance than “antioxidants” and “colourings”.

#### 4. CONCLUSIONS

The judgement of the listed groups of food additives was different, nevertheless “antioxidants” was judged as the less hazardous group in all three countries. This favourable judgement was due to the fact that it was probably confounded with the healthy compounds. After providing information more negative opinion was expressed about natural and artificial antioxidants.

The provided information had different effects on the acceptance of the different groups of food additives. Hungarian and Romanian respondents showed a more positive opinion, while Spanish participants did not in any cases.

When natural and artificial food additives were analysed separately, Hungarian and Romanian respondents were more positive regarding both, while participants from Spain only with the natural ones. Hungarians showed significant differences between the acceptance of the elements of artificial and natural groups, while Spanish participants only in some cases and Romanian ones found differences only amongst the artificial food additives.

The observed level of hazard was different in the three countries and the provided information had different effect on the acceptance of food additive groups, thus our hypothesis was not confirmed unambiguously. Although members of the Hungarian and Romanian surveys showed certain similarities, results of this study highlighted that the communication methods have to be adapted to consumers’ attitudes, knowledge and to the specialities of the given countries’ social and cultural character. On the basis of the results of this quantitative survey it was found that consumers’ confidence could be enhanced with better and more targeted information about food additives, furthermore in some cases the term “natural” could increase their acceptance.

#### REFERENCES

1. European Parliament and Council Directive No 95/2/EC of 20 February 1995 on food additives other than colours and sweeteners.  
<http://www.ziq.gov.cn/portal/webfiles/web/file/12602335603858070.pdf>