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# **Determinants of consumer preferences towards functional foods with seaweed ingredients**

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## **1 Background**

A wide range of well-known (as e.g. vitamins) as well as novel substances is under research and in parts is already marketed as ingredients for foods with enhanced health benefits. Most of these substances are secondary plant metabolites from terrestrial plants. Among these, the classes of carotenoids and polyphenols have anti-oxidant properties and therefore possess a potential to prevent cancer and cardiovascular diseases.

As the consumption of protective substances is still too low in many parts of the population, new sources of active ingredients as well as new ways to include them in the regular nutrition of the consumers are needed.

The EU-funded project "Seaweed antioxidants as novel ingredients for better health and food quality (SEAHEALTH)" aims at developing foods with a special health benefit that contain anti-oxidative ingredients on the basis of seaweeds (carotenoids as well as polyphenols from two selected species of brown algae that grow at the European sea shores). The project consortium includes nine research institutes and enterprises from Italy, Spain, France, the Netherlands, and Germany, which analyse all aspects from the harvesting and chemical composition of the algal extracts, toxicology and health effects to the development of extraction methods and model foods as well as market development and consumer aspects.

A large number of factors that influence the purchasing behaviour with relation to functional foods are discussed: Relevant attributes of the buyer are the sociodemography (Herrmann, Roeder 1998; Margetts et al. 1997) and nationality (Kearney et al. 1997; Rams 2002), but also attitude variables (Backman et al. 2002; Herrmann, Roeder 1998; Pettinger et al. 2004; Rams 2002; Verschuren 2002), subjective norm (Kassem et al. 2003; Poulsen 1999), as well as her or his general health- or risk-taking-behaviour (Rams 2002), and health condition (Herrmann, Roeder 1998).

On the level of the product, the knowledge and familiarity with the ingredients are discussed (Herrmann, Roeder 1998; Rams 2002), as well as food safety (Bech-Larsen, Grunert 2001; Verschuren 2002), convenience (Pettinger et al. 2004; Poulsen 1999; Rams 2002; Verschuren 2002), type of the base product (Poulsen 1999, Rams 2002), and its perceived or proven additional health value (Poulsen 1999; Rams 2002). Relevant for purchasing behaviour in general as well as for functional foods are the price, taste, and brand (Rams 2002; Verschuren 2002), as well as the product information, advertisement messages (Rams 2002) and the trust in the sources of this information (Bech-Larsen, Grunert 2001; Rams 2002; Poulsen 1999).

## 2 Objective

Fraunhofer ISI, together with the Institute for Economic Policy Research at the University of Karlsruhe, Germany, the Department of Agricultural Economics and Agricultural Engineering at the University of Bologna, Italy, and Counterpoint (UK) Ltd., London, UK, investigates the factors which influence the market for and the consumer behaviour towards functional food products with ingredients from seaweeds, in order to subsequently develop appropriate consumer communication strategies.

The present paper describes the methods and results of a consumer survey carried out in two large EU countries with different market structures for functional foods (the UK and Italy, the data collection in the third country (Germany) is still ongoing), to determine the most important factors that contribute to the consumers' attitudes and purchasing behaviour towards functional foods with seaweed ingredients.

## 3 Methods

To identify the most important potential factors of consumer behaviour and to supplement the literature analysis, focus groups with consumers were carried out in Germany and the UK. Issues discussed there were the relationship of food consumption and health, functional foods as well as seaweed as source of food ingredients.

On this basis, a mall intercept survey is organised in order to verify consumer preferences towards a limited set of selected attributes, also including health-related properties. A conjoint design was developed including six dimensions with two or three factorial levels each, including product ("Soft drink" vs. "Yoghurt"), origin of the specific ingredient (from "Seaweed" vs. from "Apple"), point of sale (in "Health food store" vs. "Supermarket"), 3 price levels, claim of a health effect ("No additional effect on health" vs. "Improves digestion" vs. "Reduces the risk of coronary heart disease by 10%"), and information vehicle ("Normal advertisement by producer" vs. "Normal advertisement and brochure from the producer" vs. "Normal advertisement and official quality sign").

A fractional orthogonal design with 19 product profiles is presented to the respondents, asking them to rank the profiles according to their preference. A short self-administered questionnaire completes the data collection. The total procedure of interview and questionnaire takes about 20 minutes per participant, participants receive an incentive of €5.- or £ 5.-.

Altogether, 600 individuals in Germany, the UK and Italy from the general population are interviewed. Data are collected in or directly in front of supermarkets, participants are recruited from the customers which have just purchased foods in order to reach those persons who are responsible for buying foods for the household. Different sampling points per country are used to increase the variability in the socio-demographic background of the participants.

The actual analysis is based on  $n_U=200$  cases from the UK and  $n_I=235$  from Italy. The mean age of the participants is 41.5 years ( $SD=14.3$ ; range 18 to 85 years), 15.2% have an elementary or secondary school qualification, 18.4% an intermediate, 30.8% visited an advanced technical college or similar, and 28.5% have a school qualification that has or would have qualified them for university.

71.4% are women, and the majority (81.4%) is responsible for purchasing foods for the household, indicating that the sample represents the expected target population. Over 40% have bought functional foods at least weekly over the last year.

## 4 Results

### 4.1 Focus groups

The results from the focus group discussions in the UK and Germany indicated that the attitudes towards seaweed as source for food ingredients are unexpectedly positive. However, the connotation of unsavoury algae should be avoided, the UK group members recommended not to call the source “algae” but better “seaweed”. Some reservation exists because of feared contamination with toxic substances, especially iodine or contamination by maritime environmental pollution.

As important factors for the purchase of functional foods, the personal experience, being firm with product, knowledge and appropriate information, as well as the price and availability in the stores were mentioned. There are some concerns about functional foods having no "real" health benefit for the consumer but introduced into the market by the industry only for PR reasons. The most credible information was expected by the members of the focus groups from an authority or charity independent from the food industry.

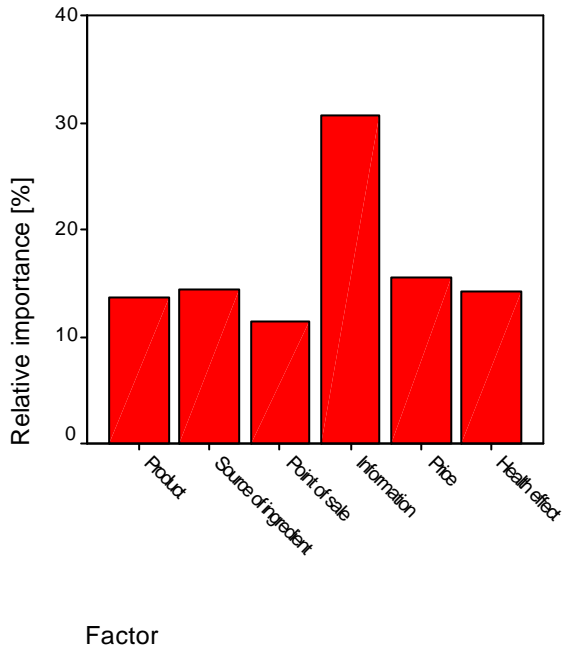
Besides the fact that foods should be as natural as possible, an interesting aspect was that the additives used must "fit" with the base product, e.g. ingredients from algae with pasta, bread or soups.

Foods with ingredients from algae (where the participants mostly thought of green algae) were seen as natural and interesting, there were not many concerns about food ingredients with maritime origin. Especially the British participants were very reserved towards the information given by the food industry. Information from independent sources (government, charities) would be helpful to find trust in new products and related health claims.

### 4.2 Conjoint analysis

The input from the focus groups was used to supplement the conjoint design. The main results are presented in figure 1.

*Figure 1. Summary results of conjoint analysis*



The summary results show that the source of information is the most important factor that influences the simulated purchasing behaviour; it contributes about 30% to the consumers' decision for a specific product.

The price is not dominant. The expected health effect is only equally important as the type of product (yoghurt or soft drink). The source of the ingredients (seaweed or apple) did not make

*Figure 2. Sources of information*

a large overall difference.

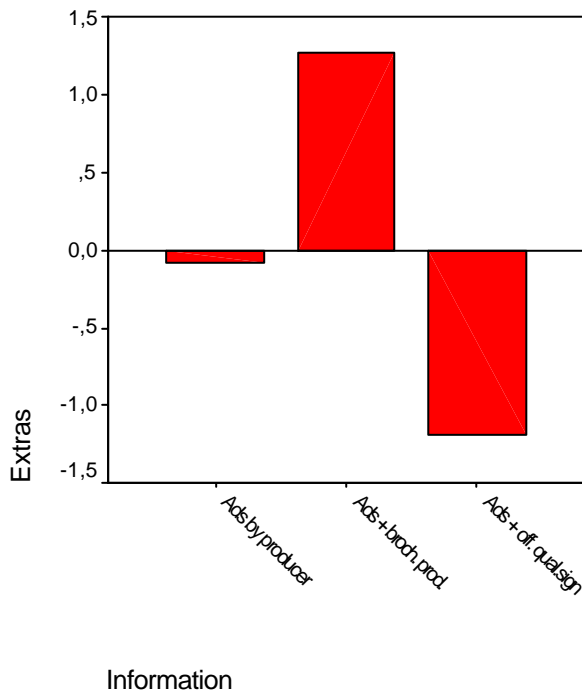


Figure 2 analyses the relevance of the different sources of information that the consumers would prefer to be available with the product. For methodological reasons, these utility values are reverse. The data show that the high overall relevance of the information for the purchasing behaviour is based on a strong negative evaluation of additional brochures from the producers and a strong preference for an official quality certificate.

Figure 3. Attitudes towards seaweed ingredients

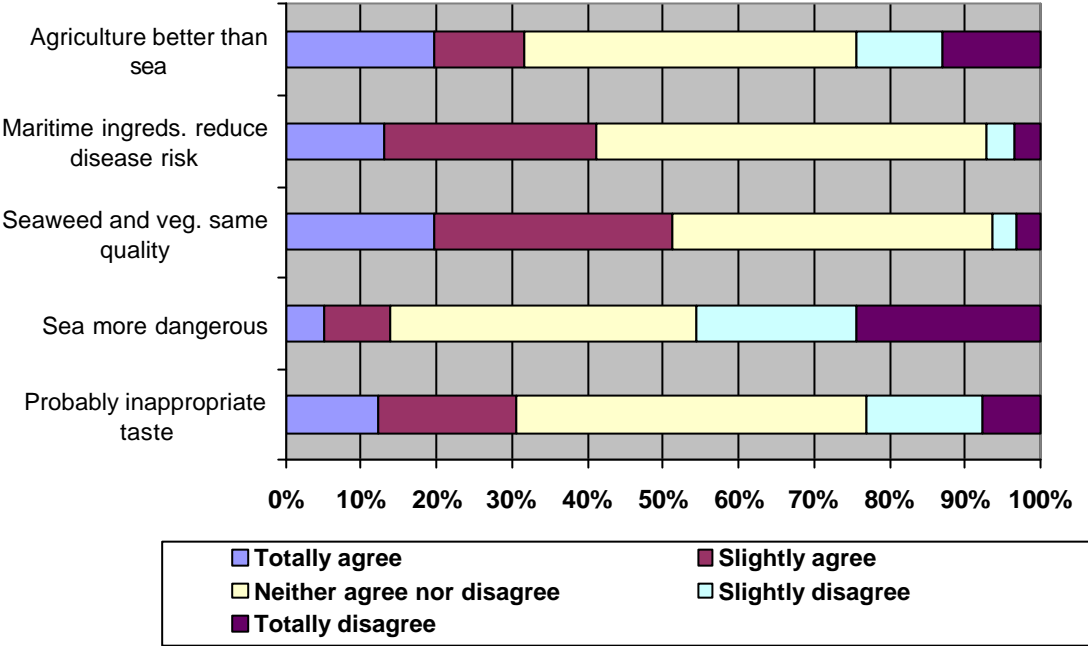


Figure 3 summarises the attitudes towards food ingredients made from seaweeds as assessed with the supplementary questionnaire. Only a small fraction of the consumers finds that it is better to obtain ingredients for foods from normal agriculture than from plants that grow in the sea. Instead, leaving the relatively large group of those out of the discussion who are undecided, there is a strong majority of those who believe in the capability of maritime ingredients to reduce disease risks and in the feasibility of their production in equally high quality and safety as vitamins from fruits or vegetables.

There are no strong fears that the sea as a source of foods is more dangerous than the same products from conventional cultivation, but some concerns about such products having an inappropriate taste.

### 5 Discussion

The general acceptance for foods with seaweed ingredients is unexpectedly high. The conjoint analysis reveals the importance of information concerning food products with ingredients from seaweeds, and an unexpectedly low relevance of the price as well as of the claimed health effect. This lack of information is stressed by a relatively large group of persons who – according to their answers in the questionnaire – have no clear-cut opinion about seaweed ingredients for foods, although many of them have bought other functional foods throughout the last year.

Other data are still to be analysed. The results will be used to inform the product development within the project as well as the development of appropriate information strategies to encourage consumers to protect and improve their health by an increased consumption of antioxidants.

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