

Executive summary:

For the first time, the ECROPOLIS project provides an approach that focuses on sensory quality, i.e. perceived taste quality of organic food versus equivalent conventional food, to enable producers, processors and marketers of organic food to offer products that meet consumer expectations and that lead to repurchases at European level. The focus on the entire product value chain is a new approach for organic actors. The research results showed that sensory properties are of major importance with regard to consumer purchasing decisions for or against organic products. Organic stakeholders are in most cases small to medium sized enterprises without financial resources for adequate market research. To fill this gap, the ECROPOLIS project delivered consumer-oriented and product-oriented research results. Moreover, it combined this approach with the analysis of the impact of main requirements on sensory properties of the EU regulation and private standards for organic production and organic food in European countries (CH, DE, FR, IT, NL, PL). Private organic standards impacts could empirically be verified in the case of sausages (use of nitrates/nitrites), plant oils (processing methods) and fruit yoghurts (flavouring ingredients, partly steering and homogenization).

In respect of sensory quality, the results for organic food products display a broad range of taste perceptions. For about 55% of all products tested, organically produced food reaches a leading position concerning taste. However, in other cases organic food tasted differently and/or was less preferred than the conventional market leader products. This shows that sensory quality of organic products is not always able to meet consumer expectations. The project team discovered that two reasons can lead to this situation: Firstly, a lower sensory quality value can lead to a disappointment in consumer expectation. Qualitative market research of the ECROPOLIS project indicates that consumers expect a high sensory quality. It is important that sensory properties of the products keep their promise and are therefore regularly identified by sensory analysis. To this end, organic actors should improve product sensory properties and their marketing strategy, i.e. when product failures exist, when a product tastes differently from what it should taste like, it should be optimized, e.g. by changes in recipes, by improved quality of ingredients and by better explaining the standards-related differences.

A second reason for sensory disappointment in an otherwise faultless developed organic food product is prior consumer sensory imprinting from equivalent conventional foods over several years. An organic differentiation strategy can be a useful marketing strategy here, e.g. by placing marketing emphasis on traditional or flavour-free products. In this case, organic products have to be promoted by a sensory marketing to overcome reservations in consumer minds.

Furthermore, results of both research areas consumer/market research and sensory research show that the sensory image of organic products is generally good and leads to a positive perception of sensory

attributes. This is a highly promising, applied and market-driven outcome for marketing and product positioning of organic products based on their sensory quality, of special relevance for SME's.

For sensory marketing of organic products, the project outcome proposes two suitable strategic approaches: In most cases, a differentiation approach is adequate by positioning a product as a specialty or premium product. Products should have an outstanding taste, be authentic, be processed on a low level, be artisanally produced, be characterized by an original/ a traditional taste, and should contain few additives. However, for a certain range of products an imitation approach seems a better fit. Imitation means the adaptation to a median taste, i.e. to an average consumer taste and/or the taste of a benchmark product. In this case the competitive advantage has to focus on product properties other than sensory taste (e.g. environmental and/or social benefits of organic production).

The ECROPOLIS project contributed to a better understanding of the European organic food market, consumer perceptions. It increases economic benefits for organic food actors on the national as well as on the European market to improve their competitiveness position through better sensory quality.

Project Context and Objectives:

Project background

The sensory properties of food products are an important market success factor, especially in the organic market, where many producers and distributors of organic foods claim superior tastes for their products compared to the conventional alternative. This argument however is still subject to a hard debate, from an objective scientific perspective, but especially from the subjective consumer point of view.

Along with the fast growth of the organic markets and increasing market shares of supermarkets and discounters goes a differentiation of buying motives: Traditionally, the most important motive to buy organic food was environmental concerns. The buying motives of the new target groups are characterized through more selfish benefits such as health, wellness, or taste, whereas altruistic motives (environment, animal welfare) lose relevance (Lóth et al. 2005; Goldman and Clancy 1991). Higher prices for organic products where organic products are not enough informed about sensory specifics of organic produce. They will thus prefer already known brands or varieties. These consumers can only be attracted by well-defined but rather simple sensory information tools or labels, which make the complex characteristics of organic products more easily understandable. An obvious answer to this challenge is the better integration of product development and sensory marketing. Therefore, the organic food producers, which are by more than 95% SMEs, need a deeper knowledge on consumer expectations and preferences as well as on the objective properties of their products. Understanding the impact of production methods and ingredients then enables them to produce tailored products for different market segments. It thus only be justified for the consumer if they provide benefits beyond the organic production, such as a higher organoleptic value. Sensory properties of organic food thus are of higher relevance than ever before.

Due to specific regulations for organic production (EU Council regulations, Codex Alimentarius, or standards of other associations) organic products show considerable differences in sensory properties compared to conventional products. Because consumer preferences are largely dependent on their long-term nutritional habits, for new consumers expecting superior properties from organic products, these unfamiliar sensory experiences can lead to dissatisfaction (Buchecker et al. 2003). Especially occasional and non-buyers of organic food claim superior tastes for their products compared to conventional alternatives. This argument, however, is still subject to hard debates and thus deserves more scientific evidence. Since repurchases are dependent on the overall attractiveness and taste of a product, and sensory experiences are hypothesized to have an important impact on the consumer acceptance, knowledge about these dimensions is crucial for producers and marketers of organic food.

Main objectives

The main objective of ECROPOLIS was to develop the European-wide Organic Sensory Information System (OSIS), a multilingual and centrally based online data folder for data deposition along with an interface scheme. This interface serves as a basis for data exchange to the benefit of the organic food market (organic associations, producers, processors, retailers, wholesaler as well as consumers). The extendable data folders contain descriptions of sensory properties of specific products from six product categories (bakery products, meat, apples, yogurt, native plant oils, and tomato sauce) in six European countries (France, Germany, Italy, Netherlands, Poland, Switzerland) as well as information about underlying production methods. The production methods explain sensory differences between organic and conventional products as well as consumer expectations in the single countries. Proposals for product improvement and communication strategies were developed for the different product groups.

Methodological approach

To obtain information about the sensory quality and the improvement potential of organic products as well as information and tools for sensory marketing, the following methodological approach was chosen:

1. Status quo analyses on the existing knowledge about sensory properties specifically regarding organic food
2. Analysis of the regulatory framework underlying the organic food sector and its effects on sensory aspects of products
3. Sensory analysis to give a comprehensive overview of sensory characteristics, acceptance and preferences towards a defined broad, but representative range of organic products
4. Consumer research to develop marketing solutions for the actors of the organic food supply chain adapted to sensory expectations and preferences of different consumer segments
5. Synthesis of evaluated results of the literature survey, analysis of regulatory framework, sensory analyses, as well as qualitative and quantitative consumer research and evaluation of market need along the supply chain to
 - assess product improvement potential
 - develop recommendations for specific sensory marketing
 - develop Organic Sensory Information System (OSIS)
 - develop education documents for the different target groups

In the following, the objectives and respective implementation measures are explained more deeply. Sensory profiles of selected products from six categories (yoghurt, salami, cookies, vegetable oil, tomatoe sauce and apples) were developed by Quantitative Descriptive Analyse (QDA) The statistical data are be presented in form of spider web diagrams to achieve clear descriptions of the sensory properties and to reveal the differences in the various products, as well as to compare sensory product differences in the involved European countries.

Parallel consumer sensory studies were carried out as acceptance tests with subgroups of regular and occasional buyers of organic

food to evaluate their sensory preferences. In order to gain information about the impact of the organic image on the sensory perception, the sensory acceptance tests were carried as blind and branded tests. The comparison of the results showed the influence of the image on sensory perceptions.

From these results, indications for product improvement were drawn. The sensory and consumer studies were combined with a preference mapping through multivariate analysis.

The impact of the regulations on sensory properties was evaluated in this project through an extensive literature review. The result was a hypothetical impact matrix for the different product groups, which were in a next step validated through the correlation with the results of the sensory analysis of products. The aspects of the different European organic standards were connected with sensory description data by multivariate analyses to identify parameters that directly influence sensory qualities (e.g. prohibition of added ingredients, certain additives, processing aids or production methods).

Besides the objective sensory description of the products, which were included in the OSIS-database, the identified impact of regulations on the sensory properties helped to create more transparency for supply chain actors and consumers.

Finally, strategies for sensory marketing were developed, based on qualitative as well as quantitative consumer research in order to reveal consumer knowledge, attitudes, and sensory expectations concerning organic food and to validate the existence of different market segments which have to be confronted with tailored communication strategies in order to maximise profits.

The sub-objective of the consumer research thus was to provide SMEs with a typology of organic food consumers based on their sensory preferences and buying motives. By describing the target groups regarding their knowledge, experiences and attitudes towards organic production and products, this typology will be the starting point for the development of targeted marketing and communication strategies for the SMEs and SME-AGs: The quantitative consumer survey also investigated consumer reactions on the different communication instruments, to give recommendations which of the identified consumer types will accept which kind of marketing strategy and which information is worth to be included in the OSIS.

Project Results:

The main achievement of the ECROPOLIS project was the development of the first European-wide Organic Sensory Information System (OSIS), a multilingual and centrally based online data base along with an interface scheme. This interface serves as a basis for data exchange for the benefit of the organic food market (organic associations, producer, processors, retailers, wholesalers as well as consumers).

In the OSIS database all the main results of the project team can be found both in a condensed and "digested" form for the different market actors and stakeholders as well as the detailed project reports.

Overview about main results, which the project covered:

- Status quo analyses on existing knowledge about sensory properties specifically regarding organic food;
- Analyses of the regulatory framework underlying the organic food sector and its effects on sensory aspects of products;
- Sensory analysis to give a comprehensive overview of sensory characteristics, acceptance and preferences towards a defined broad, but representative range of organic products (apples, yoghurt, plant oils, cookies, salamis and tomato sauce) in six countries (DE, FR, IT, NL, PL, Switzerland);
- Consumer research to develop marketing solutions for the actors of the organic food supply chain adapted to sensory expectations and preferences of different consumer segments;
- Synthesis of the evaluated results of the literature survey, analysis of regulatory framework, sensory analyses, as well as qualitative and quantitative consumer research and evaluation of market need along the supply chain;
- Recommendations for product improvement as well as specific sensory marketing for different market actors (processors, standard-setting organisations, retailers, SME's)
- Development of the Organic Sensory Information System (OSIS);
- Development of education documents and training material for different target groups.

Status quo literature analyses on existing knowledge about sensory properties regarding organic food

The initial attraction of organic food to the general public was that it was perceived to be more environmentally friendly, and, in time, that it would be regarded by some consumers as tastier and healthier. Scientists and policy makers have mainly stressed the benefits to the environment of organic farming. Previous research from all over the world seems to agree in indicating that consumers' choices are largely motivated by health, the environment, price and social status. Other considerations include ethics, the localness of the product and lifestyle choices. Scientific support for marketing actions addressed to those who want to enjoy better taste, and are willing to pay more for these benefits, is scarce. Although many studies show the importance of taste as buying motive, past research shows no clear evidence on the importance of certain sensory

characteristics such as taste, smell, appearance etc. of certain products in consumers' preferences with regard to organic food. The ECROPOLIS project, funded by the EU, was set up to investigate the role of different sensory properties of organic food in consumers' preferences and food choice, leading into research on how to satisfy those preferences. The status quo analyses aimed at providing a solid basis for such research with an in-depth review on the relevant scientific literature. The first part addressed consumers' expectations of organic products in terms of taste, smell, appearance, etc. and how these expectations are, or are not, met; the second part was about the science of the senses.

The first project tasks included:

- creating and agreeing on a glossary of terms,
- deciding on search criteria (key words, etc.),
- setting up a bibliographical data base,
- preparing and then circulating the above-mentioned reports, and
- finally preparing a summary of the reports.

The analyses of consumers' expectations confirmed the assumption that, while organic food has traditionally been marketed through specialized retailers, its market share will only grow significantly if it is promoted by multiple retailers.

The literature also indicated that the organic market will expand significantly only if consumers are more willing, and able, to recognize quality; but this presents serious issues. When buying the product they cannot personally verify its quality and genuineness and thus must rely on regulations, inspection bodies and organic labels. The recognition of quality can be encouraged by effective communication through appropriate branding, labelling and presentation.

There is broad agreement on two findings:

1. there is no proof that organic food is more nutritious or safer, and
2. most studies that have compared the taste and organoleptic quality of organic and conventional foods; they report no consistent or significant differences between organic and conventional produce.

Therefore, claiming that all organic food tastes different from all conventional food would not be correct. However, among those well-designed studies with respect to fruits and vegetables, that has found differences, the vast majority favour organic produce. Some organic produce tends to store better and has longer shelf life, probably because of lower levels of nitrates and higher average levels of antioxidants. The former can accelerate food spoilage, while antioxidants help preserve the integrity of cells and some are natural antibiotics. The above mentioned finding may, however, depend on factors not directly connected to organic farming, such as harvesting and storage methods and the type of land used for growing the food.

Regarding the second finding, it must be considered that measuring organoleptic quality is difficult and inherently subjective and evaluations may be clouded by the influence of numerous factors on the consumer's perceptions of the food and not just its appearance and taste. Experimental research indicated that the information that a food is organic confers upon it a "halo effect" (label effect: a product is perceived of better sensory quality simply because it is organic), which improves consumers' liking and acceptance of a product. ECROPOLIS researchers analysed in detail which sensory aspects have an impact on consumers' overall liking of a product and how organic and conventional products are evaluated in terms of these sensory aspects. Based on these results, suggestions were developed for future policy. These suggestions considered aspects such as how the food is stored, transported and presented, which is also essential for maintaining sensory properties. The analyses how the regulation for organic food influences directly the sensory characteristic of the product showed the following picture: International organic standards (like the Codex Alimentarius Guidelines or the standards of the private world umbrella organisation for organic agriculture IFOAM), with some important exceptions, are largely in line with European ones. Differences in standards usually refer to whether there is orientation towards freshness "per se" as opposed to increasing shelf-life, or quality standardization as opposed to quality differentiation. Differences in regulations refer to aspects such as ingredients, additives, processing aids and methods, packaging, storage and transport. The lack of harmonisation among the different regulatory systems in different countries often reflects different traditions and market conditions. A stronger harmonisation would not only reduce such costs, but would also increase consumer confidence in European and international organic standards and regulations.

Analysis of regulatory framework affecting sensory properties of organic products

Within ECROPOLIS, a synthesis of the analyses of the regulatory framework governing sensory properties was established. The main focus of the analyses was on the most relevant differences between the EU rules for organic production, governmental rules and private standards, which are relevant for sensory properties.

The standard comparison of five private national standards in France, Germany, Italy and Switzerland and three international standards (IFOAM, Codex Alimentarius and Demeter International) showed that the most significant differences are:

- the use or non-use of ingredients containing specific flavours and colour compounds;
- the use or non-use of specific thickeners in particular for milk-products and vegetable/fruit products;
- the use or non-use of nitrate/nitrites in meat products;
- the use or non-use of natural flavours (e.g. for yoghurts, juices or bakery products);
- the use of organic yeast (mainly for bakery products);

- the exclusion of some processing methods like high-temperature processing of oils or of milk.

Within the analyses, a preliminary assessment was performed on how the different restrictions might impact sensory properties.

Furthermore, these differences were linked to a typology, where products are differentiated into four segments.

Along the horizontal axis are some more standard products and others more premium products. On the vertical axis there are products positioned with a long shelf life and vice versa products with freshness/authentic character.

Influence of the organic regulations on sensory product quality

The influence of organic regulations on the sensory product quality was then determined by establishing sensory profiles and investigating consumer expectations in six countries (France, Germany, Italy, Netherlands, Poland, and Switzerland). The results were linked with the information about the production parameters of all standards and regulations involved (e.g. EU-Regulations or standards with additional requirements beyond the EU rules such as Demeter, Bio Suisse, Bioland, etc.). In this way, parameters that directly influence sensory properties could be identified (e.g. prohibition of added ingredients or processing methods). The analysis was made for natural and strawberry yoghurts, sunflower oil, cookies, salami, tomato sauce and apples.

The outcome of this work was a number of factor-matrices for different product groups investigated in the project that relates the influence of the different international and national organic standards on the sensory quality of the foodstuff. Generally the analysis showed that on the level of the EU regulation/governmental regulation of Switzerland for organic production, generally no regulatory impact through the EU regulation on sensory properties of yoghurt was detectable in any participating country.

Some requirements, which are regulated in private standards, revealed a clear impact on sensory properties. Examples analysed and described are:

Natural yoghurts: The prohibition of non-milk based thickeners as well as the non-homogenisation of milk by some standards might have an impact on natural yoghurts, but was not confirmed in all cases.

Strawberry yoghurts: Strawberry yoghurt produced according to private standards, which prohibit in their standards colouring and flavouring ingredients, were characterised by the trained panel with a significantly less intensive fruity taste and odour and a paler colour. Especially the less pink colour in strawberry yoghurt led to lower scores by the consumers regarding the liking of the appearance.

Sunflower oil: The private organic standards include specific additional restrictions applied to the extraction and purification methods for sun flower oil production (temperature restriction, no chemical extraction, refining and deodorisation). The resulting high intensities of the sensory properties of these oils were mostly very much appreciated by the consumers. It seems that the restrictions lead to positively perceived product characteristics: significantly more intensive taste and smell, more intensive mouth feel properties as well as in most cases a darker yellow colour.

Cookies: Although different types of cookies were tested, no impact due to the restricted amount of allowed additives or the non-use of flavours was found. It can be concluded that differences between the sensory properties of the tested cookies resulted from individual decisions of the producers/ processors and were not due to a regulatory impact.

Salami: The EU regulation for organic production restricts the amount of nitrates/ nitrites for meat processing. With regard to the preserving and antioxidant agents, no regulatory impact due to the restricted amount of the additives was detectable. Several private standards allow the usage of preserving agents, such as sodium nitrite and potassium nitrate as well as of antioxidant agents. It could be shown that prohibition has a distinct influence on the appearance of salami. The resulting paler colour of especially pork salami was not so much appreciated by the consumers. Thus, this restriction probably leads to negatively perceived sensory characteristics of salami.

Tomato sauce: No impact of the EU regulation on sensory properties of tomato sauce was detectable. It can be concluded that sensory marketing which stresses organic-specific sensory related product characteristics of organic tomato sauce would not be appropriate.

Apples: Apart from the appearance, which was not considered within the sensory analysis of the trained panel, no regulatory impact on the other sensory properties was detectable. Therefore, it is worth focusing on variety specific information in the communication of organically grown apples to the consumers rather than narrowing the emphasis on the requirements for organic fruit growing itself.

Regarding the use of ingredients of agricultural origin, a general impact due to organic farming practices was not obvious, but organic producers rather prefer other ingredients. For instance the kind of sweetening ingredients differed: more often organic producers used e.g. raw cane sugar and agave syrup for the production of cookies and fruit yoghurt, whereas conventional producers chose in most cases the further processed refined sugar. This, however, did not lead to an impact on the intensity of sweetness so that in general organic products did not show significantly differences in sweetness compared to the conventional alternatives.

Furthermore, the assumed impact of colouring and flavouring ingredients on appearance and taste respectively was observed. This

led to differing sensory properties for some of the tested product groups between conventional products and organic products which were produced according to private organic standards that prohibit the addition of colouring and flavouring ingredients (e.g. for strawberry yoghurts).

Recommendations for standard-setting bodies

The analysis has shown that the impact of standards restrictions on sensory properties should not be overestimated. However, when a revision of the EU regulation for organic food and farming is made, e.g. by restricting or not allowing certain substances or methods, it is important to verify, which positive and negative impacts might results with regard to sensory properties.

Private standard setting bodies have to make a choice - do they want to promote a specific quality label with specific additional requirements beyond the EU regulation, which might lead to different quality characteristics and variations of the products or is the aim to go for a high degree of standardisation? For a private standard setting organisation, which intends to develop its standards towards special quality, freshness and authenticity, there are a number of points to take care:

- It is important that the introduction of more restrictions in the standards, which might have significant consequences for the quality of the products, is done in dialogue with the industry.
- For product groups with distinct characteristics of the sensory quality different from conventional products, specific communication measures have to be envisaged both from the standard setters as well as from the food chain actors. Examples are: the non-use of flavours, non-homogenisation of milk, etc.
- In the future the introduction of more organically produced additives, starter cultures or organic yeast will have to be supported by consumer tests in order to verify if there is a different impact on the sensory properties, and if yes, in which way specific communication measures would be needed.

Market needs and solutions

Finally the ECROPOLIS results correspond to the development of marketing solutions for specific food products, which are adapted to sensory expectations and preferences specific to consumer segments.

To reach this approach a four step procedure was chosen:

- Evaluation of markets need along the supply chain;
- Qualitative consumer research;
- Quantitative consumer research;
- Marketing strategies.

This approach was driven by the question why consumers buy organic products and which role taste plays in their choice.

Why do consumers buy organic products and what role does taste play?

The question of why consumers decide for or against organic when buying food products has been a topic of consumer research for many

years now, as well as the subject of numerous studies. At least since the point when organic food gained a secure foot-hold in food retail and was thus increasingly bought also by infrequent and occasional buyers, the answers to this question have been extremely variable. This is due to the fact that "the organic consumer" as such no longer exists, and has probably never existed. Rather, there are numerous different types of organic consumers that may differ considerably in their experience with and their approach to organic food.

An examination of scientific studies on the motives of organic consumption in recent years showed a large variation in results. Some researchers assume that the consumer increasingly bases their choice of organic product on "selfish reasons", because they perceive e.g. a health benefit, they can identify an organic image, or they are driven by the expectation of a superior taste experience. Other researchers assume that the unselfish aspects such as environmental friendliness or the promotion of animal welfare remain highly important. For businesses, however, it is important to be clear about the motives driving the consumer to make sure that the products and the communication are targeted accordingly.

Results from quantitative consumer survey in ECROPOLIS project
As the results of the consumer research showed, the importance the consumer assigns to the different motives for organic consumption is highly country-specific. In the framework of an international consumer study, organic consumers in France, Germany, the Netherlands, Poland, Italy and Switzerland were asked why they chose organic food. The results paint a highly differentiated picture of purchase motives in each of the countries participating in the study

Overall, the health benefits of organic products are the most important reason for their purchase. This is particularly true for Poland and Italy. Only in Switzerland was support of animal welfare found to be a more important purchase motive. In contrast to many other studies, environmental protection was shown as an important motive. The perceived taste benefit compared to conventional alternatives was confirmed as a motive in all countries. However, in most countries this plays a lesser role than health, environment and animal welfare aspects. In Germany, health is in first place, followed by environment, animal welfare, and then taste. The motive that organic products are familiar from childhood is generally rarely mentioned as a criterion for purchase, and is only worth mentioning for the Polish organic consumers.

At first glance, these results show that the better taste generally has low importance for organic purchase motives. However, statistical methods (regression analysis) allow the indirect calculation of the motives of those who buy especially high or low proportions of organic products. Thus it can be examined whether the taste of organic is not in fact an important criterion and the sensory aspect thus represents an important driver of consumption behaviour. Here, the results of the ECROPOLIS consumer study also show that there are clear differences between the individual

participating countries. For example, the perceived taste benefit of organic products in Poland had a relatively high importance as organic purchase motive in comparison to the other countries. Nevertheless it could be identified as a driver of intensive organic consumption. In Germany, on the other hand, the perceived taste benefit had an intermediate importance as purchase motive, but was identified as the strongest influence on intensive organic consumption. Organic consumers in Germany, who buy a lot of organic products, cited the good taste particularly frequently as one of their main purchase motives. In turn, for those who seldom buy organic say better taste was not an important reason for them to buy organic. In France, however, good taste was stated neither as purchase motive nor did intensive and occasional organic buyers differ.

What conclusions can be drawn for organic marketing?

In Germany, better taste is rarely used in promotion, and very few businesses advertise the taste advantages of organic farming and production. Thus, taste is not a major purchase motive. The detailed analysis shows, however, that good taste is an important driver of intensive organic consumption

Producers therefore cannot afford to neglect the taste aspect and should use professional sensory research for the optimisation of their products.

The results of the ECROPOLIS project show that there is still room for improvement here for many product groups. Once the products have been optimised, this aspect should be strongly promoted

Consumer segmentation - a new sensory related typology of organic consumers

The steadily increasing relevance of sensory aspects of organic food products, as concluded by numerous studies, has been further confirmed by the quantitative consumer survey. The main objective of segmenting organic consumers based on their food related lifestyles was accomplished by building seven segments. These consumer groups have been characterized not only by socio-demographics and behavioural aspects such as shopping, cooking and eating habits, but also by organic food consumption parameters as well as sensory preferences and attitude towards sensory labelling. This reasonably new approach of considering sensory aspects when segmenting consumers enabled the deduction of sensory marketing strategies for companies in the organic food market.

In particular three segments (passionate cooks, gourmets with limited budget and speedy quality conscious consumer consumers) had a special interest in sensory labelling.

Sensory marketing -

One focus of the work was to filter out the most relevant strategic options for different stakeholder (target) groups. The starting point of these recommendations are conclusions taken from interviews with market actors in the ECROPOLIS project in France, Germany,

Italy, the Netherlands, Poland and Switzerland, which showed that companies follow different strategic approaches, depending of the level of professionalization. Companies can integrate sensory marketing on different stages (Obermowe et al. 2010), depending on the level of professionalization.

Independently of what stage a company or an organisation is with regard to sensory marketing - there are a number of strategic options to be considered with regard to product development and marketing communication measures, which are relevant not only for companies but also for other actors in the organic food chain.

Selecting marketing strategies

The information on consumer preferences collected in the six European countries suggest different marketing strategies and tools that may be applied by organic processors and retailers striving for a competitive position in the still growing organic food market. The following aspects should be considered for a sensory related marketing concept:

- Not all consumers of organic food are interested in high sensory quality. About 25 % of organic consumers build the core group for a sensory marketing strategy. They prefer a "natural taste", characterized by intensive flavours such as bitterness, sourness, and intensive aromas, handcrafted articles, and do not mind variation in colour and size when picking fruit and vegetables. To them flavour of food is the most important aspect. In line with this they show the highest willingness to pay for very tasty food.
- In general, organic consumers express a positive attitude towards new products and new taste experiences, which suggests a variety-driven innovation strategy as a promising differentiation approach for organic products.
- Sensory preferences of organic consumers differ significantly from country to country, which recommends a customization of products when entering in the international market.
- Communication strategies such as sensory labels or detailed information about sensory properties as well as tasting of products are well suited strategies for organic consumers, who are interested in sensory information and are willing to pay for better taste. In the detailed report on consumer research the strengths and weaknesses of different sensory strategies, that companies can use to target organic food consumers with high sensory preferences, are described in more detailed.

In general, sensory marketing strategies are not well implemented in the organic food sector although this market segment is built on consumers with greater preferences for differentiated sensory properties. Sensory attributes are an important element of organic marketing and a possible tool to create a unique selling proposition.

Improvement potential for optimized sensory quality of organic food to meet consumer expectations

Based on the differentiated sensory profiles of the different products in the six countries, the goal was to evaluate specific product improvement potentials. There are different ways to approach product improvement potential. In this project, the challenge was to manage six countries and six different product categories. To identify product specific improvement potential the following methods were used: Correlations, Flow Charts, Penalty Analysis, Internal Preference Mapping and External Preference Mapping

Product improvement normally is very product-specific, so it is difficult to draw general conclusions and of course the different strategies (improvement, imitation, differentiation) mentioned in the introduction have to be considered; it has to be clear where the company want to place itself on the market. Normally, to carry out a directed analysis to identify the product improvement potential, it is required to know already where one would like to reposition the product and it is necessary to fully cover the needed sensory space e.g. by producing/developing specific samples.

External Preference Mapping gives an overview on how the products are accepted by the consumers. In general, it was found that there is already at least one organic product per product group in every country, which can compete with the conventional leading product or even outclasses the conventional product.

The correlations help identify the drivers of like versus dislike. This contributes to develop improvement recommendations. Dependent on the choice of the products (not too heterogeneous regarding product- and process parameters) the correlations provide clear indication of the preferences for special attributes. To give an example, sunflower oil is very homogeneous product group, so here in every country, the project team found high correlation values for attributes like sunflower seed-like, nutty and hay/grains.

The Penalty Analysis was helpful to identify possible directions to improve products by detecting about which value the overall-liking of a product is reduced if a characteristic is considered as not "just about right". This analysis is based only on consumer data and is not useful to make generalizations because it is very product specific and has to be carried out for every single product separately.

Choice of products per country:

- At least 6 products were tested (min. 3 organic, max. 3 conventional);
- Products come from different regulations;
- The project focuses on domestic products;
- An organic market leader product was included;
- A conventional market leader product was included;
- Products with a high relevance for the organic market were selected.

The country analysis showed the following results:

Germany: In Germany, the organic products were preferred by heavy and light users of organic food except the salami group. The conventional salami market leader had a high influence on building taste preferences in this market segment.

Poland: In more processed products, such as cookies and tomato sauce, the consumers preferred a conventional sample.

Switzerland: In Switzerland in all product groups one organic product scored the best.

Italy: Except cookies in Italy the target group preferred an organic product.

France: The French market is driven from the conventional taste preferences, except sunflower oil.

The Netherlands: The Dutch market also seems to be more conventional driven. For salami and sunflower oil the selected target group of organic light- and heavy-users preferred an organic product, for yoghurt, cookies and tomato sauce a conventional product.

Product analysis:

Sunflower oil is the product group where an organic product was preferred in all countries. It is a product with a long tradition on the organic market. However in the Netherlands, the targeted consumer preferred a product with an intensive yellow colour but no taste impressions. The technological capabilities give no chance to produce such sun flower oil with an organic standard.

The yoghurt results show clearly, that in Germany, Poland, and Switzerland, semi-solid yoghurt with liquid on the surface led to lower preferences. Creamy products were preferred in all countries. This leads to the conclusion, that the sensory characteristics of semi-solid yoghurt need an explanation for those consumers, who are not used to this kind of consistency.

Except for Germany and Switzerland, where an organic product was preferred, in most countries, conventional cookies met the consumer expectations. Sweetness was one of the main driving attributes of sensory like. Nearly all conventional cookies had higher sweetener intensities compared with organic ones. It also met the inborn preference for sweetness. At present, high sugar amounts in sweet products lead to health problems in the population. Although producers of organic food mostly claim higher health value of their products, more efforts in sensory marketing are necessary explain sensory differences (e.g. through sensory product descriptions, tastings, etc.) to familiarize consumers with lower sweet intensities and higher intensities of other recipe component (e.g. oat). For some of the analysed cookies, a product optimization is necessary.

By tendency, among the tomato sauces as the second highest processed products, a conventional alternative was preferred in most of the countries. Only in Germany and Italy, an organic product was the test winner; in Switzerland tomato sauce hasn't been tested.

Regarding salami, consumers by tendency preferred the organic products. Differing to this tendency on the German market there is a very strong conventional market leader defining the sensory preferences also for the organic light- and heavy user. A darker product colour, affected by leaving out nitrite curing salt, has to be explained. In France also a conventional salami sample was the preferred product.

The apple market also shows a tendency of a higher preference for the organic apples. In Poland and France a conventional sample is the most preferred product. A product improvement in this product group is difficult, because region, weather etc. have a strong impact of the product quality. The sensory quality of preferred varieties can be integrated in the breeding of new varieties integrating further demands for the organic market (e. g. resistance).

It has to be kept in mind that in some product groups the best organic and the best conventional product scored not significantly different. The reasons could be product characteristics close to the conventional market leader or organic products with own character in a very good quality.

For each products and each country a specific evaluation was done. You can see as an example below a simplified summary for Organic cookies for Italy:

An example: Interesting facts about organic cookies in Italy:
Sensory characteristics and further details for Italy
Organic cookies with a sweet and honey-like taste and a fragmented texture are favoured. Cookies with a sweet taste and odour and a medium intensive fatty odour are preferred by Italian organic consumers. In contrast, high intensities of floury and grainy taste and odour as well as a high intensity of dryness, crispiness and hardness led to a disliking of the cookies.

On the Italian organic market oat cookies are not easily available. For this reason wheat flour cookies were analysed.

The EU regulation on organic food has only few restrictions for the production of organic cookies. The amount of baking agents and other additives is limited and only natural flavour is allowed. The Italian organic cookies analysed in the ECROPOLIS project are produced according to the EU regulation on organic food production.

Regarding the flavouring, all analysed Italian cookies, organic and conventional, are flavoured. The organic cookies are flavoured with a natural flavour, whereas one conventional sample is flavoured with an artificial flavour. No further information on the kind of flavouring used for the other conventional cookie samples is available. Artificial flavours are mostly much stronger in taste impressions than natural flavours.

All cookies are produced with baking powder, which has an influence on the consistency/mouth feeling, because cookies are less hard.

The different cookie recipes have the main influence on the sensory properties of Italian organic cookies. The influence of organic regulations is very low.

The taste of the analysed Italian cookies is mainly influenced by the kind of flour, sweetener, fat, spices, and flavours. As mentioned before, the variety of flavours have an impact on the flavour intensity. The consistency/mouth feel is influenced by the added baking agents.

Psychological influence/effect of labelling
There is no impact of the organic labelling on the Italian cookies (branded consumer test), an organic labelled product doesn't achieve different sensory preferences of cookies for Italian consumers of organic food.

Preferences of heavy versus light users

For Italian samples, there were no differences in the overall liking scoring found between regular and occasional consumers of organic food (heavy and light users).

Product information

A cookie is a small, flat, baked treat, usually containing fat, flour, eggs and sugar and other flavouring ingredients, such as spices, chocolate, peanut butter, nuts or dried fruits. There is a high variety of production processes, wherefore a Cookie is very heterogeneous in its product and process parameters. In this project, three types of cookies were regarded: short crust cookies, roasted cookies and hard cookies. Cookies are most commonly baked until crisp or just long enough that they remain soft, but some kinds of cookies are not baked at all. The softness of the cookie depends on how long it is baked and on the ratio of the ingredients to one another.

Database Organic Sensory Information System

A specific database called OSIS (Organic Sensory Information System) was developed and is available under <http://www.ECROPOLIS.org/osis.html>. This sensory data base is new and unique. It correlates sensory characteristics, influences of regulatory frameworks on the sensory properties, as well consumer expectations and understanding including specific communication. The main results of ECROPOLIS are summarized in OSIS, taking into account different target groups at different levels: at the first level, a product group specific short summary for consumers, retailers and SMEs are available in English, German, Italian, French, Dutch and Polish. A concise overview about specific sensory characteristics for the six chosen product groups in the six different countries is given, as well as important information about the consumer habits and sensory marketing for these product groups. OSIS enables a sensory journey through the participating partner countries with the different products to learn about the different country specific preferences.

At the second level more specific guidance for the practical implementation of sensory marketing and sensory analysis in the companies is given in form of fact sheets targeted to the retailers, SME and SME associations. The fact sheets are available in the six mentioned languages.

At the third level, all public detailed research reports are available for the interested audience. With this three step approach, it is guaranteed that a broad user group can be reached.

Dissemination and potential for product improvement

In the six countries, national workshops took place for direct dissemination as well as for a final discussion about the results and working documents developed for the different stakeholders. For

all evaluated project results and dissemination activities of ECROPOLIS, see <http://www.ecropolis.org>. Several project partners improved their products based on the ECROPOLIS research results. We expect that more processors will be able to improve their products and their sensory communication strategy with support of the OSIS database. Furthermore, the project is expected to push research on more products further, so that the OSIS database can be continuously expanded, especially with additional products.

ECROPOLIS has shown that for several product groups there is still a potential of product improvement, but this will also depend on knowledge of expectations of special consumer segments. Therefore, it is desirable that the research conducted in ECROPOLIS becomes the starting point for innovative technological improvements of sensory quality deficits. One way to put the innovative technological improvements into practice would be to link the quality research with agronomic field research, looking at the impact of choice of varieties and cultivation techniques on sensory properties.

Potential Impact:

POTENTIAL IMPACT OF THE ECROPOLIS PROJECT

ECROPOLIS has generated multiple potential impacts: Differences in sensory quality between conventional and organic products as reflected by consumer preferences were evaluated in cross-cultural context. Product improvement strategies were developed for different target groups (consumers, retailers, SMEs, SME-associations, researchers). For sensory characteristics, the research work of ECROPOLIS enabled to differentiate the sensory properties within the selected product groups (apple, salami, yoghurt, oil, cookies).

A consumer typology, based on the consumer's general sensory preferences and their perception of importance of sensory characteristics was worked out. Hypothesized linkages between regulations and sensory aspects were evaluated by correlating results. These linkages were confirmed to a large extent. All results are summarized in product group specific fact sheets on the OSIS website.

OSIS integrates results of the ECROPOLIS project (such as collected data, scientific findings, obtained knowledge and expertise, formulated recommendations) in a way that is potentially useful for different types of stakeholders. OSIS provides data and advice for various decision-making processes in organic food production, marketing and communication and support to various stakeholders with ready to use information.

It gives operators a focused and effective product development and product improvement process, or the basis for a specific communication strategy. The developed methodology can also be applied to additional and new product categories.

The developed training programs in all involved countries helped to implement the knowledge in the daily business of the companies and the SMEs for their education programs of their members. All activities to improve quite a number of organic products in their sensory quality, to develop specific products to the different consumer typology in respect of different cultures and so for better market success, besides aspects of price, packaging, product story. Furthermore the project helped to improve more generally the quality of organic products and to give advice on how to communicate differences that influence sensory quality.

Product improvement: As a result of this project some of the involved SMEs like Agrovision or TAST have already achieved improved market success with their products cheese and oat cookies. Their products were evaluated by the sensory analyses. In addition, in focus group discussion, consumer expectations on sensory properties on organic food were evaluated and also tested with the oat cookies. Based on those results product deficits were evaluated and improved in product development. The improved products replaced the existing product on the market. Already during the project period a better

market success was generated and with that a successful practical implementation of the project results.

As a first step, the sensory Database OSIS was set up with the three levels of Information to disseminate to the different target groups. Disseminating and facilitating access to science-based information has been one of the major objectives of ECROPOLIS but for a further optimal use of this huge volume of results additional dissemination work can and should be done and specific simplifications for the SMEs for the transfer of this knowledge into practice is needed. The national workshops showed the interest and the need for more knowledge on this topic but also the limitations in passing on general recommendations. Always the companies' specific situation needs also be considered.

Research in the ECROPOLIS Projects has generated many findings and recommendations in different areas and for different actors. We will summarise these by focusing on two areas, where strategic options can be developed:

- a) product development and improvement
- b) sensory quality communication strategies.

Product development

At a product development level a company or organisation can follow different strategies:

In general, a company might follow a product improvement strategy (optimize the sensory quality, e.g. when product mistakes are identified). Strategically, a company has two choices:

- Standardisation / Imitation strategy (product properties of the market leader);
- Differentiation strategy (e.g. with a more traditionally produced product).

The strategic decision to determine what product type for which target group the sensory quality is developed and promoted in the organic market, needs good knowledge of the attitudes, expectations and preferences of the different consumer segments in a specific market. The consumer segmentation model developed in the ECROPOLIS project provides first insights into these issues at European level.

Sensory quality communication strategies

The consumer testing showed several country-specific sensory preferences for all main product groups, which need to be considered for product development. These results are particularly relevant for the participating SMEs and SME-associations and other organic processors. They are reported in detail on the OSIS website. The following recommendations were derived from the sensory quality results and the consumer studies:

Recommendations for processors and SMEs

First of all, processors and SMEs should collect sensory information about their products through professional sensory testing in order to verify whether their products taste similar or different compared to other products (especially market leader products) in the market

and if these similarities or differences are liked by organic consumers.

The next step is to decide about the strategic product positioning: In general, the ECROPOLIS researchers conclude that organic products can taste differently from conventional products depending on the raw material, the recipe and the processing impact. Differences also come about from different producer companies and from different quality strategies for organic products.

A company can choose between two main strategies:

- (a) Standardisation / imitation strategy (follow product properties of the market leader products); or
- (b) Differentiation strategy (e.g. choose a more traditional/less industrial processing of the product).

The strategic decision to determine for which target group the sensory quality of a product should be developed and promoted in the organic market needs good knowledge of the attitudes, expectations and preferences of the different consumer segments in a specific market.

Consumer testing showed several country-specific sensory preferences for all main product groups, which need to be considered in product development.

A standardisation strategy might be a first step in entering the market to ensure a constant demand, however could be risky for some product groups in a longer term perspective due to competition by other companies. In this strategy, it is important to ensure appropriate standardised sweetness, spiciness and dryness as compared with conventional benchmark products. Communication measures can emphasise the most preferred sensory attributes in order to better attract specific consumer segments. In those countries, where organic labelling has not had a positive influence, or where it even developed a negative image for some products, attributes other than organic should be communicated.

In a differentiation strategy, more emphasis should be placed on communication of sensory differences. Furthermore, the use of specific ingredients or traditional recipes can be successfully supported by communication measures. How strong the organic origin will be communicated depends on the organic image of the product group in the respective country, as well as the presence of strong conventional brands.

For the differentiation strategy, we recommend consumer tasting events in shops and training for sales staff. For some product groups like apples or plant oils it may be interesting to introduce special labelling systems, e.g. indicating the taste for different flavour groups (e.g. sweet apples, slightly sour apples)..

Recommendations for SME- associations and standard setting organizations

Generally, product development is not a core issue for SME associations and label organisations; however guidance can be given to related companies about consumer attitudes and preferences (e.g. from consumer and sensory research).

In a differentiation strategy particular additional requirements in standards or Codes of Practice can be developed to support the differentiation (dialogue with industry necessary, studies of impact of standards change desirable). Other measures envisaged could be: taste awards, establishment of a sensory information system for market actors, information campaigns or tasting for product groups, in cases where the impact of standards are significant.

Recommendations for retailers

Retailers and retail chains can follow different strategies with regard to sensory quality:

In a standardisation strategy it is important to communicate the added value of organic farming in different areas (not only sensory quality) in particular for product groups, where organic food has a good image in the country. It is important that retailers give regular feedback to processing companies on consumer preferences to be used for product improvement.

In a differentiation strategy the retailer or retail chain can develop further retailer-specific requirements for different product groups to support differentiation (in cooperation with the processing industry, wholesalers and farmers organisations). Important other measures are: tastings at the point of sale; special communication system or labelling to highlight special tasty products at the point of sale.

Recommendations for training and educational institutions

In a country there are different institutions and organisations capable and willing to support the development of the organic market and of sensory marketing. In most cases, this is a task for SME associations and umbrella organisations to support their members in training and education. In general, information about professional sensory analysis methods and product improvement methods should be provided.

Recommended Strategic Research Agenda for sensory quality development and communication

From a commercial point of view, integration of the range of sensory quality attributes in product development and marketing has high potential in the market place. It will improve the added value of the organic products. The research and development ideas of this report provide the basis for achieving this.

One challenge in delivering commercially relevant results is to develop a commitment and interest in a mutually beneficial agenda with food businesses. Regular network meetings, exchanging knowledge

derived from research and the implementation of research that responds directly to business and consumer needs would help.

Research that improves understanding of what motivates consumers based on their diverse expectations, the development of new business models and the identification of new added values can all help bring together the currently rather disparate and fragmented business and R&D communities.

One of the key issues for research and development of product sensory research is to expand the research to other product groups and to other countries beyond the ECROPOLIS project. The analysis has shown that for several product groups there is still potential of product improvement, but this will depend on the expectation of special consumer segments. Therefore it would be desirable that the research started by ECROPOLIS could be the starting point for innovative technological improvements of sensory deficits, even by linking this quality research with agronomic field research into the impact of choice of varieties and cultivation techniques on the sensory properties.

List of Websites:

<http://www.ecropolis.eu/>

<http://www.ecropolis.org/osis.html>