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**D1.3.10 Guidelines for stimulating consumer innovative behaviour with respect to fruit innovations**

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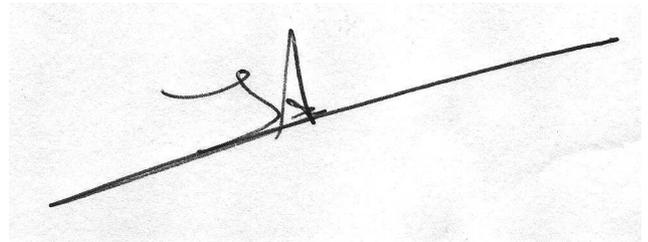
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<b>Dissemination Level</b>		
<b>PU</b>	Public	X
<b>PP</b>	Restricted to other programme participants (including the Commission Services)	
<b>RE</b>	Restricted to a group specified by the consortium (including the Commission Services)	
<b>CO</b>	Confidential, only for members of the consortium (including the Commission Services)	

## Description of deliverable

The present work was carried out within the Project 'Isafruit'. The strategic objective of this project is to increase fruit consumption and thereby improve the health and well-being of Europeans and their environment, by taking a total chain approach, identifying the bottlenecks and addressing them by consumer-driven preferences. The report is a deliverable of Workpackage 1.3 (INNOFRUIT) of Pillar 1, which focuses on the area of 'Consumer driven and responsive supply chain'. The aim of Workpackage 1.3 is to understand the determinants of the adoption of innovations by consumers, thus yielding insight into consumer behaviour with respect to new or modified fruit products and identifying opportunities for fruit innovation. As such, it will provide guidance for the development and marketing of future fruit product innovations. This deliverable (D1.3.10) first briefly summarizes the Deliverables 1.3.1 to 1.3.9 of WP1.3 and then describes guidelines for stimulating consumer innovative behaviour with respect to novel fruit products.

The provided insights into factors that influence consumers' willingness to buy the new fruit products, such as those developed in other pillars in the ISAFRUIT project, should be helpful for adopting these products to consumers needs and thus contribute to the overall strategic objective of ISAFRUIT, namely, "...to increase fruit consumption, searching the improvement of health and well-being of Europeans and their environment, by taking a total chain approach, identifying the bottlenecks and addressing them by consumer driven preferences.", by "the development of consumer-driven, efficient, responsive, and innovative supply chains for the growth of fruit consumption in Europe and for a competitive and sustainable fruit industry," which is the main goal of Pillar 1.

This deliverable was made in cooperation between the partners 38 (WAU), 10 (WUR-LEI), 24 (UPM), and 29 (AUA).

A handwritten signature in black ink, appearing to be 'Ivo A. van der Lans', written over a horizontal line.

Wageningen,

Ivo A. van der Lans  
Scientific coordinator of Pillar 1  
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# Guidelines for stimulating consumer innovative behaviour

## **Acknowledgement**

The present work was carried out within the Project 'ISAFRUIT'. The strategic objective of this project is to find ways to increase fruit consumption and thereby improve the health and well-being of Europeans and their environment, by taking a total chain approach, identifying the bottlenecks and addressing them by consumer-driven preferences. The present report is a deliverable of Pillar 1, which focuses on the area of 'Consumer driven and responsive supply chain'.

The authors want to thank the European Union for financing the ISAFruit project ([www.isafruit.org](http://www.isafruit.org)). In this way they support the cooperation of research with the fruit industry to gather and integrate insights in a whole lot of different aspects from farm-to-fork. These insights will help the fruit industry playing into consumer demands and needs, and improve in the price, quality, safety, availability and sustainable production of fruit and fruit based products.

More information: [www.ISAfruit.org](http://www.ISAfruit.org)



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# D1.3.10 Guidelines for stimulating consumer innovative behaviour

## Summary

This report presents an overview of the Deliverable 1.3.1 to 1.3.9 of WP1.3 and, from their conclusions, derives guidelines for stimulating consumer innovative behaviour with respect to novel fruit products. First every deliverable is briefly introduced. Second the methods used in every deliverable are described and discussed. Third, some major conclusions from the different deliverables are summarized. Finally, lessons learned from the research in WP1.3 and overall policy recommendations for future product development of fresh fruits and fruit products and communication strategies are formulated.

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# 1 Introduction

## 1.1 ISAFruit

Innovative Consumer Behaviour (INNOFRUIT) is one of the work packages (Work Package 1.3) of the ISAFruit project, in which several studies on consumer innovativeness and adoption of fruit product innovations have been carried out with the aim to developing consumer innovative behaviour in relation to novel fruit products. ISAFruit is a large European Integrated Project (IP), which consists of 25 work packages and over 60 participants. The mission of ISAFruit is to improve human health through increased consumption of fruit, produced in a sustainable way. The vision of ISAFruit is that better fruit quality and availability, a higher convenience of fruit and fruit products and improved consciousness of consumers leads to higher consumption. Higher consumption leads to increased health and well-being. The strategic objective of ISAFruit is to increase fruit consumption by taking a total chain approach and identifying bottlenecks and opportunities for a higher fruit consumption. ISAFruit started at the beginning of 2006 and will be finalised in 2010. The scientific and technological objectives are addressed by Research, Technological and Development (RTD) activities that are clustered in six pillars encompassing the total fruit chain and one pillar on Training and Dissemination (TD):

Pillar 1. Consumer driven and responsive supply chains.

Pillar 2. Fruit and human health.

Pillar 3. Improved appeal and nutritional value of processed fruits.

Pillar 4. Quality, safety and sustainability: improved post-harvest chain management.

Pillar 5. Quality, safety and sustainability: improved pre-harvest chain management.

Pillar 6. Genetics of fruit quality and implementation of better fruit cultivars.

Pillar 7. Knowledge management.

This report is the 10<sup>th</sup> deliverable (D1.3.10) of Work Package 1.3 (WP1.3) of Pillar 1. In the following sections, a description is given of Pillar 1 and WP1.3.

## 1.2 Pillar 1

Pillar 1 consists of five work packages each with its own objectives, but working together for an improved consumer driven fruit chain. WP1.1 EUFCON has the objective to describe consumption and fruit trends and to increase and improve interaction among consumers, producers, other supply chain actors and researchers. The objective of WP1.2 CONPREF is to understand the forces that drive consumer preferences with respect to fruit and fruit products in order to identify consumer segments to stimulate consumption. The objective of WP1.3 INNOFRUIT is to understand the determinants of adoption and dissemination of innovations by consumers and individual chain members. Using results from CONPREF, it yields insight into consumer behaviour with respect to new or modified products and identifies opportunities for fruit innovation. WP1.4 INNOCHAIN aims to identify the supply chain organization and management structure that maximizes supply chain innovativeness and performance, in terms of effectiveness and efficiency, in dynamic and/or developing markets. The objective of WP1.5 TRANSCHAIN is to collect and integrate relevant results from all ISAFruit work packages and pillars in order to develop strategies for innovation implementation and transition in the fruit chain aimed at increasing fruit consumption and discuss these strategies with the fruit industry, governments and (fruit) researchers. Results of WP1.1 EUFCON, WP1.2 CONPREF, WP1.3 INNOFRUIT, and WP1.4 INNOCHAIN are input for other pillars as well as for the development of innovation implementation and associated chain transition strategies performed in WP1.5 TRANSCHAIN.

### **1.3 Work Package 1.3**

The objectives of WP 1.3 in the ANNEX (120706) were:

1. To develop an integrated framework for understanding the determinants of consumer decision making with respect to fruit innovations.
2. To analyse the stages in the process of consumer acceptance and choice of new products, and the extent to which adoption is based on preference.
3. To classify consumers according to their attitude towards innovations.
4. To understand consumer choice in the presence of innovative fruit products.
5. To develop research guidance for researchers and the Fruit Industry with respect to future fruit product innovations.

The work package was divided into two major tasks and in total 10 deliverables.

The first task (Task 1.3.1) focused on consumer acceptance and choice of fruit innovations. A theoretical model of the antecedents and consequences of consumer behaviour with respect to new products was developed that elaborates and extends previous models based on a review of leading academic literature, and knowledge from WP1.1 and WP1.2. Consequently the model was validated by using data from European countries representative for the four regions. A choice experiment was designed and conducted that focuses on the influence of several marketing claims on the consumer adoption of novel fruits. Second, in Task 1.3.2, fruit product innovations of the past were investigated and results of the consumer survey and choice experiment were used to analyse and explain their success or failure. Results of WP1.3 gives evidence on how to improve consumer acceptance and choice of new products.

#### **1.4 Deliverable 1.3.10**

This deliverable (D1.3.10) looks back at the work in WP 1.3 INNOFRUIT, presenting its major conclusions, limitations, points of discussion, and recommendations. The results of WP 1.3 can contribute to more insight into consumer innovative behaviour and the successful adoption of fruit innovations.

#### **1.5 Reading directions**

This final report of WP1.3 consists of five chapters. In Chapter 2 the methodology used in Deliverable 1.3.1-1.3.9 will be discussed. Chapter 3 describes the major results of WP1.3. Chapter 4 focuses on lessons learned. Finally in Chapter 5 overall conclusions are drawn.

## 2 Discussion on methods used

In this chapter the methods used in Deliverable 1.3.1.-1.3.9 are discussed. First, a brief description of the deliverable is given. Furthermore, for every deliverables the methodology used, is discussed. For more specific information on the methods, the reader is referred to the method chapters of the specific deliverables.

### 2.1 Deliverable 1.3.1

#### *Description of the deliverable*

Deliverable 1.3.1 (Prosińska & Bartels, 2007) gives the results of a literature review on consumer innovativeness and consumer acceptance of innovations. Based on the literature review, a conceptual model has been developed (see Figure 1) on consumer innovative behaviour with respect to fruit and fruit product innovations.

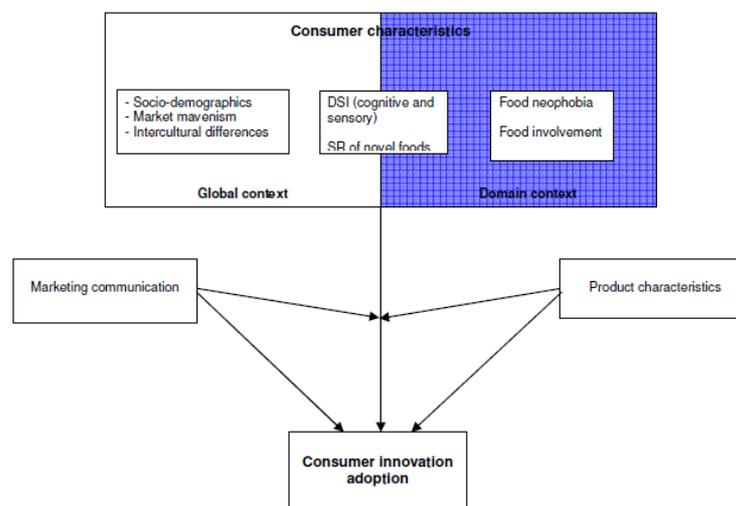


Figure 1: Conceptual model on consumers' innovation adoption in a European fruit context

#### *Description of the methods*

A literature review was conducted on consumer innovative behaviour. First, the development of the definitions in literature on consumer innovativeness was described. Second, important correlates were elaborated for a general context and for a food context. Finally, based on the review a conceptual model was developed. This model was the basis for the empirical studies in D1.3.2-D1.3.9.

#### *Discussion of the methods*

Although Deliverable 1.3.1 gives a broad overview of consumer innovative behaviour with its most important correlates, a more systematic approach could have resulted in a more thorough review. A systematic review is an overview of studies that contains an explicit statement of objectives, materials, and methods, and has been conducted according to an explicit and reproducible methodology (Greenhalgh, 1997). The results of the studies found in a systematic review, give a more thorough overview on the positive or negative correlations between several variables and innovative behaviour. In short, following the guidelines of a systematic literature review (see Bero & Rennie, 1995 or the Cochrane Handbook for Systematic Reviews of Interventions, 2006), the conceptual model in Deliverable 1.3.1 could have been somewhat stronger. More specific, a systematic review by Bartels & Reinders (2010) gives a conceptual model and propositional inventory for future research on consumer

innovative behaviour. In their model they describe several levels of innovativeness (from an innate characteristic to actual behaviour). Furthermore, Bartels & Reinders (2010) advise to focus on different predictors for the different levels of innovativeness. For example, they suggest that individual psychological characteristics have more impact on someone's innate innovativeness, while domains specific variables and demographics have more impact on domain specific innovativeness and actual innovative behaviour. Moreover, they suggest several moderators (e.g. emotions, self-efficacy, social identification) that could influence the relationship between the several levels of innovativeness. Although this systematic review could have attributed to the conceptual model in Deliverable 1.1.3, at the time, it was unfortunately unavailable.

Although the literature review carried out for Deliverable 1.3.1, a useful conceptual model was developed for a fruit context. There have not been extensive studies on consumer adoption behaviour in such a context (for exceptions see Bäckström, Pirttilä-Backman & Tuorila, 2004; Huotilainen, Pirttilä-backman & Tuorila, 2006), which seems to emphasize the relevance of the model in Deliverable 1.3.1 as input for the empirical research in D1.3.2-D1.3.9.

## **2.2 Deliverable 1.3.2**

### *Description of the deliverable*

Deliverable 1.3.2 (Zajac & Kraszewska, 2007) provides a list of fruit and fruit product innovations selected for the case studies. The research procedure resulted in a list of several innovation categories selected for case studies of examples of innovations.

### *Description of the methods*

The method in Deliverable 1.3.2 consisted of both the gathering of primary qualitative data and qualitative data analysis (coding, sorting and reducing/selecting data, completed by intra-case and cross-case analysis), according to the research scheme presented in Figure 2.

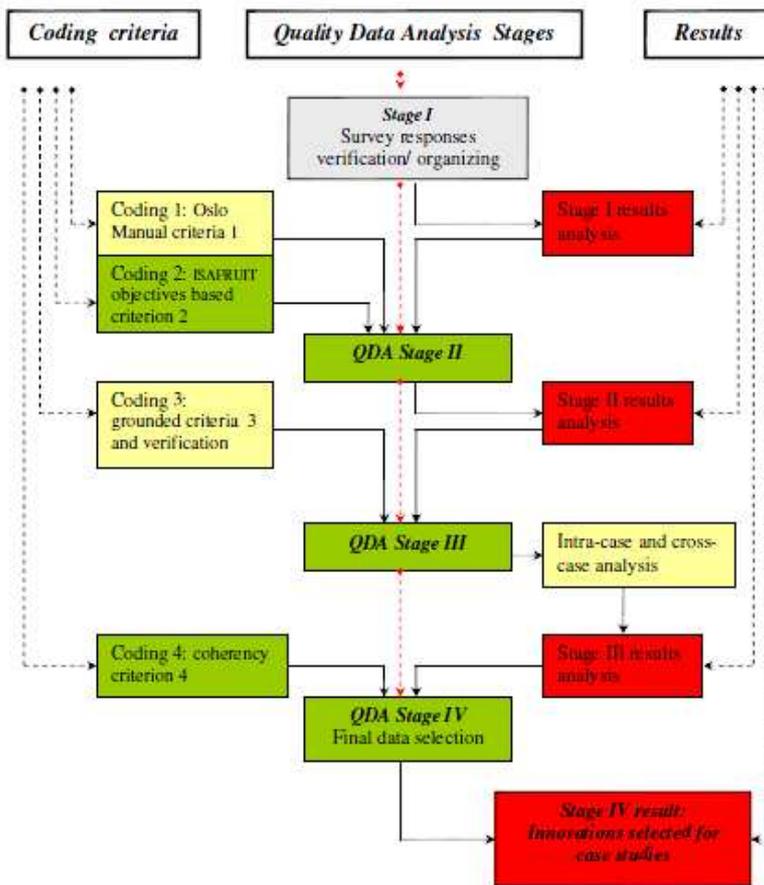


Figure 2: Research process (data selection) scheme

The method used for the selection of innovations for the case studies was according to a coding scheme that is well-recognized in the literature (Miles & Huberman, 1994). In total 60 experts on fruit in 11 EU countries provided 386 fruit and fruit product innovations. This list is not exhaustive, though gives a broad view on a variety of fruit innovations in the EU.

#### *Discussion of the methods*

Although a thorough coding scheme was used and a wide range of examples for fruit innovations was collected, the method used has some limitations. First, the experts who participated in the research were all part of the ISAFRUIT project. An advantage of this procedure was that data was collected from experts in a wide range of the fruit chain. However, one could have missed some particular kinds of experts who were not in this particular consortium. Since the ISAFRUIT consortium consists of broad variety of researchers on fruit and fruit products in several countries, it is plausible that the innovations mentioned were representative.

The second limitation mainly focuses on the different analyses in Stage I–IV. Although different researchers coded the innovations (independently), there still could be some subjective judgement on where how to code some innovations. For example, in coding Stage II, the researchers used two categories, A) can be recognized by the consumer versus B) cannot be recognized by a consumer. One might wonder whether experts in the field always know if consumers can recognize certain innovations or not. However, overall the coding was conducted in a thorough way based on general standard procedures.

In all, the examples gathered in Stage I and the list of innovations reported in Stage IV, seem to resemble a major part of current fruit innovations in the EU.

## 2.3 Deliverable 1.3.3

### *Description of the deliverable*

Deliverable 1.3.3 (Kraszewska, Zajac, Jasiulewicz, & Bolek, 2008) presents the results of focus group interviews conducted in four European countries. The focus groups (FG's) were conducted to fine tune issues implied in the theoretical framework (Deliverable 1.3.1). The aims of the focus groups were: 1. to identify characteristics of fruit innovations important for their adoption and 2. to analyze role of communication in the adoption process.

### *Description of the methods*

The FG's were conducted among respondents from different age groups, educational level and occupation. In total 102 participants took part in the FG's equally divided over the four countries. Before conducting the focus group research, research questions were formulated and an extensive FG guide was developed. Furthermore, in every part of the FG guide, goals and expected possible outcomes were formulated to align the FG moderators in the different countries. An outline for the FG guide is displayed in Table 1.

Table 1 Structure of FG Guide WP 1.3

Specification	1. Introduction
Product characteristics	2. Warming up
	3A. Investigation of the importance of specific innovative fruit product characteristics for adoption (including when, where, whom)
	3B. Perception of a number of fruit (product) innovations
Communication	4A. Different information sources and their importance for the adoption of new products (including when, where, whom)
	4B. Trustworthiness of information sources
	4C. Matching different ways of communication with different novel fruit products
	Word of thanks and farewell

### *Discussion of the methods*

Although the method and data collection followed a standard procedure (e.g., Marshall & Rossman, 1999), there were some limitations.

The most important limitation is concerned with the data collection. There were different moderators in different countries. Therefore, there could have been some differences in the level of experience of moderating FG's in the different countries. This was inevitable, since for example most Dutch do not speak Polish, and Greek do not speak Spanish. However, in every country the same FG guide was used after an extensive discussion between the researchers involved. More specific, in all FG's the same topics were discussed, which made comparison of the results in the different countries more easy.

In each country, the FG transcripts were summarized in English by local researchers using a coding scheme. These summaries were then analyzed by the core research team, which may have introduced some misinterpretations and biases in the results. Country or even FG specific characteristics have been easy to understand by the researcher(s), who moderated the FG's but more difficult to interpret by the core-team researchers who conducted the analyses.

Since FG's were conducted in a specific context, the accurate 'translation' into readable results seems to be a limitation of the study.

In short, although the FG's produced a vast amount of information on characteristics of important fruit innovations and the role of communication in adoption of innovations, one should interpret the results with some caution. Nevertheless, the qualitative results from the FG's provided a good starting point for more quantitative studies (consumer survey, choice experiment) in Deliverables 1.3.5, 1.3.6 and 1.3.8.

## **2.4 Deliverable 1.3.4**

### *Description of the deliverable*

Deliverable 1.3.4 (Kraszewska, Bartels & Onwezen, 2009) presents the selection and development of measurement instruments for the questionnaire on consumer innovativeness in the context of novel fruits and fruit products. The final version of the questionnaire was used for Deliverable 1.3.5 and 1.3.8.

### *Description of the methods*

Based on the constructs in the conceptual model in Deliverable 1.3.1, measurement instruments were obtained from the literature. Validated scales were used for most of the constructs. As some of these are domain specific, they were adapted to the context of this study, i.e. fruit and fruit products. The fruit (product) innovations and their product characteristics were included in the study based on earlier research in Pillar 1 (see D1.1.5 Trends in fruit consumption by Bartels et al., 2007; D1.3.2 List of selected fruit innovations by Zajac & Kraszewska, 2007; D1.3.3 Report on consumer focus group discussions by Kraszewska et al., 2008) and a literature review on specific product characteristics (e.g. Steptoe, Pollard, & Wardle, 1995). The questionnaire was validated in four countries in a pilot study among 282 respondents divided equally across countries.

In general, the conceptual model was the basis for the questionnaire. However, the choice for the specific product innovations and their characteristics was mainly based on more qualitative data from earlier work in ISAFRUIT.

### *Discussion of the methods*

Only 12 out of the original 386 innovations were used in the consumer survey. Although this is a small selection of products, the choice of the innovations was representative for the fruit (product) categories formulated in Deliverable 1.3.2.

Confirmatory factor analyses were conducted for each of the scales both per country and across countries. Reliability (internal consistency) was assessed using Cronbach's alpha. After validation, further changes were introduced to the questionnaires - mainly to the scales for the confirmatory factor analyses revealed some problems. Moreover, to ensure that there were no mistakes in the process of translation of the English master questionnaires into national languages, online versions used in the pilot study were back translated. This led to further changes in item formulation in the questionnaire.

Although validated scales were used and tested, still cultural differences and as a consequence differences in construct validity (between the four countries) could have influenced the quality of the final version of the consumer survey in a positive as well as in a negative way. Therefore, researchers from the four countries discussed the final version of the consumer survey for improvement based on the qualitative responses from respondents in the pilot study. One example is the deletion of an item that compared functional food with a nuclear plant (an

item from a social representation dimension of new food) due to misinterpretation by the respondents in at least two countries.

In sum, the pilot study seems to have improved the original questionnaire significantly.

## **2.5 Deliverable 1.3.5**

### *Description of the deliverable*

Deliverable 1.3.5 (Onwezen, Bartels, Kraszewska, Papoutsi & Briz, 2010) presents results of a consumer survey that was conducted in four European countries – Poland, the Netherlands, Greece and Spain. The consumer survey was conducted to validate the major part of the theoretical framework in Deliverable 1.3.1 (Prosińska & Bartels, 2007).

### *Description of the methods*

Respondents completed an online questionnaire consisting of (A) personal characteristics of the respondents, (B) importance ranking of product characteristics of fresh fruit and fruit products, (C) perception of specific novel fruits and fruit products in terms of product evaluations, (D) adoption of novel fresh fruit and fruit products, and (E) demographics. There were four different versions of the questionnaire. In each version, respondents were asked to evaluate three different novel fresh fruits or novel fruit products. In addition, in the first two versions respondents answered specific personal items in the context of novel *fresh fruit* and in two other versions respondents evaluated the specific personal items in the context of novel *fruit products*.

### *Discussion of the methods*

Respondents had to answer a lot of questions on most of the constructs in the conceptual model in D1.3.1. Therefore respondents could not evaluate all 12 products. This would have made the questionnaire unreasonably long. Since there were no significant differences between the four conditions on the dependent variables (e.g., buying behaviour for novel fresh fruit), the groups of respondents seeing different products seem to be equivalent and therefore results could be directly compared across those groups and across all products.

Several statistical analyses were conducted in Deliverable 1.3.5. *Descriptive analyses* focused mainly on mean scores (e.g., average buying intention, average product evaluation). For both fresh fruits as well as fruit products differences in mean scores were reported for the four different countries by conducting ANOVA's or t-tests. Furthermore *predictive analyses* were conducted by means of correlation and regression analyses per country. First, buying intention of a specific innovation (e.g., fruit salad mix) was used as dependent variable, while product evaluations (e.g., tasty, expensive), were used as independent variables. Second, the influence of the social psychological constructs from the conceptual model on actual buying behaviour (for both fresh fruit and fruit products) was investigated. Finally, actual buying behaviour was regressed on buying intentions and social psychological constructs.

Most of the analyses that were conducted were very straightforward. To actual test the conceptual model in Deliverable 1.3.1 as a whole, more sophisticated analyses could have been used (e.g., Structural Equation Modeling, SEM). This would have had a stronger theoretical value. However, this could have lead to too complex models that are difficult to be translated into practical implications for policy makers. However, since research questions were formulated as a guide line for the analyses in Deliverable 1.3.5, the results were adequate to formulate relevant conclusions for practice (e.g., relevant policy recommendations).

## 2.6 Deliverable 1.3.6

### *Description of the deliverable*

Deliverable 1.3.6 (Van 't Riet, Onwezen, Bartels, Kraszewska, & Briz, 2010) presents the results of the choice experiment that was conducted in Poland, the Netherlands and Spain in which the effect of several marketing claims concerning innovative fruits and fruit products were investigated.

### *Description of the methods*

The conducted choice experiment was designed to test the influence of marketing communication on adoption of novel fruits (see Figure 1). Based on an additional investigation of the literature, five marketing communication claims were selected, that have been found to affect consumer decision making. These marketing claims consisted of scientific information, social information, information about the naturalness of the product, information on the time-till-expiration and price information. Participants were asked to choose between two fruit innovations that differed only in marketing claims. This task was repeated for different pairs of marketing claims, provided in a random order.

### *Discussion of the methods*

The advantage of the current choice experiment is that consumers actually have to choose between products like they have to choose in real life. However, there are two limitations that are worth mentioning. First, forcing consumers to choose between two products on the basis of specific claims of a product assumes that consumers act consciously during grocery shopping for (fresh) fruits, since they have to read the claims and make choices based on this task. Research on human behaviour though suggests that a lot of consumers' choices are based on automatic behaviour or habits (e.g., Ouellette & Wood, 1998; Verplanken & Orbell, 2003). Therefore, the conclusions on conscious choice behaviour and the guidelines formulated based on these conclusions should be interpreted with some reservations.

A second methodological limitation is concerned with the marketing claims that were included in the choice experiment. The outcome will be that one or more of these specific five claims will have an impact or not, possibly leaving a wide range of claims untouched. However, based on the literature review, these claims seem to be among the most important for evaluating novel fresh fruits and fruit products.

In sum, conducting a choice experiment has some limitations. However, in combination with the consumer survey conducted in Deliverable 1.3.5 it gives a broad overview on important predictors of consumers' adoption of new fresh fruits and fruit products.

### *Analyses*

The effects of the five marketing claims on consumers' choice were investigated by means of a logistic regression analysis. These analyses were performed separately for the three countries, for the four different fruits and fruit products and for participants with low versus high scores on social psychological constructs that appeared to be important predictors of adoption behaviour in Deliverable 1.3.5. To investigate the effects of the marketing claims on people with high and low scores on the personal characteristics, a mean-split procedure was employed and the main effects of the marketing claims was assessed for participants below and above the mean of that characteristic.

## **2.7 Deliverable 1.3.7**

### *Description of the deliverable*

Deliverable 1.3.7 (Bakker, Benninga, Rakowska & Bartels, 2010) describes the results of an international case study on the success or failure of recent fruit innovations in the market place. First the selection of cases was described. Second the methodology of the case study analysis was discussed. Once the (un)successful fruit products were identified for every country, interviews with retailers were performed to obtain information about factors underlying the success or failure of an innovative fruit product. An innovation was defined as successful when it was still in the market at least two years after introduction. We used the results from Deliverable 1.3.2 (Zajac & Kraszewska, 2007) to make a first choice on product innovations, since these innovations were at least two year in the market. Based on a literature review, the success and failure of innovative product was analyzed according to six factors: product, price, place, promotion, competition and consumer.

### *Description of the methods*

The study was carried out in Greece, Spain, the Netherlands and Poland. The goal of the case selection process was to identify four products for every country, of which two are successful and two are non-successful. In total sixteen products were selected for the countries included in this research. The selection process was based on the inventory of fruit (product) innovations in Deliverable 1.3.2. Interviews with retailers (experts in the field) were conducted on why certain products were successful and why certain products were unsuccessful. Based on experience in earlier research, we expected that retailers were more easily approachable and were willing to give more information on a specific product or product category than producers. An extensive interview protocol was used to conduct the interviews.

### *Discussion of the methods*

The current method used in general seemed to be line with previous research on case studies (e.g., Eisenhardt, 1989).

However the case study research had some limitations. First, it seemed to be difficult to talk to experts in the field about unsuccessful products. Most of the case studies (13 out of 16) were on successful product innovations.

Second, although there was a detailed interview protocol based on the literature review, experts were not always open to discuss all questions in the protocol. This openness seemed to be different in the different countries, possibly as a consequence of different cultures in the different countries. In some countries retailers are more willing to give detailed information on why products are a success or a failure than in others.

Third, not only country culture itself but also the expertise of the interviewers could have influenced the results. In the different countries different interviewers were used with different levels of experience. This could also have an influence on the quality of the results.

In all, the case study research seemed to have acceptable results for drawing conclusions on successful and unsuccessful fruit products in the four countries

After the data collection both single-case and cross-case analyses were conducted. The single case analysis consisted of comparing the six factors influencing product success with the interview outcomes of one of the innovative fruit products.

Once the outcomes of the single cases were grouped in factors, it was possible to compare outcomes of cases in a cross case analysis. For each factor, outcomes were compared across cases (the innovative fruit products). Consequently, similarities and differences were identified among: product types (fresh fruit/fruit products), countries (the four countries included in the study) and successful products versus failures.

Although the analyses give an extensive overview of the different cases, one should keep in mind that the results are only qualitative. On the one hand, three researchers independently added value to the qualitative coverage of the results by discussing their individual interpretation with the group. On the other hand, more quantitative techniques could have been used to be able to draw more generalizable conclusions. A way to analyse this qualitative data is using a qualitative data management program like Atlas.ti (Muhr, 1997). For an example of an extensive analysis of qualitative data see Reiss, Gibson, & Walker (2005). The result of such an approach would have been more quantitative. As a consequence, these quantitative could have been used more easily for validating the results from Deliverables 1.3.5 and 1.3.6. In the current form, validation was only possible in a qualitative comparison.

In sum, a more thorough (quantitative) analysis of the case study results could have increased the quality of the original validation aim of Deliverable 1.3.7.

## **2.8 Deliverable 1.3.8**

### *Description of the deliverable*

Based on the survey data that were used in Deliverable 1.3.5 for testing the theoretical model from Deliverable 1.3.1, a consumer segmentation study was conducted in Deliverable 1.3.8 (Onwezen, Bartels, Kraszewska, Papoutsi, & Briz, 2010). Cluster analyses were performed for fresh fruits and for fruit products, based on the respondents' importance rankings of the product characteristics for novel fresh fruit and for novel fruit products.

### *Description of the methods*

Cluster analyses were performed using Latent GOLD 4.5 Choice program (Vermunt & Magidson, 2005). Carrying out the analyses, the demographics age, gender, country, education and income were included as so-called concomitant variables. These concomitant variables contribute to the identification of the clusters. To find the optimal amount of cluster alternative models were estimated. The optimal number of clusters was identified with the use of the CAIC value. According to Vermunt (2003), the model with the lowest CAIC value is the model with the best trade-off between model fit and parsimony. This procedure resulted in four clusters. In the further analyses, these four clusters (consumer segments) were used.

### *Discussion of the methods*

Although in general the four consumer segments seemed to be distinct and regular procedures were used, some limitations concerning the conducted analyses could be formulated.

First, the results from the cluster analysis in general are dependent on the choice of variables included. For the segmentation study consumers' ranking of important product characteristics was used. As a consequence, this obviously influences the results. However, using consumers' evaluation of product characteristics as input for cluster analysis has proven to be a useful tool for consumer segmentation in a food context (Ares & Gámbaro, 2007; Honkanen, 2010; O'Connor et al., 2005, 2006).

Second, only three of the four consumer segments could be clearly defined. One segment did not consist of a homogeneous group of consumers (like the other three segments). Also, the CAIC values suggested that the heterogeneity in this segment did not derive from the presence of smaller homogenous subgroups (which would have suggested a solution with more than four segments). It would have been more clear when this heterogeneous consumer segment was excluded. Then, further analyses could have been conducted only on the more obvious consumer segments, analogous to procedures for singling out random responders in a separate segment (see SAS/STAT® 9.2 User's Guide, 2008: Chapter 38, The GLIMMIX Procedure).

However, in sum, based on the current segmentation study general as well as segment-specific recommendations for product development and marketing strategies could be formulated.

## **2.9 Deliverable 1.3.9**

### *Description of the deliverable*

Based on the case study data in Deliverable 1.3.7, a list of characteristics for future fruit innovations was reported in Deliverable 1.3.9 (Bakker, Benninga, Rakowska, and Bartels, 2010). Recommendations for future product development were divided into suggestions for fruit producers, retailers and policymakers.

### *Description of the methods*

The method and data collection for the case studies, on which the list of characteristics in D1.3.9 are based, were already described and discussed in Section 2.7.

### *Discussion of the methods*

The recommendations based on the qualitative data could have been more thorough. However, since the data used for these recommendations were qualitative one could not expect more quantitative conclusions. In general, Deliverable 1.3.9 seemed to be focused more the application for practice of what one has learned from the results in Deliverable 1.3.7. More specifically, although there are clear links with earlier deliverables in WP1.3, the translation into policy recommendations could have been somewhat more extensive. In the next chapter, we will therefore elaborate more on the results in the direction of policy recommendations.

## 3 Major conclusions on consumer adoption behaviour

In the former chapter the method and analyses were briefly discussed for every deliverable from WP1.3. With the limitations of the methods used in mind, the current chapter focuses on some major conclusions on consumer adoption behaviour in the context of novel fruits and fruit products. Every section presents the results of one of the deliverables of WP 1.3. In Chapter 4, some general conclusions will we drawn based on the results presented in Chapter 3.

### 3.1 Deliverable 1.3.1

Deliverable 1.3.1 presented a conceptual model based on an extensive literature review as input for the empirical studies in WP1.3. The variables included in the model appeared to be important correlates of adoption behaviour. The main findings from the model were:

- Important consumer characteristics in a general context are intercultural differences between consumers, market mavenism, and to lesser extent socio-demographic characteristics.
- Important consumer characteristics in a food context are domain specific innovativeness, social representation dimensions of new food, food neophobia and food involvement.
- Marketing communication seems to be an important social environmental factor that influences consumer adoption behaviour.

### 3.2 Deliverable 1.3.2

Deliverable 1.3.2 presented a list of innovations that were mentioned by researchers from natural science and social science in the fruit context in several EU countries. Deliverable 1.3.2 offered a wide variety of fruit innovations that could be divided into the following main categories:

- **Convenience** (including such sub-categories as: *packaging, fresh cut fruit, fresh/prepared/ processed fruit and shelf-life*): any innovation that makes fruit or fruit products less time- and less work-consuming, when prepared and eaten, or more convenient, easier to buy, carry, store and consume; also any innovation that makes the shelf life (guaranteed optimal quality) of fruit or fruit product longer.
- **Health** (including such sub-categories as: *functional foods, organic, natural, allergy and diet*): any innovation that makes the fruit or fruit product health-promoting, and/or disease preventing, and/or will be adjusted to the needs of people suffering from different illnesses e.g. allergy, overweight, diabetes.
- **Differentiation (variation)** (including such sub-categories as: *snacks, new kinds of juices and drinks, seasonal availability and new kinds of fruit*): any innovation that makes the range of fruit and fruit products wider, e.g. new kinds of fruit, new kinds of juices and drinks.
- **Target group**: any innovation that provides or adjusts fruit or fruit product to the needs of a certain target group.
- **Information** (including such sub-categories as: *promotion, origin, labelling - only if not required by regulations*): any innovation that makes the information about the fruit or fruit product, its origin, its characteristics, quality, easily available to the consumer; that enables product tracking and tracing.

- **Sensory characteristics:** any innovation that changes sensory characteristics: taste, smoothness, colour, appearance.
- **In home/out of home** (including such sub-categories as: new market place, availability meant as location): any innovation that enables the consumer to consume fruit or fruit products in home and/or out of home, e.g. at work, schools, on the go, at gas stations, cafés/bars, restaurants, hotels..
- **Quality:** any innovation that improves or produces new, higher quality of fruit or fruit products, e.g. premium quality.

In the final phase of coding the following innovation categories were formulated as possible input for the focus groups in Deliverable 1.3.3 and the consumer study in Deliverable 1.3.5:

- Packaging (e.g. new individual packaging, smaller package and bottle sizes, soft fruit packaging, packaging assuring longer shelf-life of fruit and fruit products) represents a *convenience* category
- Fresh-cut fruit, salads, fruit slices represent a *convenience* category linked with *differentiation*.
- New fruit drinks (e.g. fruit juices mixed with milk products, with vegetable juices, with other drinks, with ice tea, with herbal extracts) represent a *differentiation* category.
- Fruit juices with added vitamins represent a *differentiation* category linked with *health*.
- Functional fresh fruits and fruit products containing e.g. antioxidants represent a *health* category.
- Small size fruit for children represent a *target group* category.
- Labelling e.g. an organic label represents an *information* category.
- New tastes or taste combinations e.g. new varieties of fruit, new tastes of juices and fruit products represent a *sensory characteristics* category.
- Vendors selling fruit represent *in home/ out of home* category.
- High quality fruit and fruit products sold at higher price represent a *quality* category.

### 3.3 Deliverable 1.3.3

Deliverable 1.3.3. presented the results of the focus groups in the Netherlands, Spain, Greece and Poland. The following main conclusions are divided into: the definition of fruit innovations, the importance of product characteristics, the role of communication and the role of intercultural differences.

#### **Fruit innovation definition**

Consumers in the different focus groups did not perceive fruit innovations as one product category but discerned different sub-categories and form different attitudes toward each of them. The identified sub-categories of fruit innovations are: fresh fruit, prepared fruit, processed fruit, radical innovation, product differentiation and genetically modified (GM) products. For each of those groups, different product characteristics seem to play a role.

#### **Product characteristics**

- Characteristics of fruit (product) innovations are important for adoption of fruit innovations
- Fresh fruit: Healthiness and good sensory characteristics of fresh fruit are the main reason for consumption of fresh fruit. Lack of convenience at purchase, transportation and consumption hinders adoption of novel fresh fruit.
- Prepared fruit: Convenience, freshness, good sensory characteristics, safety, packaging and price are the most important characteristics determining innovation adoption.

- Processed fruit: The characteristic which positively influences adoption of processed fruit innovations is most of all convenience (within convenience also packaging), whereas production methods, (low perceived) quality, (low perceived) healthiness and bad sensory characteristics have a negative influence.
- Product differentiations (imitative innovations): (Low) level of novelty and price are the most relevant issues in adoption of imitative innovations.
- Radical innovations: (High) level of novelty, lack of information on product safety and healthiness and price are the determinants of radical innovations adoption.
- Healthiness and safety are the main characteristics influencing product evaluation of especially unfamiliar products.

### **The role of communication**

- Communication (both formal and informal) was found to influence processes of innovations adoption. According to the respondents in the focus groups, proper information about novel aspects of innovative products decreases the perceived risk of adoption. Lack of such information usually results in negative evaluation of the innovative products. Lack of information about such important characteristics like safety and healthiness (which in case of fruit products often related to the production methods - i.e. fruit growing and fruit processing) seems to be especially harmful in case of radical innovations (where the level of risk is relatively high).
- Ingredients, nutritional value, product origin and production methods are obligatory information on the product for both healthiness and safety.
- For different innovative products different aspects appeared to be doubtful (risky) for participants, therefore requiring different information both in terms of content of the message and source of information.
- The role of communication seems to be dependent on cultural differences – consumers in some countries seem to have more close relations with relatives. Therefore informal communication plays more important role in these countries, whereas in other countries dependent (professional) advisors are valued more.

### **Intercultural differences**

The focus groups revealed intercultural differences between the countries. Spain and Greece seem to represent southern markets well, whereas the Netherlands and Poland seem to be representatives of northern markets. Figure 3 gives a summary of the cultural differences that appeared from the focus groups.

<b>Northern European markets</b>	<b>Southern European markets</b>
Both fresh and processed products are consumed daily.	Strong preference toward fresh fruit.
Consumers are used to eating both fresh and processed fruit.	Negative perception of processed fruit due to its' lower perceived quality, healthiness and sensory characteristics.
Some preference toward inland products, less familiar with exotic fruit.	More open for fruit from foreign countries, more experienced with exotic fruit.
Fruit are purchased both in the supermarkets and greengroceries.	Purchase of fruit is a social activity; recommendations of fruit sellers are very important and appreciated. Buying in the supermarkets is criticized (limited possibility to touch and watch carefully each fruit).

Figure 3 Summary of the cultural differences

### 3.4 Deliverable 1.3.4

Deliverable 1.3.4 focused on the development of the questionnaire for the survey into consumer innovativeness in the context of novel fruits and fruit products. The questionnaire was based on the conceptual model in Deliverable 1.3.1. For the theoretical constructs in the model validated scales were used to develop the current questionnaire. With regard to the specific product characteristics, the input from Deliverable 1.3.3 and a literature review was used.

The following characteristics were evaluated as important and therefore included in the consumer survey: taste, price, convenience of consumption, healthiness, newness, availability, attractiveness, safety, naturalness, and advantage as compared to regular fruits.

The product categories that were used for the consumer survey were mostly based on the results from Deliverable 1.3.2 Each of the categories represented specific type of product with one or more distinctive qualities: products with convenient packaging, new fruit drink (new taste, new mix of tastes, new packaging), a fruit juice with added vitamins, a functional fruit (product), a product with distinctive label (organic production), or a high quality product. Some categories consist of just one but for some reasons important product. Such special products identified in Deliverable 1.3.2 were fruit vending machine and fresh cut salad.

Finally, the following products were selected for the consumer survey for fresh fruits: GM environmental friendly apple (genetic modification), Organically produced apple (distinctive label), Mini nectarines without stone (convenience), Fruit vending machine (new distribution channel), Cholesterol lowering peach (functional food), and Pitaya (exotic fruit). For (processed) fruit products the following products were selected: Organic fruit mousse (distinctive label), Cholesterol lowering orange juice (functional food), Fruit salad mix (convenience), Pitaya juice (exotic fruit), Prebiotic dried fruit (functional food), Nectarine chips (convenience).

### 3.5 Deliverable 1.3.5

Deliverable 1.3.5 was concerned with the consumer survey. First for product characteristics, the following main conclusions can be drawn:

- Health and taste were the most important product characteristics for fresh fruits and fruit product in all countries.
- In general the same product characteristics were rated as important and the same product characteristics were rated as unimportant for fresh fruits and fruit products.
- Consumers valued healthiness, taste, price and safety of the new product the most and familiarity, convenience to consume, having a good brand, locally produced and a product looking appealing the least.
- In general, product innovations related to convenience aspects (mini nectarines and fruit mix salad) and exotic fruit innovations (pitaya and pitaya juice) seemed to be the most appealing to the respondents.
- A new purchase channel (a fruit vending machine) seemed to be relatively unattractive to all consumers.
- The twelve product innovations were evaluated differently on the product evaluation aspects.
- Consumers from different countries perceived the product innovations differently. They scored distinct on the product evaluations.
- For each of the four countries taste and attractiveness are important predictors of the acceptance of fruit innovations. These product evaluations forecast the buying intentions of multiple fruit innovations in all countries.
- Different marketing strategies seem to be the most applicable to the different product innovations in different countries. In addition, some product innovations seem to have similar predictive characteristics over countries.

Concerning consumers' personal characteristics the following main conclusions can be formulated:

- Suspicion towards new foods, childhood habits in eating fruits and opinion leadership concerning fresh fruits and fruit products significantly impact the actual adoption of fruit innovations.
- The effects of the psychological constructs do not differ for fresh fruits and fruit products. Thus psychological characteristics in the specific domains of fresh fruit and fruit products have a similar impact on the actual adoption behaviour.
- The social representation dimensions suspicion and natural and childhood habits have an interaction effect with country on the actual adoption of novel fruits, such that the strength of this effect on the actual buying behaviour of new fruits differs between countries.

Finally, based on the results of D1.3.5 the following conclusions concerning the different countries could be drawn:

*The Netherlands* Dutch consumers seem to value tastiness, price, the way a product looks and the convenience of a product. Naturalness of fruit is valued relatively low. These consumers are the least innovative with regard to buying intention towards the fruit innovations. In addition, Dutch consumers are less willing to buy fruit product innovations compared to their willingness to buy fresh fruit innovations. They also perceive the fruit product innovations as less positive than the fresh fruits. Finally, better than regular is a product evaluation that has an impact on the adoption of multiple fruit innovations for the Dutch consumers.

*Greece* Greek consumers rate the safety and naturalness of a product relatively high. They especially value the price of fruit innovations. Greek consumers are more willing to buy fresh fruits than fruit products. Moreover, they are more willing to buy organic fresh fruits compared to the other countries and less willing to buy GM and functional fruits. Greek consumers evaluate the product innovations the most negative compared to the other countries. They evaluate the innovations in general as less natural, novel, healthy, safe and tasty. Better than regular is a product evaluation that has an impact on the adoption of multiple fruit innovations for the Greek consumers.

*Poland* Polish consumers value the way a product looks like relatively high. They are the most innovative in their acceptance of fruit innovations, such that they are most willing to buy all fresh fruits and fruit products. Polish respondents score the product innovations lower on easy available indicating that their situation is quite different in relation to product innovations available on the market. In addition, they evaluate the product innovations more as being better than regular, novel, exclusive and tasty.

*Spain* Spanish consumers rate taste and familiarity of fruit as relatively important. In comparison with the other countries they perceive the product innovations as more average concerning the product evaluations. For the Spanish consumers the evaluation of expensiveness predicted the acceptance of multiple fruit innovations.

### **3.6 Deliverable 1.3.6**

Deliverable 1.3.6 presented results of the choice experiment. Based on the results, the following main conclusions could be formulated:

- Scientific information about the health benefits of innovative fruits and fruit products, social information about the reactions of other consumers to the products, information about the naturalness of the products, information about time till expiration and information about price can all influence consumer choice.
- Price information was the most important driver of product choice.
- Time till expiration was in general the least important driver for consumers' product choice.
- Results were broadly similar in the Netherlands, Poland and Spain, with the exception of time till expiration.
- Time till expiration had positive effects on product choice in the Netherlands and Spain (products with longer shelf life were more attractive), but no effects in Poland for the GM apple, the cholesterol lowering peach and the dried black currants, and a *negative* effect in Poland for the cholesterol lowering orange juice.
- Another difference between countries was the fact that naturalness was particularly important for Polish consumers. In Poland, naturalness had the strongest effect on product choice, even larger than price. This could explain the negative relationship between time till expiration and products choice.
- Concerning consumer characteristics, time till expiration and price were particularly important to those consumers who are not very involved in their food choice and were not very interested in the intrinsic qualities of food and fruit products.
- Scientific information had a larger effect for participants with high rather than low food involvement and domain specific innovativeness.
- The effect of information on naturalness was larger for participants with high versus low domain specific innovativeness.

### 3.7 Deliverable 1.3.7

Deliverable 1.3.7 described the results of the case study research. The following main conclusions could be drawn from the study:

- The case study findings confirm the ISAfruit project assumption that fruit product innovations may have some potential to increase fruit consumption.
- According to the retailers involved in the study, product characteristics have the biggest impact on success.
- Health, convenience and taste play the most important role in influencing consumers' choices.
- Innovative taste does not implicate automatically a successful product. If the taste is too rare (eccentric) to consumers, they could create negative associations towards the products. In the end, this could have a negative impact on product adoption.
- The claims on the package (e.g. health, convenience) should match the characteristics of the fruit product. For example, consumer perceptions concerning the apple chips (which could be perceived as regular chips), did not match the health claim of the producer.
- The scope of product innovation seemed to be more limited for fresh fruit than for fruit products, because it is more difficult to obtain a unique product in the former category.
- Based on the retailers' opinion, two consumer groups could be defined: 1) a group that appreciates only well-known, classical taste but accepts some innovative characteristics like for example increase in convenience or health, and 2) a group that appreciates and accepts improvements or novelties in different product characteristics.
- Retailers most often do not know the producers' target group for the innovative product.
- A premium pricing strategy was mostly justified by offering consumers innovative products with added value such as convenience, better taste or added health, in comparison with competing and substitute products.
- A premium pricing strategy was caused by high cost price, which limits the potential consumer group.
- Fruit products were generally promoted either by the retailer or by the producer through conventional mass media techniques.
- Fresh fruit products were often promoted by retailer only.
- The introduction period of innovative product is crucial for the success of products. The first months seem to be especially decisive. When the sales of the innovative fruit product are below expectations, retailers may quickly give up selling the product.
- In general, producers' strategies concerning product introduction are unknown to retailers.
- Successful products have a prominent position in the shop
- Specialty shops pay attention to positioning in a much lesser degree than grocery shops.

### 3.8 Deliverable 1.3.8

Deliverable 1.3.8 described the results of the consumer segmentation study. The following main conclusions could be drawn from the study:

- Based on the importance rankings for the characteristics of fresh fruits and fruit products, three clear consumer segments are identified, *Average Joe*, *Naturally conscious consumers*, and *Health oriented consumers*.
- There was a fourth more heterogeneous group of consumers who could not be clearly interpreted as one group.
- Country proves to be important in the identification of the consumer segments for fresh fruits and for fruit products.

- The different consumer segments can be used to develop cross cultural communication strategies to market fruit innovations.

Concerning the specific segments, the following could be concluded:

- The *Average Joe* segments for fresh fruits and fruit products both ranked taste, price and health as the most important characteristics, followed by looking good, convenient and safe. They attach the lowest importance to natural, familiar and a good brand. Both segments consist of many Dutch consumers and very few Greek consumers.
- The *Naturally conscious consumers* also reveal comparable results for fresh fruits and fruit products. Natural, healthy and safe are the most important for these consumers. They attach a medium high importance to taste and price. The other characteristics are relatively unimportant for these consumers. Consumers in these segments are not Dutch, but are mainly from Greece, Poland and Spain.
- The link between the *Health oriented consumers* of the fresh fruits and fruit products is less clear. Both consumer segments attach high importance to healthy, taste and safe. Natural is more important for the consumers in the importance rankings of the fruit products and price is more important for the importance rankings of fresh fruits.

### **3.9 Deliverable 1.3.9**

Deliverable 1.3.9 was based on the case study research in Deliverable 1.3.7. Below the most important policy recommendations are formulated. The recommendations are divided into suggestions for industry (e.g. fruit producers, retailers).

#### **Recommendations for industry**

- For a more successful product introduction, producers could test whether consumers accept the new characteristics of the innovative product.
- More specifically, a new taste should not be too radical, since taste seems to be the most crucial aspect concerning consumers' acceptance of innovative product and in general consumers do not seem to want radical taste changes in fresh fruits or fruit products.
- In line with the previous, a product claim should be easily recognizable for consumers.
- Producers could put more effort in informing the retailer on target groups of the product. Furthermore, producers and retailers should cooperate in carrying out promotions. At least, they should communicate about the target group and about general outlines and time of their promotions.
- When introducing a product with a premium price strategy, the added value should be made clear for the consumer.
- Both producers and retailers should take into consideration the fact that they have to allocate sufficient financial resources to support the new innovative product within its first several months on the market, as this time can be a prevailing factor in some cases.
- Retailers could improve their promotion campaign when they are compatible and complementary with producer's campaign. This could also lead to an increase in efficiency of financial resources allocated to the promotion.

## 4 Lessons learned

The multi-method sequential approach used in WP1.3 seemed to be appropriate to come up with some consistent results. Below some of the most important lessons learned will be dealt with.

### 4.1 General lessons learned on product characteristics

A first lesson learned is that explaining consumers' adoption of new fresh fruits of new fruit products is dependent on a wide range of product characteristics, consumer characteristics and social environmental characteristics. In this respect, not only developing qualitative better products itself but also insight into consumer perceptions of these products will be important. Consumers in general already seem to know that consuming fruit is healthy and they are willing to adopt new fruits if they have some additional value. Sensory characteristics are certainly important, but experienced as a pre-condition. In other words, the general consumer seems to expect a tasty, good looking, reasonably priced product. One could argue that future research should not focus solely on technical product development. Besides focusing on product innovations, process innovations and organizational innovation, implementing marketing innovations seems to be as important for successful adoption of new products, since, consumers mostly perceive only product and marketing innovations (for an extensive explanation of the four types of innovations, see Oslo Manual, 2005).

From the results among the ISAFRUIT researchers (list of innovations), the results on the focus groups, the consumer survey and consumer choice experiment and the case studies among retailers, there still seems to be a gap between the different stakeholders in the chain. Producers could put more effort in gaining information on what retailers do and the other way around. For example, what are retailers' target groups and how could producers concentrate more on these target groups in their product development activities. Consumer wishes are complex and differ between countries and consumer segments. More specific knowledge on consumer segmentation at the producer level could increase the acceptance of specific new fruits and fruit products (see also Deliverable 1.4.7, 2009, by Hiller, Zimmermann, Wiersinga, and Trienekens for a description of how firms in the fruit industry can collaborate to form innovative and responsive fruit supply chains).

In short, product characteristics are still important. In general, consumers (qualitatively or quantitatively) value taste, health and convenience as most important. New product development should keep these product characteristics in mind. For example, exploring differences in the evaluation of sensory aspects of fruits between different consumer segments (e.g. taste, juiciness, aroma, sweetness, and firmness) could also improve the acceptance of innovative fruits and fruit products. Therefore, (international) consumer tests on these sensory aspects should be part of new product development for fresh fruits and fruit products,

Besides product innovation, researchers and industry should keep in mind that there are three additional main types of innovations: process innovations, marketing innovations and organizational innovations. While WP1.4 INNOCHAIN mainly focussed on process and organizational innovations, WP 1.3 INNOFRUIT gives a better understanding of possible marketing innovations besides product innovations. For example, Deliverable 1.3.5 and 1.3.8 give more insight into what kind of product innovations are most attractive and how specific consumer groups differ in the way they would like to be approached. *Average Joe* accepts a different message than a *Naturally conscious consumer* or a *Health oriented consumer* for the same product to be interesting to them. Furthermore in the choice experiments (Deliverable 1.3.6) show that different product messages appeal to consumers in different countries and that optimal messages can be different for different products.

A main lesson from WP1.3 INNOFRUIT is that on the one hand, one could say that it is difficult to compare apples and peaches, since consumers perceive different characteristics important for both products. On the other hand, also consumers perceive certain characteristics equally important for both products.

An example of the former is that a GM apple with non-allergic properties is not the same as a functional food like a cholesterol-lowering peach and that consumers in the Netherlands perceive these products differently than consumers in Spain. A GM apple has to be mainly perceived as natural to have positive buying intentions. A cholesterol lowering peach needs to be perceived as healthy and better than a regular peach to have higher willingness to be bought. Furthermore in general, buying intentions for a GM apple are lower than a new functional peach. Even if both products are presented in a way to consumers that they claim to taste the same as regular products. Apparently, one (additional) functional value of a fresh fruit is not the same as another.

An example of the latter (compare apples with peaches) is that overall the most attractive products were associated with convenience (mini nectarines and fruit mix salad). The list of innovations from the technical researchers in Pillar 2-6, the focus groups as well as consumers in the quantitative studies seemed to agree with convenience products being (most) important. Both, product evaluations as well as buying intention were positive for most fresh fruits and fruit products. The consumer segmentation study revealed that even the GM apple and a radical innovation like a new purchase channel seem to have positive buying intentions among consumers, when targeted with the right marketing strategy. Moreover, taste, health reasonably priced and safety seem to be important consumers' motives for both new fresh fruits and for new fruit products.

#### **4.2 Specific lessons learned on product categories and its characteristics**

*Fresh fruit:* It is important not to interfere with the fresh fruit in a way that could make its healthiness doubtful for consumers. Good sensory characteristics are also crucial for the purchase of innovative fresh fruit. Only if sensory characteristics (like colour, smell or texture) are assessed as satisfactory the purchase will take place. New sensory characteristics can be a trigger for fresh fruit innovation adoption (exotic fruit, new fresh fruit variety). Since regular fresh fruit is perceived as the safest and healthiest, applying controversial technologies and production methods to new products (e.g., GM) could decrease the adoption success.

*Prepared fruit:* Combination of enhanced convenience and freshness make prepared products attractive to participants. The proper balance of these two characteristics may be significant for success of a new product on a market. Good sensory characteristics (fresh look, ripe fruits, natural colour etc) appeared to be crucial for acceptance of prepared products. According to the focus group participants, no matter how unusual the special properties of an innovation, first, perceived sensory characteristics must be evaluated as satisfactory. Packaging as part of convenience of the product seems to be important for prepared and processed fruit innovations. All kinds of aspects related to packaging were being assessed by participants in detail. They paid attention to size, material used, opening, if a spoon was included. Participants chose prepared and processed product for its convenience, thus they had very high expectations toward packaging of the product, which determines its convenience. Safety was another characteristic vital for fruit innovations adoption. Safety seemed to mean something different for fresh, prepared and processed fruit innovations. In case of prepared products, safety was strongly associated with hygiene of preparation.

*Processed fruit:* Different types of convenience were recognised by focus participants in reference to innovative processed products. The most often indicated were convenient packaging, or convenient size (for children, to be eaten / drunk at once, to be put in a lady handbag). Perception of production process of fruit product innovations may determine the adoption process. Generally fruit processing was perceived negatively (as risky, unsafe, decreasing level of other positive properties of fruit products such as quality, healthiness, content of nutritious components, sensory characteristics). To minimise negative effect of perception of fruit processing two actions could be undertaken. First, production process should be compatible with the image of fruit product - a healthy product (for example - fruit as an ingredient but fried does not match this image - it cannot be healthy, so the adoption of such new product will be hampered). Second, many risks and uncertainties about fruit processing may be decreased by quality control certificates visible for consumers. Safety of processed fruit was strongly associated with the naturalness of the production process, content of artificial additives and content of nutrients and healthy ingredients. In the focus group studies, quality control appeared to be a solution to make processed products reliable and safe enough to make innovative processed products bought and consumed. Increasing availability of products during the day seems to be most relevant opportunity for introducing innovative processed products and increasing this type innovation adoption.

*New fresh fruits versus new fruit products*

From the focus group discussions, it turned out that fresh fruit and fruit products do not substitute each other. First, because processed products are perceived to have lower nutritional value. Second, because they are consumed in different situations. Therefore competition takes place within those product categories but not so much between them. This means that novel fresh fruits are not likely to cannibalize existing (processed) fruit products and novel (processed) fruit products are not cannibalize existing fresh fruit consumption.

**4.4 Lesson learned on consumer characteristics**

Besides consumers’ actual evaluations of new products, some consumer characteristics seem to matter. First, the country consumers live in is an important aspect for future strategies on product development and health promotion. Both, the results from the focus groups as well the results from the quantitative studies (consumer survey and choice experiment) showed significant differences between the countries. As an example, in Table 2 you will find a summary of the lessons learned from the focus groups concerning country differences.

<p>Eating fruit as an element of healthy life-style in northern countries seems to be the result of education (governmental campaigns, promotional campaigns). Therefore it seems natural that to get information about new products and their healthiness and other characteristics, participants from northern countries indicate independent sources - experts’ opinions, magazines related to the healthy living (especially from developed markets like the Netherlands).</p>	<p>Eating fruit as an element of healthy life-style in southern countries seem to be consequence of tradition and consumption patterns. The role of interpersonal communication is therefore very important. Both discussions with family and advice of fruit sellers are important for most of participants. This may serve as some indication for introduction of novel fruit products.</p>
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*Table 2: Summary lessons learned from focus groups*

Moreover, the results from the consumer survey in Deliverables 1.3.5 and 1.3.8 showed that country had a significant influence on consumers' buying intention. For example, Dutch consumers were more willing to buy novel fresh fruits than novel fruit products. Greek consumers had a higher propensity to buy novel organic fresh fruits compared to consumers in other countries and less willing to buy novel GM fresh fruits and functional fruit products. Also the results from the choice experiment in Deliverable 1.3.6. confirm the importance of country differences. For example, products with a high level of naturalness were particularly appealing for Polish consumers compared to Spanish and Dutch consumers. Focusing on different products in different countries therefore seems to be crucial for a successful product innovation.

A second important characteristic in new product adoption is people's habitual behaviour. Although, habit seems to be difficult to influence, there are some strategies for improving new product adaptation in a fruit context. For example, Verplanken and Wood (2006) advise to develop interventions that focus on the change of environmental cues to disrupt existing habits. Furthermore, Oaten and Cheng (2006; 2007) describe interventions that focus on increasing consumers' self-control to help them reducing unhealthy eating habits or increasing their healthy eating behaviours. In short, literature on habitual behaviour offers several interventions for changing people's habits (e.g., Steenhuis & Vermeer, 2009; Wansink, 2006).

Third, the way consumers perceive food is important for new product adoption. More natural consumers are very distinct from health consumers of regular consumer groups. As expected, when people are more suspicious to novelties, they are less inclined to buy new foods, while on the other hand opinion leaders are more inclined to try new fruits.

In short, a major future challenge is to integrate the insights from product development and improvement of specific product characteristics with the development of targeted marketing strategies for specific consumer segment in different countries.

#### **4.5 Lesson learned on the role of communication**

From the focus groups it appeared that not only uncertainty was related to sensory characteristics but also to production methods and safety of the product. It seems to be important to study which aspects of the new products are raising uncertainty and to deliver information about them. Some participants were bored with the same, usually repeated information that "fruit is healthy".

As one could expect, when the novel agent is related to *healthiness* and *safety* of fruit (product) - most of all independent, professional sources are important. Interestingly, labeling (so dependent source of information) was indicated as appropriate and reliable for those characteristics as well. On the other hand, if innovative agents of novel product focus on *sensory characteristics* - informal opinions are very welcome (e.g., advice of friends and relatives). Free trial of product at promotional stands could also be a good way to uncertainty about sensory characteristics.

For *imitative innovations* all kinds of sources are accepted by consumers - dependent and independent including mass media - TV commercials and outdoor advertisements. Mass media information is very much appreciated due to very informative messages. Reliability of those messages however was not perceived as not high, but as imitative innovations were not loaded with a lot of risk, low reliability did not seem to disturb participants.

Additionally, results from the choice experiments learned that price information still seems to be the most important. As a consequence one could wonder whether information on packaging will do the trick, since price is still an important driver of consumers to buy fast

moving consumer goods (e.g. new fruits) in all countries. From the case study results, premium pricing strategies still seemed to be important for producers and retailers. This does not mean that price strategies are the only way in selling new fruit products, but still has to be kept in mind when starting to develop new products that could be too expensive for the market at the moment. Premium pricing means that the additional value of a product has to be visible for and accepted by consumers, which is not always the case in current promotional strategies.

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