

Role of product characteristics for the adoption of fruit and fruit product innovations

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SUMMARY

The aim of this study was the identification of those product characteristics that are important for the adoption of fruit and fruit product innovations by consumers. Sixteen focus group discussions were held in four European countries (Greece, The Netherlands, Poland, and Spain). Different aspects of six innovative fruit products were discussed, revealing those characteristics that were important for the adoption of each of them. It was observed that the participants did not perceive fruit innovations as a homogenous group, but assigned them to different groups, which led to a number of categories of fruit innovation. Three categories concerned the level of preparation of fruit. These were fresh, prepared, and processed fruit product innovations. Another two categories, radical and evolutionary innovations, related to the level of novelty of the fruit innovation. Characteristics important for the adoption of each of these categories are given. The results will be used for further, more quantitative, research.

Product characteristics have been an essential part of innovation adoption research for decades (Rogers, 1993; Goldsmith and Flynn, 1992; Goldenberg *et al.*, 2001; Steenkamp and Gielens, 2003). They are said to be crucial for consumer decision-making with respect to new products. In his seminal work, Rogers (1993) discerned five characteristics of innovations, which significantly influenced the innovation-adoption process. These were: *relative advantage* (i.e., something a new product offered compared to other products); *complexity* (i.e., the facility to understand and use a new product); *compatibility* (i.e., with previous experiences, norms, and values); *trialability* (i.e., ability to test the product before final purchase); and *observability* (i.e., if a purchase of the new product was visible to other consumers). Rogers (1993) applied this classification of product characteristics to all types of products and services; however, consumer innovativeness research has started to become more specific to different markets and product domains (Goldsmith and Hofacker, 1991; Goldsmith and Flynn, 1992; Steenkamp and Gielens, 2003).

In early studies, innovativeness was viewed as a general psychological trait (Hirschman, 1980; Venkatraman, 1991; Venkatraman and Price, 1990). Although this concept seemed to be valid, it was also found to have little influence on actual consumer behaviour. Domain-specific innovativeness (Im *et al.*, 2003; Hirunyawipada and Paswan, 2006) was a far stronger predictor of actual innovative behaviour.

Moreover, other domain-specific features such as product involvement (Bell and Marshall, 2003; Foxall and Bhate, 1991; 1993) were identified as being relevant to actual new-product purchase behaviour (Kraszewska and Bartels, 2008). They appeared to be more reliable parameters with which to predict the adoption of innovation in specific markets, taking into consideration all characteristics, conditions, and limitations.

Prosińska and Bartels (2007) suggested that, when a consumer encounters a new fruit product (fruit innovation), domain-related characteristics such as expected and perceived taste, healthiness, and quality, would also influence his/her attitude towards it. Moreover, innovation- and domain-related characteristics may be closely interrelated; for example, a new juice taste can also be characterised in terms of its innovative characteristics.

Studying consumers' reactions to innovations in terms of innovation characteristics alone, seems to be insufficient as, for example, a product with new, more convenient packaging could be evaluated well by consumers, but would not be purchased when the taste did not match their preference. Therefore, the aim of this study was to obtain a qualitative assessment of all those product characteristics that are important for consumer adoption of fruit and fruit product innovations.

MATERIALS AND METHODS

Sixteen focus groups were conducted in four European countries: Greece, The Netherlands, Poland, and Spain. The idea of a focus group is that the

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interactions between all participants on each others' responses to questions and items introduced by a moderator not only give more insight into what the participants truly think, but also how and why they think that way (Kitzinger, 1995, 1994; Morgan, 1996).

Focus group sessions took place in October and November 2007. Four-to-eight consumers participated in each session. Per session, the participants were selected from one of four age-groups: 18 – 24, 25 – 40, 41 – 55, and over 55 years. In each country, one focus group was held for each of these four age groups. The focus groups varied in gender, household size, level of education, and occupation, as a means to obtain greater differences in opinion and to stimulate participant interactions on focus group topics. In total, 42 men and 60 women participated. Most participants were highly or moderately educated, and only 10% were unemployed.

Each discussion took 2–3h, and took place in the morning or in the evening, depending on the country and age group. To avoid the attention of participants being drawn towards fruit product innovations before the start of the sessions, they were told that the discussion would be about food consumption. One pilot focus group with five participants was carried out in Poland to test the practical value of the discussion guidelines.

Group procedure

The focus group sessions started with a brief introduction in which the participants were asked to name new fruit or fruit products, and the location where they had seen or heard about them. This was used to explore participants' ideas about what was new and innovative related to fruit and fruit products. Next, six new fruit or fruit products were introduced and discussed, focussing on specific characteristic related to product innovation. These new fruit and fruit products were based, in part, on the five major categories of novel foods developed by Tuorila (2001). On the other hand, products were chosen that had been mentioned in response to a survey among all researchers involved in the EU ISAFRUIT Project (Zajac and Kraszevska, 2007). The products selected were either already on the market in each of the four countries, but still relatively new, or had been introduced to the market in only a few countries. The products and the relative advantage of what made each product new (in parentheses) was as follows: (i) a non-allergenic apple (safety and health); (ii) a processed fruit drink (health, convenience, quality); (iii) fresh cut salad (convenience, packaging, health, quality); (iv) freshly-squeezed organic juice (health, organic, convenience, quality, sustainability); (v) apple chips (snack, convenience, availability, shelf-life); and (vi) a fruit vending machine (availability, convenience, health).

The non-allergenic apple has not been widely introduced yet. Therefore researchers used a regular apple and told the participants that it was a non-allergenic apple. After the focus group discussions, the participants were told the truth about the product. For the fruit vending machine a picture was shown as it was impossible to bring a fully-loaded machine to each focus group.

All six products were discussed separately, and were placed on a table in front of all the participants, so that they could touch, or smell them or read the product

labels. They were not allowed to open or to taste the products. The first reactions of each participant to the products were requested, by asking what they thought was good or bad about the product, and why they would or would not buy this product. This should result in an overview of the associations the participants had with the individual products, as well as providing an overview of those characteristics that people use to evaluate new fruit products and those characteristics that play a role in their adoption.

A discussion on the role of product characteristics was followed by a discussion that sought to explore the role of communication in the innovation adoption process. Since the role of communication was not within the scope of this paper, it is not described here.

Data analysis

All focus group sessions were recorded and transcribed by local researchers, then translated into English. Each local researcher used a standardised scheme to categorise what was said in the discussions about each topic, and by each participant. Extra space was available in this scheme for additional comments. By comparing and structuring the translations, and completing the schemes from the different countries, conclusions could be drawn.

RESULTS

Before describing the results, it must be stressed that the results from such qualitative research are of an exploratory character, and are therefore tentative and can not be directly generalised to the whole population. The findings of this study will therefore have to be confirmed (or refuted) by quantitative research.

All the focus group discussions in all countries revealed that the fruit innovations introduced were perceived differently and that the participants clearly distinguished between new fresh, prepared, and processed fruit products, and between radical and evolutionary innovations. These five categories were not defined, *a priori*, but emerged from the discussions. An analysis of participant opinions allowed us not only to assign the examples of innovations used in this study to the categories, but also to define what other products belonged to each of these categories.

New fresh fruit was represented in this study by a "non-allergic fresh apple". According to participant opinions, this category could also include new varieties of fruit, fresh exotic fruit, or fresh fruit produced using new methods.

Prepared fruit is a new trend in the fruit market across Europe. Innovations of this kind have sensory characteristics and nutritional values similar to fresh fruit, but their convenience for consumption has been improved by pre-preparation (e.g., peeling, cutting, or squeezing). This category emerged based on discussions on the "fresh cut salad" and "freshly squeezed organic juice".

New processed fruits are highly processed fruit products with a nutritional value or sensory characteristics significantly different from those of fresh fruit. A new taste or a new mix of tastes, a new production method, new packaging, etc., may be the

innovative factor. This category was discussed using the examples of the “apple chips” and the “small processed drink”.

Radical innovations were distant from participants’ previous experiences, often not easy to comprehend, and sometimes conflicted with their norms and values. Participants regarded the “apple chips”, “non-allergic apple”, and “fruit vending machine” as radical innovations.

Finally, *evolutionary innovations* are usually minor differentiations of existing products, and are not really unique from many similar products on the market. Their novelty resides in their brand, mix of tastes, size of packaging, etc. Evolutionary innovations were represented by the “small processed drink” and “freshly squeezed organic juice”.

Participants’ opinions differed on whether or not “fresh-cut salad” was a radical or an evolutionary innovation. Therefore, it was not considered in either category.

New fresh fruits

Participants indicated *healthiness* as the main reason for consuming new fresh fruit. They would buy the product, as long as they believed it was healthy. Not knowing how a “non-allergenic apple” was produced, and assuming that genetic modification (universally perceived as unhealthy) was involved, all participants rejected this product. So, for ready adoption of new fresh fruits, it seems relevant not to interfere with them in any “technical” way that could make their healthiness doubtful to consumers.

Good sensory characteristics such as colour, smell, or texture, were mentioned as secondary factors influencing the purchase of new fresh fruit products. Participants said that they might buy the “non-allergenic apple” out of curiosity, and would keep buying it if its sensory characteristics suited them. New sensory characteristics could also trigger the adoption of fresh fruit (e.g., exotic fruit, a new fresh fruit variety) innovations.

The *convenience* of some fresh fruits was assessed as being low by most participants, while discussing the “non-allergenic apple”. Inconvenient aspects that were mentioned, among others, were: necessity to peel with a knife, dripping juice, and difficult to eat. Due to these inconveniences and eating habits, fresh fruits were mostly consumed at home. So, there seemed to be opportunities for more convenient fresh fruits. Respondents also mentioned their lack of convenience in transportation and low availability. So, the adoption of new fresh fruits may be enhanced by their ease of handling and increased availability at the place of consumption (e.g., at work, at school, on trips).

To sum up, the *healthiness* and *good sensory characteristics* of fresh fruit seemed to be pre-requisites for the adoption of new fresh fruit products. *Convenience* was also a relevant factor.

Prepared fruit

A combination of enhanced *convenience* and prolonged *freshness* made the fresh-cut salad and the freshly squeezed orange juice very attractive to participants. They seemed to fulfil participants’ expectations of *healthiness* (quality) and *convenience*

extremely well, regarded as being almost as healthy as fresh fruit, but far more convenient.

Good sensory characteristics such as fresh appearance, ripeness, natural colour, etc., seemed to be another crucial issue for participants to adopt prepared products. Participants indicated that the sensory characteristics must first be satisfactory, no matter how special the properties of an innovation were.

Safety was strongly associated with the level of hygiene during preparation and was mentioned as the third most important characteristic. Participants saw well-known brands and trusted certificates as a guarantee of product safety.

Packaging was an aspect that, as part of the *convenience* character, participants had high expectations about in terms of size, material, ease of opening, added spoons or forks, etc.

Price was mentioned as a barrier to adopting innovative prepared products. They were perceived as being more expensive than fresh fruit, and only suitable for affluent people interested in a healthy life-style and taking care of themselves (e.g., single people, young working couples, working parents with one child).

Special attention, and a more critical attitude towards prepared products, seemed to result from a participant’s lack of experience with them. When evaluating new fresh fruit, participants seemed to use a type of logical template to form their opinion (e.g., “It is fresh fruit, so it must be healthy then”) and discussed only the novel aspects, while in the case of a completely new prepared product, they considered and discussed it more carefully and critically.

Summing up, *convenience*, *freshness*, *good sensory characteristics*, *safety*, *packaging*, and *price* seemed to be most important in the process of adoption of prepared fruit product innovations.

Processed fruit

Several aspects of *convenience* came forward as the main reasons for buying processed fruit products. Most often, the participants discussed convenient packaging and convenient portion size (e.g., for children, small enough to be eaten and/or drunk at once, or to fit in a handbag).

Generally, participants perceived fruit processing as being risky, unsafe, and decreasing the levels of other positive properties such as *quality*, *healthiness*, *content of nutritious components*, and *sensory characteristics*, due to the artificial processing steps the product had undergone. Participants concluded that good quality control could ensure that processed fruit products were reliable.

Out-of-home situations (e.g., eating on trains, when driving a car, at work/school, etc.) favoured the adoption of convenient innovative processed fruit products such as dried fruit and fruit chips, which were described as a “healthy snack” and a good alternative to regular snack products.

In conclusion, *convenience* seemed to have the most positive influence on the adoption of processed fruit innovations, whereas production method, low (perceived) quality, low (perceived) healthiness, and bad sensory characteristics made participants reject processed fruit innovations.

Radical innovations

High levels of *novelty* led to doubts about the *safety*, *healthiness*, *sensory characteristics*, and *convenience* of a fruit product. *Proper information* seemed to be necessary to decrease the perceived risks and to increase adoption of an innovation. Participants stated that the information provided should concern production methods, country of origin, taste, preparation, and storage.

A high price was seen as a barrier to the adoption of radical innovations, especially given several doubts that consumers might have about a product.

Genetically modified products

Although genetic modification was not mentioned by the moderator, participants came up with it in reference to the “non-allergenic apple”, suspecting that genetic modification was involved in the production process. In all countries, it provoked a heated “debate” about genetically modified (GM) fruit. Although GM products could be categorised as *radical innovations*, participants revealed such firm opinions about GM that it should be looked at separately. GM products were perceived as *unhealthy* and *unsafe*. Unknown consequences of consuming GM fruit on human health caused almost all participants to reject any GM products. Participants’ fear of eating GM products was very strong. When they were presented with the non-allergic apple, and were not sure how it was produced, they suspected the use of genetic modification and immediately rejected it. This showed how just one characteristic may influence the perception of a new product so heavily that other “regular” characteristics no longer matter. Therefore, proper information on production methods should be delivered, so as not to hamper the adoption of innovations.

Evolutionary innovations (product differentiation)

Low levels of *novelty*, *suitable sensory characteristics*, and *price* were the most relevant issues affecting the adoption of evolutionary innovations. Although participants perceived evolutionary innovations as quite new, they did not think of them as “true” innovations. Their low perceived risk made many participants try them without hesitation. Curiosity about a new taste, a new mix of tastes, etc., was the main reason for trying them, but their added value was also perceived to be relatively low and may not be enough to encourage participants to purchase such novelty. Participants declared that they would buy such products regularly only if they liked the new taste. There are so many products of this kind, that participants were not willing to pay a higher *price* than for similar traditional products.

Intercultural differences

Conducting focus groups in four European countries revealed some intercultural differences, which can tentatively be generalised beyond the countries involved. For example, Spain and Greece seemed to represent southern markets well, whereas the Netherlands and Poland seemed to be representatives of northern markets.

The intercultural differences seemed to result from existing consumption patterns and fruit eating habits. Participants from southern countries declared they ate fresh fruit daily, in large quantities, mostly at home and

with the whole family. Most participants from these countries did not consume processed fruit as they found them tasteless, unhealthy, and of low-quality. In contrast, participants from the northern markets seemed to eat less fresh fruit, and declared they ate both fresh and processed fruit. Participants from northern countries accepted the sensory characteristics of processed fruit better, and evaluated their healthiness and quality to be higher. It seems that processed product consumption fitted the eating habits of North European consumers more closely, whereas South European consumers were solely fresh fruit oriented.

Participants from the northern EU countries tended to prefer domestic products, while participants from southern EU markets seemed to be more open to fruit from foreign countries. They also seemed to be more experienced with consuming exotic fruit. This may be an indication of the differences in the adoption of food and/or fruit innovations between countries.

DISCUSSION

The first important finding to emerge from the focus group discussions was that the set of characteristics that influenced the adoption of fruit innovations differed between different categories of innovations.

For new fruit products, participants considered both the basic requirements regularly associated with fruit products such as freshness, healthiness, sensory characteristics, and innovative features. It seemed that the basic requirements must be evaluated positively before any novel aspects could trigger consumers to adopt a new fruit product. This has a lot to do with the image of fruit and fruit products, which is so strongly associated with such basic characteristics as healthiness and good sensory properties that, if any of those characteristics was in doubt, the innovative feature(s) would no longer count in the overall evaluation of the product.

These basic requirements seemed to be more important for fresh and prepared products than for processed products. Participants seemed to have accepted the idea that processed fruit products would have less of their original characteristics due to processing. They seemed to tolerate interference with the characteristics of processed fruit more than with fresh or prepared fruit. Nevertheless, the production process should not interfere with the characteristics of the processed product beyond some limit, defined by the healthy image of the fruit product.

A detailed analysis of the opinions of focus group participants on product characteristics within established categories enabled us to identify those directions for acceptable innovative activities.

Concerning *fresh fruit*, only those actions that would not affect the perceived healthiness of the new product and its sensory characteristics should be undertaken, as those two features appeared to be crucial for the adoption of a new fresh fruit product. Proper information on important issues such as the production method, for domestic fruit, and the country of origin, for exotic fruit, would significantly increase the chances of adoption. Lack of such information would probably result in the product being rejected. Furthermore, it

seems that there was an opportunity for fresh fruit that was more convenient to consume (e.g., without stones, easier to peel, etc.); but, once again, any new product must have proper information provided. Finally, the low availability of fresh fruit at work, in school, and during travel, reported by many participants, indicated the greatest opportunity to increase the purchase and consumption of fresh fruit. It seems that innovative means of selling fresh fruit have the potential to succeed in increasing the availability of fresh fruit.

Enhanced freshness, and therefore healthiness, and increased convenience, were the main characteristics of *prepared fruit products*, and were perfectly matched to participant expectations regarding fruit products. Convenience makes prepared products suitable for out-of-home consumption, which may increase the adoption of prepared product innovations. A proper balance between freshness and convenience seemed to be a significant success factor for such innovations on the market.

However, lack of information on the method of preparation, related to product safety, was a possible constraint for such innovations. Appropriate information on the label and quality certification would decrease the perceived levels of risk. As convenience was indicated as an advantage of prepared fruit, special attention must be given to all aspects, including packaging, opening, providing cutlery, serviettes, etc. Finally, good sensory characteristics were as important here as in the case of fresh fruit, because they affect every purchase decision.

Opportunities for the adoption of *processed fruit* innovations seemed to be related to two areas. First, processed products were mostly purchased for their convenience. It seemed that this area had not yet been exploited sufficiently, and this creates opportunities for successful, new innovations. However, all aspects of convenience of a novel product must be designed carefully, as consumers assess them very critically. The second area of opportunity concerns both processed fruit and evolutionary innovations, and refers to all kinds of product differentiations such as new tastes, combinations of tastes, and also to different packaging, etc. It seemed that group participants were willing to try these kinds of products, and there were no significant barriers to their adoption. However, as many similar products are being launched on the market at the same time, price cannot differentiate them from other similar products, and the potential to gain a substantial market share is limited.

A possible constraint for the success of a new processed fruit product is the negative perception that fruit processing decreases product quality. Two actions may be undertaken to minimise the negative effect of such a perception of fruit processing. First, the

production process should match the healthy image of fruit products. For example frying fruit does not concur with the healthy image. It could not be healthy, in our participants' opinions, which would hamper the adoption of such a new product. Second, many perceived risks and uncertainties about fruit processing may be overcome by quality control certificates that are clear and familiar to consumers.

Fresh fruit and *processed fruit* products did not substitute for each other in group participants' opinions. First, because *processed fruit* products were thought to have a lower nutritional value and, by eating *processed fruits*, participants felt they would simply not get the same nutrients. Second, because they are consumed in different situations (i.e., *fresh fruit* is mostly consumed at home, whereas *processed fruit* products are more often consumed in out-of-home situations). Therefore, competition may take place within each of those product categories, but not so much between them. However, future innovations towards increasing the availability of *fresh fruit* in out-of-home situations may increase competition.

Radical fruit innovations are breakthrough products that vary greatly from what has been offered on the market, to date. They may become successful, but, due to consumer perceptions, their launch on the market may easily fail. Information on the characteristics of the novel product and any influence on the original characteristics are crucial. Such information was found to decrease perceived risks significantly. Only then did group participants recognise the other advantages of a new product. Another means to decrease perceived risk can be to offer a product trial, on a limited basis, on promotion stands or at a lower price. The other important issue was that the novelty of *radical fruit innovation* should not conflict with the image of fruit as a healthy product.

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