

The paradigm of consumer-driven and responsive supply chains: an integrated project approach

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(Accepted 18 August 2009)

SUMMARY

This paper describes an integrated project approach that forms the basis of the studies on consumer-driven innovative and responsive supply chains in ISAFRUIT Pillar 1. This integrated approach leads to a wide range of in-depth results on trends, preferences, and innovativeness of the European consumer in the context of fruit, and on product innovation, chain innovativeness, and transition strategies for the European fruit industry. Differences in, for instance, preferences for different fresh, prepared, and processed fruit products across consumers and across consumption situations, and differences in consumer innovativeness in the context of novel fruit products, lead towards a cross-cultural European segmentation and a variety of consumer-driven fruit chain strategies to valorise the added value of fruit products. Inputs from social, natural, and technical sciences are combined to optimise true consumer-driven innovativeness.

The current European food market is saturated, and consumers can be critical as to what they choose, which makes consumer-orientation vital for firms in order to gain a so-called “share-of-mouth” (Kotler and Keller, 2006; Van Trijp and Meulenberg, 1996). In a consumer-oriented approach to new product development and marketing, consumer needs and wishes, the way in which consumers make their product choices, and knowledge about how consumers react to marketing efforts, are the starting points to create so-called “customer value” for different consumer segments (Van Trijp and Meulenberg, 1996). With such a “consumer-pull strategy”, which is fundamentally different from a “supply-push strategy”, supply chains must focus on an optimal “demand-and-supply” match, by being responsive with customised fulfillment of consumer demands. Here, responsiveness is defined as the ability of supply chains to respond to market intelligence in a flexible, timely, and cost-effective manner.

Hence, there is a clear need to understand the fruit and fruit product preferences of the European consumer, including consumer demands for quality products, and to identify those key product attributes that underpin them. Fruit and fruit product innovations may play a significant role in the process of eliminating those bottlenecks that were identified as the starting point for the ISAFRUIT Project, preventing consumers from buying and consuming more fruit, both fresh and processed. These bottlenecks included: insufficient quality and safety, limited availability, lack of convenience, and a relatively high price (see ISAFRUIT Annex 1, 2006). From that perspective, it is crucial to

determine the factors underlying consumer acceptance and rejection of fruit and fruit product innovations, and to translate these findings into recommendations for the supply chains in the European fruit industry.

ISAFRUIT Pillar 1 “Consumer driven and responsive supply chain” is aimed at developing strategies to enhance consumer-driven innovativeness in the fruit supply chains, and the transition towards more consumer-driven innovativeness. The purpose of this review paper is to present the integrative approach taken in Pillar 1, in which factors underlying consumer behaviour with respect to existing and novel fruit products are being studied, as well as fruit product supply-chain organisation and management structures that may facilitate optimal fruit supply chain innovativeness. Part of this integrative approach is to build bridges between specialists in the social and natural sciences, and to provide research guidance for technological researchers in order to reach the overall goal of increasing European fruit consumption.

BACKGROUND

Consumption trends

Despite the fact that current European consumers face more homogeneous food market conditions, differences exist in their food consumption behaviour because of different preferences and food habits, in which a number of trends can be distinguished.

First, as the number of single-adult households increases, this leaves less time for meal preparation, and a larger proportion of expenditure on food occurs out-of-home. Also, the proportion of income expenditure on food has decreased, while an increasing number of consumers

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are becoming more selective in their choice of food. Consumers are taking into account 'qualitative' aspects that include both personal benefits (e.g., convenience, health, safety, sensory characteristics) as well as societal benefits (e.g., environmental impact, animal welfare, ethics; Kaditi and Swinnen, 2007) derived from process-related (i.e., quality control, origin, production technology) and product-related (i.e., convenience, health, safety, sensory characteristics) quality attributes. All of these influence consumer perceptions of quality (Garcia and Albisu, 2001; Grunert, 2003).

Following these major trends, the market for foods with new flavours, ingredients, and smells to meet consumer needs has grown, as well as for processed and prepared foods with increased convenience (e.g., storage, ready-to-eat). "Convenience" addresses consumer needs in the context of the growing value of time, mainly due to women participating in the labour market. The need for convenience is mainly situation-specific (Productschap voor Tuinbouw, 2008).

Increasing awareness of personal health stimulates the need for low-fat, fortified and/or functional food products. In addition, food safety issues constitute a growing concern in all EU countries, and consumer perceptions of risk influence food choice. Consumers are mainly concerned about food contamination and the safety of new technologies (e.g., genetic modification). Therefore labelling and traceability are required to address consumer needs.

There also is a trend for more "naturalness", of which organic and (non)genetically modified food are examples, which is also related to consumer perceptions of safety and healthiness, to sustainability, and to preferences for products with a specific (and protected) geographic origin, where hitherto technical advances in agriculture have led to the disappearance of local and organic/low-input products.

These trends have caused European consumers to demand more added-value in their food products.

Consumer-driven and responsive supply chains

As a result of these trends in consumer preferences, the availability of new technologies, linkages between members of the food supply chain, and prevailing policies and business environments, the European food market is constantly evolving (Kaditi and Swinnen, 2007).

As such, innovativeness is crucial for the performance of companies in the supply chain. Companies that fail to develop new products are vulnerable, due to changing consumer demands, competitors, product substitution, and the possibilities that new technologies offer (Kotler and Keller, 2006). The innovative power, and therefore total performance in terms of turnover and profit margins of the entire chain, are largely dependent on the proper functioning of the members of a supply chain, and their inter-relations. To have the right innovative products in the market at the right moment in time requires collaboration and information-sharing between members of the chain. The challenge for any supply chain is to maximise the difference between the total value delivered to their end-customer and total supply chain costs (Figure 1).

With new technologies to monitor consumer demand (e.g., point-of-sale scanners and related concepts such as

Quick Response and Efficient Consumer Response), many companies have turned, or tried to turn traditionally functional products into innovative products, therefore the rate of new-product introductions has sky-rocketed. However, they continued to focus on physical efficiency in supply-chain processes (Fisher, 1997).

Fisher (1997) argues that the main cause for new-product introduction failures is a mismatch between the type of product and the type of supply chain. A distinction can be made between primarily functional products, and primarily innovative products. Functional products satisfy basic consumer needs, which do not change much over time, and generate stable and predictable demand, and long life-cycles. Innovative products give consumers added value and therefore an additional reason for purchase. Consumer-driven innovativeness combines the innovativeness of the industry with trends in consumer demand and preferences, to make sure that the products that reach the market are the ones that consumers want to buy (see Bucklin, 1966; 1970; De Vries-Van Ketel *et al.*, 2004; Inman *et al.*, 2004; Morales *et al.*, 2005).

METHODS

The integrative approach of Pillar 1 to enhance consumer-driven innovativeness in fruit supply chains was structured as follows.

First, public data sources from, among others, UN FAOSTAT (October, 2006) and EUROSTAT (October, 2006) were used to give an overview of fruit consumption patterns across the EU based on a number of indicators, and to select a shortlist of seven countries that were representative of all other EU countries (Groot *et al.*, 2006; 2007). More in-depth figures on fruit consumption were then collected for these seven countries, ranging from macro-level (markets and regions) to micro-level (households and individuals), in order to select four representative product/market combinations (countries and/or regions) as a starting point for the rest of the studies in Pillar 1.

In a second step, publicly available statistical data and expert opinions were combined in a so-called "Trend-Impact Analysis" in Greece, Poland, Spain, and The Netherlands (see Hennen and Benninga in this Issue). The aim was to produce scenarios for future fruit consumption based on forecasted developments in underlying trend factors, such as increasing consumer orientation towards personal health and out-of-home consumption. Expert opinions were solicited both from within and from outside the fruit industry, using the so-called Delphi method, in which experts comment upon each others statements in subsequent rounds of interviews. Scenarios for future fruit consumption were formulated, while realising that the forecasts depended on assumptions about future developments in influential factors, of which supply chain members would have to make optimal use (Groot *et al.*, 2008).

Building on these first two initial steps, three research projects were started: Project 1 investigated those factors underlying consumer preferences for existing fresh, prepared, or processed fruit products, and the motives and barriers to fruit consumption. Project 2 studied those

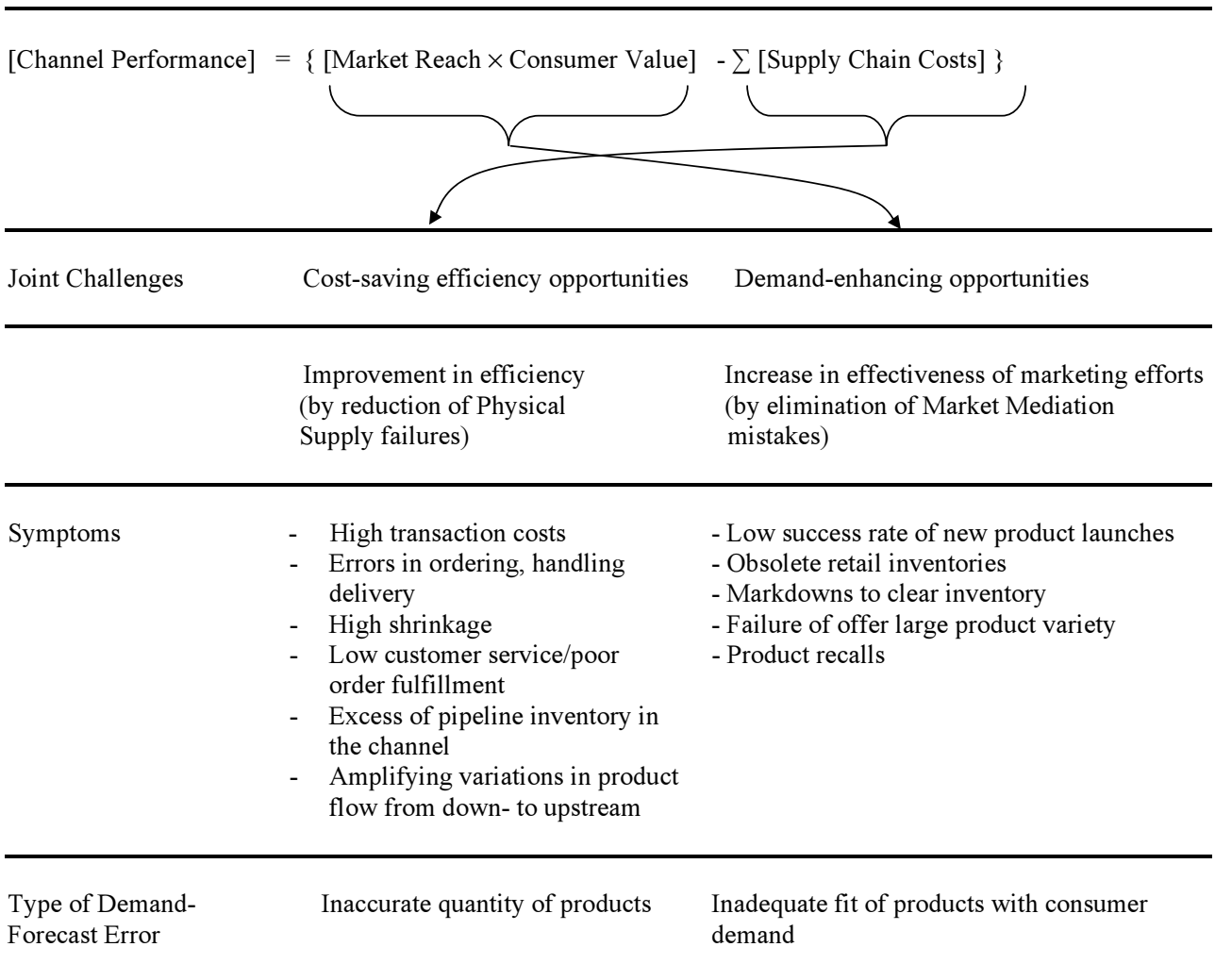


FIG. 1
Maximising total chain performance [Smit, W. (2006) based on Fisher (1997)].

factors that influence consumer innovativeness and the adoption of new fruit products. Project 3 was on supply chain management and organisational structures to enhance fruit supply chain innovativeness. These three research Projects were aligned, as much as possible, in terms of their selection of consumer characteristics and the examples of fruit product innovations and fruit supply chains. Whenever possible, selected fruit product innovations and fruit supply chains were matched to developments in other parts of the ISAFRUIT Project, to create common ground for providing guidance in research.

Both Project 1 on consumer fruit preferences, motives and barriers for fruit consumption, and Project 2 on consumer innovativeness and adoption of new fruit products, started with reviews of the relevant literature to identify a theoretical framework (Sijtsema *et al.*, 2007; Prosińska and Bartels, 2007). These were then fine-tuned on the basis of focus-group discussions in each of the four previously selected countries (Greece, Poland, Spain, and The Netherlands; Briz *et al.*, 2007; Kraszewska *et al.*, 2008). To test the theoretical frameworks, and to assess the strength of underlying factors, a consumer survey was designed in each Project and applied to samples of approx. 500 consumers in each of the four

countries. Before carrying out the surveys, the questionnaires were tested in a pilot study, with a sample of approx. 70 consumers per country, to check the adequateness of the choices for fruit consumption situations and the examples of novel fruit products, and the reliability and validity of existing and newly-developed scales to measure the constructs that were included in the theoretical frameworks (Reinders and Jager, 2007; Reinders *et al.*, 2008). The consumer survey data were also used to identify cross-cultural European consumer segments, both in terms of the benefits that fruit products must compete on against other products in different consumption situations, and in terms of innovative consumer behaviour. In Project 2, on consumer innovativeness and new fruit product adoption, an additional choice experiment will be carried out to study substitution effects that occur following the introduction of novel fruit products in different consumption situations. Also, a validation study will be carried out to see whether the findings could actually explain the success or failure of past fruit product innovations, a list of which has been compiled using inputs from researchers across the entire ISAFRUIT Project (Zajac, 2007).

Factors in Project 1 on consumer preferences for existing fruit products included product characteristics, consumer characteristics, and characteristics of the consumption situation. Special attention was paid to the distinction between cognitive and affective constructs that mediate the influence of these characteristics on consumer preferences (Sijtsema *et al.*, 2007).

In Project 2 on consumer innovativeness and new fruit product adoption, particular attention was devoted to consumer behaviour in consecutive stages of the adoption process. The results provided evidence on how to improve consumer acceptance of new products and show promising directions for future innovations.

Project 3 on supply chain management and organisational structures to enhance innovativeness in the fruit supply chain, also started with a literature review (Van Uffelen *et al.*, 2007) to derive a theoretical framework linking supply chain management and organisational structures to chain innovativeness (Verdouw, 2008), as one aspect of overall chain performance. Subsequently, an overview of the fruit industry in Greece, Poland, Spain, and The Netherlands, in both qualitative and quantitative terms was prepared (Krukowski and Lemanowicz, 2009).

Based on the theoretical framework, two questionnaires were developed for a number of case studies. One questionnaire focussed on chain-organisational structures and was administered to representatives of companies from a number of fruit supply chains in face-to-face interviews in Greece, Spain, Poland, and The Netherlands. The second questionnaire focussed on supply-chain innovativeness, in relation to supply-chain performance, and underlying managerial and organisational factors. This questionnaire was administered to the same representatives, again in face-to-face interviews. In total, representatives from ten different supply chains were each interviewed twice, in two successive rounds. Criteria to select the supply chains were: (a) those that demonstrated some degree of innovativeness (e.g., because of a recently successful innovative fruit product on the market, or because of implemented novel processes) covering fresh, prepared, as well as processed fruit products for both the in-home and out-of-home markets and, of course, (b) their willingness to collaborate. Based on the results, critical success factors for innovativeness in fruit-supply chains will be identified and guidance for the fruit industry given on innovativeness-enhancing organisational and management structures.

Building on the findings from these three Projects and from the other ISAFRUIT Pillars, the final step in Pillar 1 will involve the development of a roadmap for the transition towards a European fruit industry that has consumer-driven innovativeness as one of its competitive advantages. Based on the literature, strategies for such implementation of innovation and transition will be developed for a number of cases covering: (1) different consumer segments; (2) different fruit industries and chains (fresh, preserved, and processed); (3) cultural and regional aspects; (4) different product/technology market combinations; and (5) communication and promotion with respect to the adoption and diffusion of innovations. These will be discussed with other ISAFRUIT researchers in a Workshop, as well as in

interviews with European experts in the field of strategic fruit production, distribution, and marketing. A maximum of four integrated strategies will be formulated, including critical success factors. Based on the Workshop and the interviews, these strategies will be adapted, after which they will be discussed with representatives from the European fruit industry and other stakeholders, including public agencies, to refine them, make them more robust, and make them economically feasible.

RESULTS AND DISCUSSION

In this section, we highlight some of the current findings in Pillar 1, without giving an exhaustive overview of results.

Our results show that fruit quality is important, but, as an added-value, this is mainly a past trend. Fruit quality is the standard which gives companies 'a license to deliver'. It is expressed in appearance, shelf-life, taste, and safety and is associated with quality-of-life and healthy living. Product quality was identified as the most important driver in the supply chain.

Consumers' first association with 'fruit' is *fresh fruit* and *healthiness*. Nevertheless, basic conditions for the consumption of existing, as well as novel fruit products are *good taste* and *nice appearance*. Sensory cues (i.e., a fresh look, ripeness, natural colour, etc.) are crucial for the success of any new fruit product on the market.

Large differences in fruit consumption patterns and purchase behaviours exist across Europe. Spanish and Greek consumers eat fruit mainly at home, as a dessert, and prefer buying it from a greengrocer. Polish and Dutch consumers eat fruit as a snack, or between meals, and buy fruit wherever it is most convenient (e.g., a market, or supermarket). The main advantage of innovative processed fruit products is that they increase the availability of fruit. New purchase channels seem to be necessary to increase the adoption of fresh fruit innovations.

The safety of existing fruit products appears to be a worry in Poland and Greece, but not in Spain and The Netherlands. However, safety does appear to be crucial for novel fruit products and new fruit-production technologies. Steps in the production process such as genetic modification that violate the public's ideal image of "naturalness", cast doubt on both the healthiness and safety of a fruit product which can not be remedied by any special benefit.

Consumer perceptions of convenience seem to affect their preferences and behaviour, and appear as the main reason for the increasing consumption of prepared and processed fruit products as a healthy alternative to regular snacks (e.g., chips, chocolate products, etc.). Arguments such as lack of time, difficult to carry, need to peel and/or to use a knife, need to wash the fruit, need to wash hands, etc., are barriers to the consumption of various kinds of fresh fruit. It seems that everyone likes to eat fruit, as long as it is ready-prepared.

Findings on the factors underlying fruit consumption, consumer preferences, and consumer adoption of novel fruit products still need to be confirmed in quantitative studies, which are being carried out at the moment. These studies will give important insights into existing cross-cultural consumer segments, and, in the end, any effort to

increase overall fruit consumption should be fine-tuned to appeal to these different segments.

CONCLUSIONS

An integrated approach, studying both consumer behaviour and chain management and organisation, is vital to provide research guidance and recommendations for the European fruit industry. This approach can only be successful if different disciplines from the social, natural, and technical sciences interact towards product and market development. For the fruit industry, this means investing in the interactions between different areas of science to deepen consumer-driven strategies on product and process innovation. More attention to the integration of consumer-behaviour research in product development and marketing and in chain relationships will be crucial to increase fruit consumption.

The paradigm of consumer-driven innovativeness implies that the results of research in other Pillars of ISAFRUIT are exploited, without losing the opportunity to generalise our findings. Such generalisations allow for the change from a “push” towards a “pull” marketing strategy, which is necessary in order to increase fruit consumption in an already saturated and highly competitive food market.

The ISAFRUIT Project is funded by the European Commission under Thematic Priority 5 – Food Quality and Safety of the 6th Framework Programme of RTD (Contract No. FP6-FOOD-CT-2006-016279).

Disclaimer: Opinions expressed in this publication may not be regarded as stating an official position of the European Commission.

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