New Product Development of a Yoghurt Dessert via E-Collaboration

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Abstract

The following contribution describes how an E-collaboration platform may be used within new product development. In order to develop a new dairy product (a yoghurt dessert), a leading Austrian dairy co-operated with representatives from the Austrian University of Natural Resources and Applied Live Sciences Vienna and other experts by use of a specific E-collaboration platform.

The main aim of the project was the preparation of innovative product concepts. All necessary data and documents concerning consumer behaviour, market trends, product features etc. were distributed via a closed E-collaboration platform. The participants worked together for about half a year; however, only two personal meetings were necessary, all other communication processes (also group discussions) were done via the E-collaboration platform. It was possible to simultaneously communicate and co-operate even though the participants were located in Vienna, Upper Austria and Italy (South Tyrol).

In the end a new product could be developed which was launched in one of the big three Austria supermarket chains in 2004. It could be proven that the state of the art in new product development is absolutely compatible with the usage of information technology for communication and knowledge transfer purposes; however, confidentiality and trust are absolutely indispensable for the success of such a project.

Keywords: *innovation, new product development, dairy industry, E-collaboration*

1. Introduction

Food producing companies are facing a veritable dilemma concerning new product development. On the one hand they are forced to deliver innovative products – continuously and after minimum development periods – in order to stay competitive and to maximize future profits. “It is well documented that the development of innovative products is a key source of competitive advantage” (McDermott, 1999, 631). The environments of companies are changing dramatically with shorter life cycles, demand for product customization, and technical innovations. They are forced to keep costs downs and to get products on market quickly (Ariss and Zhang, 2002, 135).
On the other hand, most of the new product launches have to be classified as product flops; confirming the market research institute GFK at least 65% of all new product introductions are disappearing from the shelves within one year. This is a tremendous waste of corporate fortune as development and marketing expenses are lost without sufficient return from market sales. And has also negative impacts on the mental state of the involved personnel: “Our reading and dis-

cussions with practitioners revealed that while companies continue to bring innovative products to the market, they do so with considerable pain and frustration" (Deszca et al., 1999, 613). Therefore, one of the most important core concepts to guarantee product success to a large extent are considered to be a stringent and up to date high quality new product development (NPD) process (Cooper and Kleinschmidt, 1995, 389). Confirming Cooper (1994a, 61pp.) – he studied product success and failure for decades –several key factors for successful product introductions may be identified, all connected with a high quality NPD process:

- a unique superior product
- a strong market orientation (market-driven and customer-focused NPD)
- a continuous NPD process where all stages are covered, sharp and early product definition (before actual product development begins)
- the cross-functional team approach where team members come from several departures and from outside the organization
- sharp evaluation and decision points within the process (stop or go decisions)

In order to realize this demanding NPD process even within a rather small marketing organization[1] we evaluated the feasibility of NPD in conjunction with information technology (IT).

Therefore, the research question important for this article was: Does the use of IT media for NPD purposes provide positive effects considering the outcome of the NPD project? Positive effects might be higher efficiency, facilitation of the decision based NPD process, better documentation, acceleration of the NPD process etc.

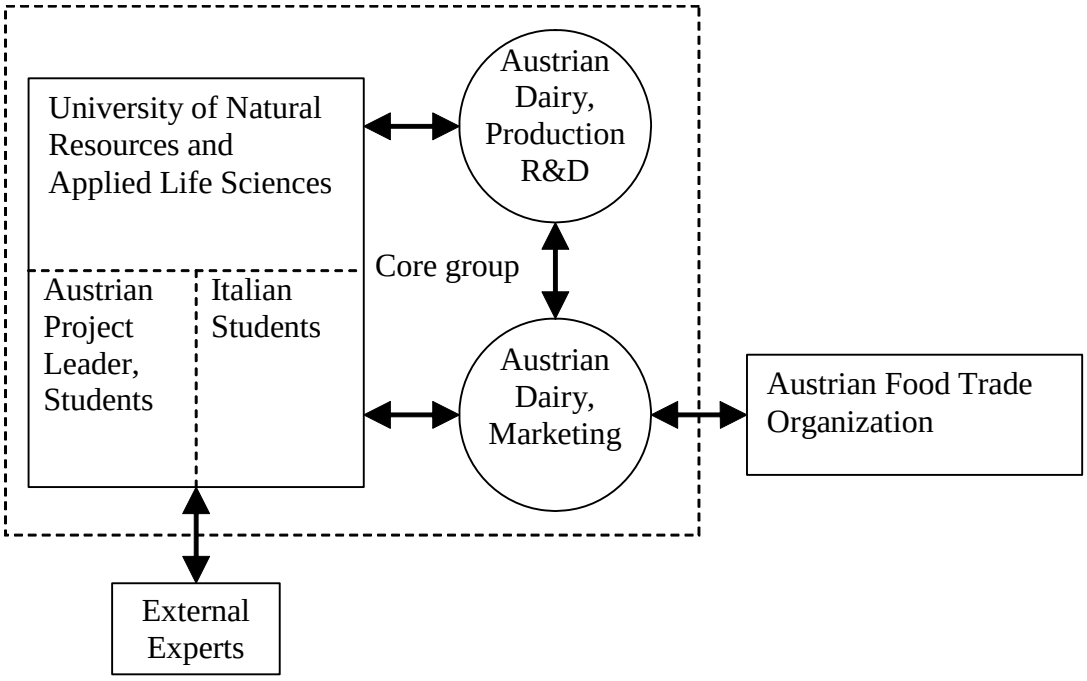

Figure 1. Project network – NPD team

1. Although the dairy is one of the big three in Austria the marketing unit within the organization is small. Taking into account the international, European context even the company size is fairly small.

For this purpose we built a product development team from the technical and marketing department of an Austrian dairy working together with an international team consisting of Austrian and Italian students of the University of Natural Resources and Applied Life Sciences, Vienna, the responsible executive of a leading trade organization[1], and external experts (see fig. 1). In other words, we also included internal and external stakeholders of NPD into the decision process (McQuater et al., 1998, 126). For not being forced to meet face to face for communication and information purposes on a regular basis, and for accelerating information flows we used a specific E-collaboration platform. The following article highlights the outcomes of this NPD project (Meixner, 2003, 247pp.).

2. New product development

"Innovation" summarizes all categories of new products coming to markets. Confirming McDermott and O'Connor (2002, 424) "innovation is defined as a new technology or combination of technologies that offer worthwhile benefits". If a product or process is new to a company, it may be classified as an innovation for *this* company. If the product or process is new to anyone within and outside the organization the innovation is said to be an "objective innovation". However, the subjective definition of innovation dominates business research. Confirming a study of the market research institute AC Nielsen most of all new product launches may be classified as so called me-too products (copies of existing products). Only 2% of the food product launches may be classified as "real" i.e. objective innovations (at least new to the market). In the milk sector, an example of good practice concerning objective innovations is the so-called ESL-milk (extended shelf life), a near fresh milk product with longer durability, which is achieved through application of a new heating technology.
These launches are classified as *radical innovations* if several attributes apply to the new product: technological uncertainty, technical and/or business inexperience, and a high level of technological cost (McDermott and O'Connor 2002, 425; following the multidimensional measure of Green et al., 1995, 203pp.). The core attribute of these projects could therefore be summarized by the term "uncertainty", i.e. an information deficit (Mullins and Sutherland, 1998, 227).
If we talk of incremental innovation we mean further development of existing products or processes as an evolutionary, continuous process. Most of all innovations may be considered to be incremental in the food industry. However: „As suggested by literature … such firms [with more than 1 billion $ in sales] have found it absolutely critical to balance their common, short term oriented, incremental product innovations with a small portfolio of radical innovations aimed at long-term market creation and growth" (McDermott, 1999, 634).
Within our project we developed a dairy product which might be considered to be incremental and radical simultaneously. The manufacturing process was a complete in-house development of the Austrian dairy company and may be assumed to be rather a radical process innovation within the dairy industry. However, the product positioning of the innovation is not new to the market. Therefore, it would be correct, too, to talk of an incremental innovation, especially with respect to the customer perspective (Cooper, 2000, 2).

We used the so-called third-generation Stage Gate process for NPD by Cooper (1994b, 3pp.) and the cognate decision based NPD process by Meixner (2003). We followed specific stages of the process (see below) using IT media. We supposed to be more time and cost effective if we built a trans-disciplinary, international team from inside and outside the company *and* replace most of all necessary personal meetings (which are in fact very costly and time-consuming) by applying IT media for communication and documentation purposes.

1. Overall market share in the Austrian food market 20%

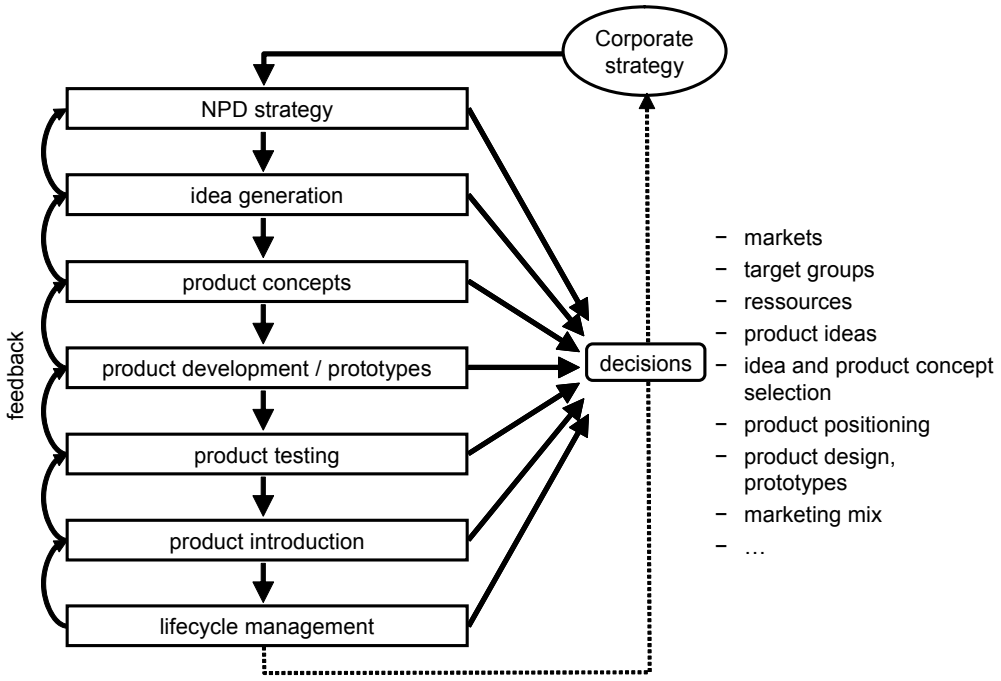

Figure 2. Decision based NPD process

However, the core group (see fig. 1) did not pass all steps of the NPD process. Mainly the creative part of the innovation process was executed by them, from idea generation to product concepts to prototypes. The physical product development and technical realization of the product attributes was done by the dairy itself, the core group was not involved in the introduction and lifecycle phase of the process. This was done by a co-operation between the trade organization and the dairy.

In contrast to the linear sequence of the NPD process in fig. 2, a key concept of it is that the stages do not necessarily follow a pre-given chronology: it is possible to start a stage even before the previous stage(s) is (are) completed. The gates are said to be fuzzy[1], which implies high flexibility and back-loops in order to accelerate the total development time. "In order to speed products to market, stages can be overlap each other; long lead time activities can be brought forward from one stage to an earlier one; projects can proceed into the next stage, even though the previous stage has not been totally completed; and stages can be collapsed and combined" (Cooper, 1996, 478). Confirming Kušar et al. (2004, 1), the problem of excessive time could be solved by transition form sequential to concurrent engineering in NPD. "Overlapping of development activities is commonly regarded as the most promising strategy to reduce project cycle time" (Lin et al., 2008, 390). Lin et al. (2008) developed a dynamic model for managing overlapping iterative product development and succeeded in reducing overall development time by about 30%. For example, in our case physical product development and formulation of appropriate marketing concepts were done simultaneously.

1. "When process uncertainty is high [very often in NPD], a significant portion of any or all of the engineering, marketing, and communications processes are relatively new, unstable, or evolving" (Büyüközkan and Feyzioglu, 2004, 29). Büyüközkan and Feyzioglu (2004, 27pp.) therefore suggest a fuzzy-logic-based decision-making approach in NPD.

2.1. IT media / E-collaboration

The particular project of the core team was conducted from October, 2002, to March, 2003 (see fig. 4). We used specific E-collaboration software called EC4EC for the whole communication and documentation process. On the one hand, we sped up development steps by immediately providing relevant information within an E-collaboration platform for all team members; on the other hand we could reduce travelling expenses dramatically as only few face to face meetings were necessary during the project.

Originally, this platform was introduced to optimize collaboration between plant construction enterprises and suppliers of complex plant components. Due to commercialization problems, we evaluated the functionality of this platform for NPD purposes simultaneously in co-operation with the company EC4EC. [1]
Some features of this E-collaboration platform are:

- paperless documentation of all relevant project results (up- and download)
- communication tool: Online discussion forum, mailing list administration
- data protection: encryption of all transmitted information, user rights administration

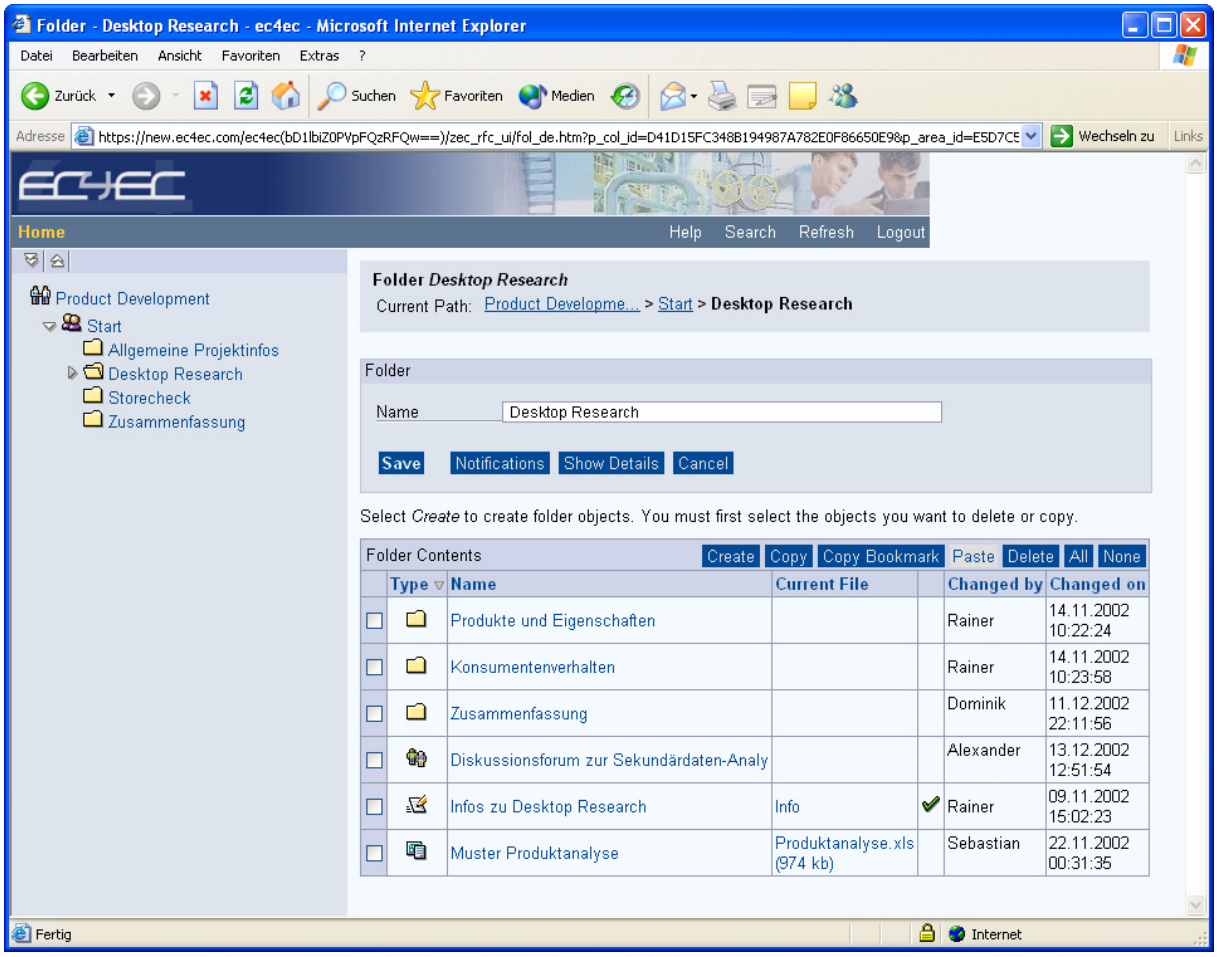

Figure 3. E-collaboration platform EC4EC

1. The results of this part of the project will not be described within this article; compare HAAS (2004, 259pp.) for detailed information.

2.2. NPD project "buttermilk yoghurt"

The scheme of this NPD project contained 8 different steps (connected to the 3 stages of the standardized NPD process "idea generation", "product concepts", and "prototypes" relevant for the whole NPD team). These steps may be described in brief as follows (Haas, 2004, 282):

Step 1: Kick off meeting; briefing with dairy company, definition of necessary workload with respect to project management and team leadership, research questions, general agreement on co-operation, introduction into E-collaboration platform; idea generation and evaluation; communication media: face to face

Step 2: Broad literature review, secondary data research concerning existing product concepts and existing products on the milk market; focus on innovative yoghurt and buttermilk desserts; upload of relevant information; communication media: E-collaboration platform

Step 3: Analysis/aggregation of uploaded information; main aim: consent about information concerning the market, innovative products, consumption, and related topics; working out an intermediary report aggregating all available information; communication media: E-collaboration platform

Step 4: Store checks in selected trade branches of the most important food distributors in Austria; analysis of the milk and dairy products focusing on dessert and yoghurt products; upload of relevant information; communication media: E-collaboration platform

Step 5: Discussion using the online forum of the E-collaboration platform about the results of the store checks; outcome: graphical, two dimensional positioning model (see below); communication media: E-collaboration platform

Step 6: Online meeting concerning work packages for product concepts and simultaneous technical development through the Austrian dairy; synchronic discussion of all team members about the collected information; communication media: E-collaboration platform

Step 7: Creativity method "brainstorming": suggestion of numerous innovative product concepts; first selection of realisable product concepts; communication media: face to face

Step 8: Upload of product concepts in combination with information concerning physical product development; evaluation of product concepts using specific utility analysis (Analytic Hierarchy Process; see Meixner and Haas, 2002, 113pp.); identification of market potentials and necessary (personal and financial) resources; work out of the final project report; communication media: E-collaboration platform

This schedule took about 6 months. Afterwards, the dairy continued the project for another 9 months, and then the final product could be launched (including product testing and co-operation with the trade organization, other external organizations for packaging design, advertising and promotion etc.). A total NPD time period of 16 months was necessary from idea generation to product launch (see fig. 4); this seems to be extremely efficient for a complex NPD project where a new processing technology had to be developed simultaneously with marketing-relevant considerations (market analysis, product concepts and evaluation etc.).

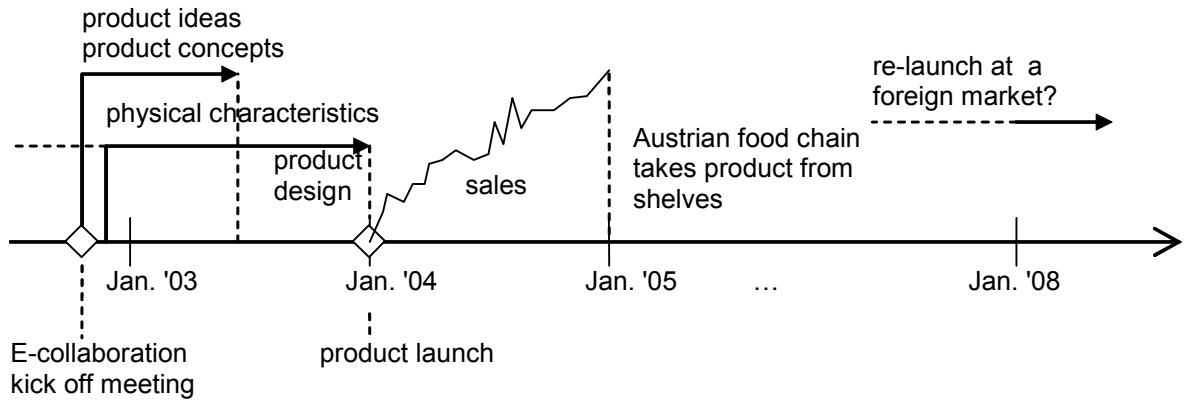

Figure 4. Total NPD project timeline

It has to be mentioned that the market performance was not totally satisfying. Sales did not meet the trade company's expectations. Confirming the marketing executive of the dairy, this was mainly due to the fact that the people who finally realized the marketable product *did not* totally trust the suggestions of the product concepts. Probably they would have done so if there were more personal contact between all affected people. There is evidence that more personal communication during the NPD project is advisable. Actually, it is planned to launch the product abroad as there is explicit interest of a foreign trade organization to include the product into its product range (see Fig. 4).

3. Results

To answer the research questions of this study, we did a lot of desktop research to work out a complete market analysis for this relevant market segment of the milk market. The next step was a deep insight into consumer behaviour on the food market. One major part of the study covered health aspects of milk and buttermilk. Within this part we discussed actual findings concerning functional food, and specifics of buttermilk and related products with respect to dieting.
On the basis of the results of this analysis we assumed that the path we followed during the NPD process was a good one and the decision for further development of the innovation was a permanent "go". Simultaneously to desktop research we did some empirical work to get a better insight into the product range of the most important Austrian food chains. The results of this analysis will be part of the following chapter.

3.1. Product positioning

To highlight only one very important NPD result within market analysis we present in the following section the findings and conclusions of the store checks. For this purpose, the team members analyzed several branches of different Austrian food chains to get a comprehensive overview of available products in the product category "yoghurts / milk desserts and related products". All team members evaluated the different products they found on a two scale basis:

- hedonic aspects of the products
- assumed healthiness of the products

The scale reached from -9 (very unhealthy assumption, very low hedonic experience when testing the product) to +9 (very healthy/hedonic). Of course, this was a qualitative assumption on

how consumers might evaluate the relevant articles. However, the assumptions were homogeneous and should only provide a broad picture of the products' positioning. The main reason for choosing the dimensions "healthiness" and "hedonism" are that buttermilk, one main component of the innovation besides yoghurt, has very positive effects considering healthiness and has, simultaneously, very positive effects on product characteristics, too, mainly connected with better creaminess. Our idea was to develop a product which delivers both, hedonic and healthy attributes (a well tasting dessert product which does not harm our physical state negatively) – a result out of the creative stage of the process connected with "idea generation".
Taking the results of the product positioning model in our study we could realize that there is a strategic gap on the Austrian market for this product category (see fig. 5). No product was found which could provide both characteristics to a large extent.

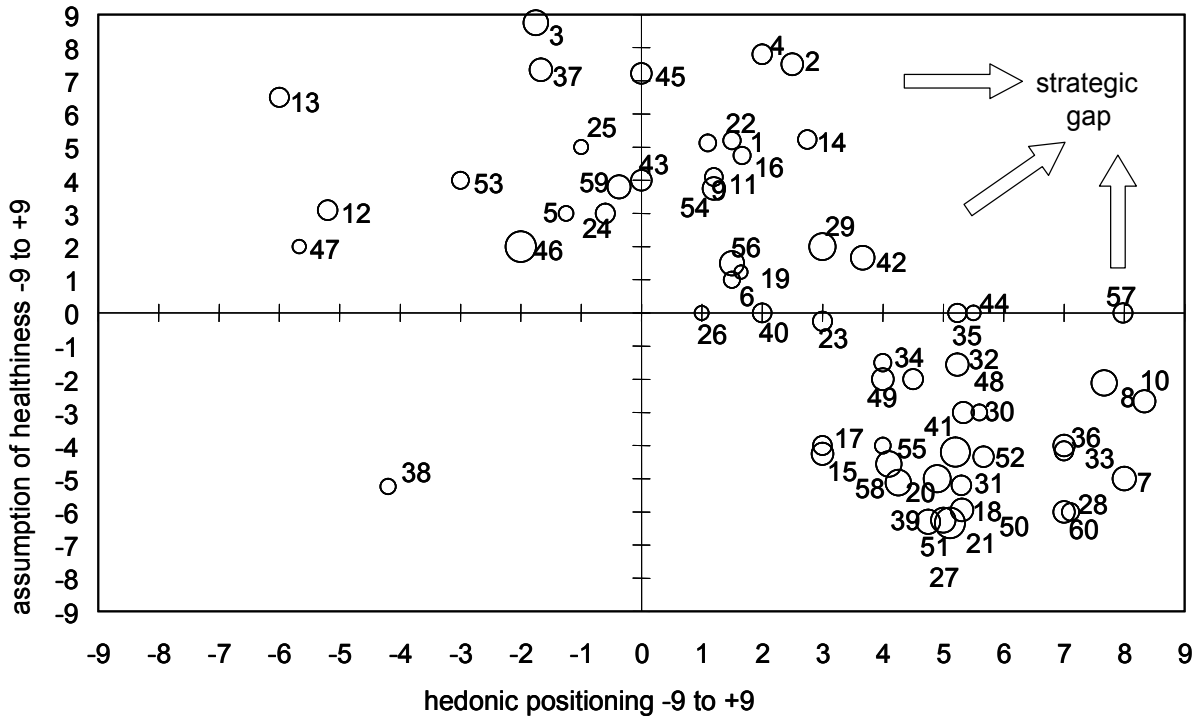

Figure 5. Store check analysis – qualitative positioning model for yoghurt / milk dessert products [1]

On the basis of the result of the store checks, we assumed that it makes sense to develop a product which ultimately fulfils the required attributes. Both, hedonism and healthiness are important trends in consumer behaviour. On the one hand, food has to be tasty ("foods that taste good"). On the other, consumers seek a balanced diet ("foods that promote health"; Asp, 1999, 290).

3.2. Conclusions

The results of this study are threefold: First of all, we could proof the principle functionality of the decision based NPD process for our purpose. We succeeded in accelerating the total project duration via simultaneous product development. The technical product requirements were de-

1. The size of the bubbles represents the relative price level of the products.

veloped immediately after the principle product description could be established. Therefore, the physical product development could be done parallel to all marketing related project steps like desktop research, store checks, and definition of the product concepts. The final product was launched in January 2004, which implies a total development time period of 16 months. The product is defined as buttermilk yoghurt dessert with fruity taste which has in contrast to existing articles some specific features: high creaminess, tasty, hedonic product and healthy impression, simultaneously, as buttermilk obviously has positive diet features (low fat, good tolerance, "light" product, poor in calories) and contains some important nutrient ingredients (high-grade protein, calcium, lecithin).

Figure 6. Buttermilk yoghurt dessert

Secondly, we found some clear evidence that a dislocated co-operation is also possible for an extremely critical business activity like NPD. With respect to confidentiality it is absolutely crucial that no information goes out of the project team and organization. Using routine E-collaboration platforms like EC4EC one can trust that the technology is sufficiently safe concerning technological data protection. To ensure personal trust and confidentiality we assume that it is a must to meet in person in order to establish personal relationships between team members. In our case we had only two personal face to face meetings, all other communication and information distribution was done via E-collaboration. This is an outstanding way of saving time and money without the risk of unwanted information transmission. Of course, as mentioned before, an implicit pre-condition is trust which could be acquired via personal meetings.
Thirdly, we could evaluate the principal functionality and usability of the E-collaboration platform EC4EC. On the basis of this specific usability test some general suggestions for comparable E-collaboration methods could be deduced (for further information regarding this point please address to Haas, 2004).
Summarizing these results, it is advisable for companies to consider the application of E-collaboration media for NPD purposes in order to benefit of the advantages of E-collaboration.

4. Discussion

After finishing the project one key question remained: Could we solve the NPD dilemma of food processing companies mentioned in the first section of this article by use of IT media for E-collaboration purposes? Was it possible to deliver methods by which food companies are able to develop innovations which guarantee success in the food market to a high extent? Obviously, the presented decision based NPD process helps to decide if a product idea or concept should lead to the development of a marketable product. Via this stringent NPD process potential risks can be identified early and projects may be stopped in time due to negative evaluations before

cost of further development or market introduction arise. Total development time can be minimized by parallel project phases where appropriate. Feedback is an integrated part of this process. This is assumed to be the state of the art in NPD, also referred to as dynamic product development (DPD; Ottoson, 2004, 209).
However, it is not possible to conclude that the *application of an E-collaboration platform* has comparable positive impacts on the outcome of a NPD project. Coming back to the research question, there are some important advantages of E-collaboration, which are:

- reduction of transaction cost, paperless product development
- simplification of inclusion of customers/deliverers and, therefore, improved market perspective (concerning this point, there might be a significant positive influence on the market success of products: the flop rate may be reduced as customers' point of view is included into product development)[1]
- better knowledge management as all outcomes are saved for future application (comparable to Ramesh and Tiwana's [1999] comments on collaborative process knowledge management)

Therefore, E-collaboration has positive effects like reduction of time and cost, better knowledge management, immediate information transmission, and inclusion of market demands. It could influence market success positively, however, if there is an imperative causality must be topic of further research.
E-collaboration is widely used in many business fields. To which extent the dairy industry is applying this technology (or the food industry in general) cannot be ascertained via this study.[2] We assume that there are more generalizable positive experiences of the application of E-collaboration media in connection with NPD. As mentioned above, to solve these questions it is advisable to do further research in this important business field.
To come to the point, the outcomes of this project are promising: A rather small marketing unit and an external organization worked together for a sensible business aim like NPD. Communication and documentation were effectively done via E-collaboration. At the end the team succeeded in developing a product which was launched at the Austrian food market. This comes along with McDermott and O'Connor's (2002, 434) request to "develop and test new practices that managers bringing radical projects along can use with confidence". E-collaboration tools can facilitate the innovation policy of organizations. Of course, there are important risks mainly connected with trust and confidence. But, as long as business partners trust each other when meeting face to face, they should be able to organize part of their communication and interaction via E-collaboration.

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1. The effective inclusion of consumers in NPD is promising (Souder et al., 1997); however, it might be difficult – following Kärkkäinen et al. (2001): "Consumer-driven product development is … a demanding and difficult task". Even more demanding (and not mentioned yet) are co-operations with competitors in order to combine dislocated know how and to get more competitive on global markets (strategic R&D alliances; Narula and Hagedorn, 1999, 285).
2. Confirming discussions with Austrian market experts it can be assumed that within the Austrian milk and dairy industry this from of co-operation for innovation purposes is very unconventional. Usually the industry is particularly concerned that nobody outside the organization knows about their innovation strategies and new product ideas/concepts.

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