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Designing new meals for an ageing population

Authors:

Ana I. A. Costa^a and Wim M.F. Jongen^b

Affiliations:

^a School of Economics and Management, Portuguese Catholic University, Palma de Cima, 1649-023 Lisboa, Portugal.

^b Wageningen Business Generator, Wageningen University and Research Centre, Lawickse Allee 11, Building Nr. 425, 6701 AN, Wageningen, The Netherlands.

Correspondence Address:

School of Economics and Management, Portuguese Catholic University, Palma de Cima, 1649-023 Lisboa, Portugal

Tel.: +351 217 214 270 Fax: +351 217 270 252

E-mail: anacosta@fcee.lisboa.ucp.pt

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Designing meals for an ageing population

Ana I. A. Costa and Wim. M.F. Jongen

Abstract:

Today's ageing population is an ever-increasing, highly diverse group of people wanting to live a healthy and enjoyable life. Seniors increasingly see the importance of eating healthy and delicious food in a pleasant environment in achieving happiness and well-being. Up until now, the food industry has been rather slow in transforming the wealth of available knowledge regarding the nutritional needs and sensory perception of the ageing into new food products. Based on own and others' published research, we discuss here how the design of new meals for an ageing population can be tackled by a consumer-led approach to food product development. After a brief overview of the underlying concepts and practices, a detailed description is given of how this approach could be used in the design of Home Meal Replacements for senior households. This description includes also a comprehensive review of the major determinants of food preference and meal choice behaviour in a later age. Finally, relevant implications are derived from the work presented and future trends in the technological development of foods for the ageing highlighted.

Keywords: New Product Development (NPD), ready meals, consumer behaviour, food choice, seniors, Home Meal Replacements (HMR).

1. Introduction

Doubled-dipped spicy chicken, blue cheese and walnut salad with maple dressing, and chocolate-dipped bananas – to whom do you think this menu is designed for? A hungry teenager perhaps? Think again! These are Rachel Ray’s recipes for self-standing seniors (The senior corner, 2006). Today’s ageing population - and, most importantly, tomorrow’s - forms an ever-increasing, highly diverse group of people wanting to live a healthy and fun life as much as any other individuals. And like everybody else, they increasingly see how important it is to eat healthy and delicious food in a pleasant environment to achieve just that (Roberts, 2002). However, to maintain the right balance between enjoyable food, a healthy diet and a pleasant lifestyle is perhaps harder on the ageing than on any other demographic group.

Generally speaking, the food industry has been slow in transforming the wealth of available knowledge regarding the nutritional needs and sensory perception of the ageing into new food products (Roberts, 2002). Although seniors are probably more willing to try new foods than previously thought (Pelchat, 2000; Otis, 1984), highly tailored approaches are still required for new products to succeed given the heterogeneity and special requirements of this group (Fillion and Kilcast, 2001; Herne, 1995; Kremer *et al.*, 2007; O’Donnell, 1994; Roberts, 2002; Rolls, 1993; Russel *et al.*, 1999; Wysocki and Pelchat, 1993). Moreover, to position new products as to target an ageing market is a notoriously difficult task, as foods labelled “for seniors” will probably turn out to be fairly unattractive for old and young alike (Roberts, 2002).

Consequently, we discuss here how the design of new meals for an ageing population can be tackled by a consumer-led approach to food product development. After a brief overview of the concepts and practices, a detailed description is given of how this approach could be employed in the development of Home Meal Replacements for

senior households. This description also includes a comprehensive review of the main determinants of food preference and meal choice behaviour at a later age. Finally, main implications are derived from the work presented and future trends in the technological development of foods for the ageing highlighted.

2. Consumer-led new product development: the concept and process in the food industry

The concept of consumer-led new product development (NPD) was introduced in the early 90's by Urban and Hauser (1993). It refers to a market-oriented innovation strategy that uses consumer needs as the basis for the development of new products with added value. Despite the promptness with which several marketing and engineering experts advocated the employment of this strategy in the food and beverage industry (Lord, 2000; van Trijp and Steenkamp, 1998), it was not until recently that concrete guidelines for its practical implementation were supplied (Costa and Jongen, 2006).

Figure 1 depicts the key implementation stages of a consumer-led NPD process in the food industry. The *opportunity identification* stage aims at defining the target markets for new foods and at generating product concepts that can successfully compete in these markets. At this stage, supported by a thorough understanding of the competitors' and their own core competences and unique strengths, companies should conduct a strategic assessment of which food technology platforms might provide a solid basis for product development. If, given the outcome of such an assessment, potentially attractive markets and concepts can be found, the decision to initiate the development process can take place (Dahan and Hauser, 2002a; Robinson, 2000; Urban and Hauser, 1993; van Trijp and Steenkamp, 1998).

The *design* stage seeks to identify the key consumer benefits the new food is to provide, as well as the positioning of these benefits *via-à-vis* the competition. It is thus throughout the different phases of this stage that the development of the physical product, the correspondent marketing strategy and the service policy takes place. The strategic information about the target consumers collected during the opportunity identification stage serves as the primary input for the first design phase – *opportunity definition*. At this point, the potentially rewarding concepts selected earlier are submitted to the target consumers' evaluation. Such an early evaluation is crucial, since it allows for an assessment of the market potential of the selected ideas to take place before any considerable funds are committed to the development process. Qualitative research methods are usually employed first to identify relevant issues which may need further investigation, while quantitative methods are used at a later time to establish the expected benefits and their relative importance in a more precise manner.

Means-end chain theory (MEC), through its most usual research application - the performance and analysis of laddering interviews and the generation of the target consumers' hierarchical value maps (Gutman, 1982; Hinkle, 1965; Olson and Reynolds, 2001) -, can be a very helpful tool in the early design phases of a consumer-led food product development process (Costa *et al*, 2004). MEC provides a more precise definition of food consumption motives by depicting how perceived product attributes are linked to self-relevant consequences of consumption (the key benefits) and personal life values (or goals), in a hierarchical model of consumers' cognitive structures. This model is thus able to pinpoint the potential choice criteria used by consumers to evaluate and select among alternative products or services, and explain the higher-order reasons leading to the relevance of these particular criteria. This results in the generation of three types of useful information about the target market (Audenaert and Steenkamp,

1997; Grunert and Valli, 2001; Gutman, 1982; Olson and Reynolds, 2001; ter Hofstede *et al.*, 1999; van Trijp and Steenkamp, 1998):

- The key benefits consumers expect from foods, which can be used to determine the positioning of new products in the marketplace;
- The attributes of food products consumers use to infer the delivery of key benefits (and the absence of negative outcomes or risks) associated with consumption, which can provide guidance to later R&D endeavours;
- The values and goals determining the relevance of the different benefits to consumers, which can be used to design and target advertising campaigns for the launch of new products.

A list of consumer benefits and their relative importance to consumers is then conveyed into a *refinement* phase, in which the new product starts to take shape. This is achieved through a careful analysis of the relationships between consumers' food perceptions, preferences and choices, on one hand, and the product's potential technological features on the other. Underlying this analysis is a model of food consumption behaviour in which preferences are formed based on the perceptions of the products' features and lead, in turn, to choices contingent upon price and availability (Urban and Hauser, 1993; van Trijp and Steenkamp, 1998). When the refinement phase is successfully completed, *i.e.*, when it was possible to design a new food that can potentially fulfil consumer needs in a superior and unique way, the assessment of the proposed design takes place in the *opportunity evaluation* phase. This assessment consists of forecasting sales for the new food product based on the aggregation of the probabilities of individual consumers' preferences and choices (Urban and Hauser, 1993).

Further development and testing of both the new product and its marketing strategy occurs when the forecasted market performance meets company targets. Once the

testing stage has been successfully concluded, *market introduction* can take place. The monitoring of the target consumers' and the competitors' reactions to the introduction, which may lead to further adjustments of both product and marketing strategy, constitutes the final stage of the development process, the so-called *life-cycle management* (Urban and Hauser, 1993).

A consumer-led food product development process, such as the one described above, simultaneously reflects and confers concrete substance to the fundamental themes of a market-oriented innovation strategy (Costa *et al.*, 2000; Costa and Jongen, 2006):

1. The needs of the targeted consumers are the starting point of the product development process, with their assessments of ideas, concepts, prototypes and products *vis-à-vis* those of competitors directing the underlying managerial decision process from onset;
2. The primary role of technological development is to support the fulfilment of consumer needs and the creation of market value. As such, the decision to adopt a specific technology platform is based on its forecasted ability to generate new products that deliver superior consumer value relatively to those already existing in the marketplace;
3. To be able to not only match the right market with the right technology but also ultimately deliver the product in accordance with the target consumers' requirements, a process of translating consumer information (needs, perceptions, preferences) into technical features (technological parameters, product specifications, quality characteristics) must continuously take place.

Throughout the following section, a research study illustrating the application of consumer-led food product development in the generation of new Home Meal

Replacements (HMR) for an ageing target market will further emphasize these central themes.

3. Consumer-led food product development for the ageing: the case of Home Meal Replacements

3.1 Identifying opportunities

Target market

Senior citizens (55 and over) currently represent 23% of the Dutch population, a share expected to rise to about 30% in 2015, mostly due to an increase in life expectancy (CBS, 2000a, b). The majority of Dutch seniors is at least in reasonable health and has an income from which they can live comfortably, there being nonetheless a considerable minority - some single seniors and widows, the very old and seniors from ethnic minorities - who are in a less favourable situation (Klerk and Timmermans, 1999). Nonetheless, it seems that most Dutch seniors will be enjoying the rest of their long lives with a reasonable degree of both individual and economic independence. These circumstances, by means of creating the expectation of a growing 'grey' buying power with a desire for quality products and services, have made of this group a very attractive target market for many companies in Europe (Hielkema and Kuyer, 1995).

As Dutch seniors become more and more active in society, they will have increasingly less time and energy left for domestic chores. Consequently, they will also start questioning themselves about what they will eat when they are no longer willing or able to purchase and prepare their own meals, and yet must for a great deal remain self-sufficient (Hielkema and Kuyer, 1995). When this happens, it seems reasonable to expect that the ageing populations will increasingly demand for solutions that can

conveniently and satisfactorily replace their own cooking (Roberts, 2002). The question is, what will they be looking for and where will they be able to find it?

Figure 2 depicts the multi-stage decision-making process underlying consumers' choice of meal solutions (Costa *et al.*, Jongen, 2004). This consumer-oriented approach to product-market structure analysis (Srivastava *et al.*, 1984) can be used to better understand how the different segments of the Dutch ageing population choose between alternative types of meals. According to a life-style segmentation of Dutch seniors (Sonneveldt, 1996), about 20% of these are reasonably healthy, well-off widows - the so-called *Silvered Singles* -, who are very active in associations and clubs and therefore eat out frequently in restaurants, hotels and catered events. Representing another 20% of this target market are the *Golden Enjoyers*, socially and physically active people with high spending power and not much will to cook everyday. Although eating out often, these seniors still appreciate staying at home to receive relatives and friends, or simply to relax and enjoy their houses. Finally, the majority of Dutch seniors are considered to be *Bronzed Home-Birds*, conservative ageing citizens with diminishing health and little wish to be socially active, who are keen on cooking and eating traditional Dutch meals. It seems thus that for at least the last two segments, though likely in a very different manner, the development of new meal solutions to be consumed at home could constitute an attractive market opportunity.

Strategic assessment and product concept

At the core of market opportunity identification lays the strategic assessment of which technology platforms might provide a solid basis for the development of new food products with superior value for the targeted consumer group. Such an assessment is essentially based on an overview of the benefits delivered by existing products and their underlying technological structure. Importantly, this overview should contribute to the

identification of structural gaps, indicating where benefits are being demanded by target consumers but not delivered by any of the existing products and technologies, since these constitute the development opportunities. Finally, it should also facilitate an early and relatively simple appraisal of the relative worth of the different development opportunities it generates (Cooper and Kleinschmidt, 1986; Dahan and Hauser, 2002a; Urban and Hauser, 1993).

Home Meal Replacements (HMR) are manufactured main courses (or pre-assembled main course components) - containing a protein (animal or plant) and a carbohydrate (starch) source, as well as a vegetable component-, designed to fully and speedily replace the main course of a homemade meal (Costa *et al.*, 2001a). This category encompasses not only pre-packed meal courses sold by food retailers, the so-called ready meals, but also meal solutions supplied through services like take-out, home delivery and meals-on-wheels, and corresponds roughly to the area on the right-hand side of Figure 2. Consumers' selection of meal replacements can be determined by several of the products' specific attributes, such as taste, similarity to homemade, main ingredients or freshness. Nevertheless, it is their distinctive convenience features and the relative level with which they are present that determines consumers' choice both at the category and at product level to a large extent. Importantly, they are also directly linked to well-defined technological processes (Dade, 1992; Datamonitor, 2003; Ritson and Hutchins, 1995; Steptoe *et al.*, 1995; Swoboda and Morschett, 2001).

Table 1 presents an overview of the benefits delivered by existing and potential HMR products, structured around two main dimensions - convenience in storage and convenience in preparation -, both containing four levels of increasing convenience (Costa *et al.*, 2001a). Each cell entry depicts the percentage of senior respondents (55-94 years old) from the Dutch National Food Consumption Survey 1997-98 (DNFCS)

who consumed products delivering the respective level of combined convenience. These figures indicate a concentration of HMR consumption at the time in two convenience levels – ready to eat products with minimum shelf-life, mainly prepared meals supplied by the foodservice sector, and manufactured meal solutions with long durability but which require a more or less prolonged heating before consumption.

When compared to the overall sample of HMR consumers from the DNFCS (Costa *et al.*, 2001b), the target market exhibited a relatively lower preference for products with the highest convenience in preparation and a relatively higher preference for HMR with a very long shelf-life. This could be associated with perceived time scarcity and easiness in regular food procurement on behalf of the younger consumers relatively to their senior counterparts. There was also a relevant difference in terms of the specific product selection. While both the ageing and the overall population consumed mostly take-away Oriental meals and canned meal soups, frozen traditional Dutch dishes were relatively more preferred by older respondents (especially those older than sixty-five), with younger ones eating mostly frozen pizzas instead. This could indicate a relatively higher preference of the target market for products that closely mimic traditional homemade meals, a hypothesis which finds support in findings from other consumer studies (Herne, 1995; Laureati *et al.*, 2005; Sonneveldt, 1996).

Importantly, the overview depicted in Table 1 highlighted relevant mismatches in the way the assortment of manufactured HMR products commercialised at the time was meeting the demand of the target group, which could be transformed into potentially rewarding development opportunities. Though seniors clearly preferred manufactured products the preparation of which involved a fair amount of cooking, few such products could be found on offer. This was mainly because earlier Research and Development (R&D) and marketing efforts of ready meals' producers had been directed mostly

towards younger consumers. Moreover, the concurrent seniors' trend to favour products with a very long shelf-life posed interesting challenges to the development of new processing technologies, namely those sustaining the generation of high durability meal replacements composed of raw or minimally processed ingredients. Finally, this outcome stressed the need for manufacturers to address the general trend to seek for meal solutions in take-out or home delivery services, through either the development of short-life retail products competing on readiness for consumption or of prepared meal components for the foodservice sector.

3.2 Designing the new product

Opportunity definition

The potentially rewarding product concepts and technological developments identified in the previous stage must be submitted to the target market's evaluation as early as possible in the design process. Such evaluations usually start with qualitative consumer research studies, like focus groups and personal interviews (Krueger and Casey, 2000; Marshall, 1997). These aim at the timely detection of all the potentially relevant strengths and weaknesses of the identified concepts for the targeted consumers, as well as perceived bottlenecks and synergies which could turn out to affect the development and acceptance of innovative technologies. Subsequently, semi-quantitative and quantitative research studies are envisaged with the aim of defining more precisely the aspects previously uncovered and, most importantly, establish their relative importance for the target group (Costa and Jongen, 2006; Urban and Hauser, 1993; van Trijp and Steenkamp, 1998, van Kleef *et al.*, 2005).

In the context of a research project regarding the development of HMR for the ageing, four focus groups (n=32) and 11 individual, in-depth interviews were conducted with

target consumers (54-84 years old, 90% retired, 45% living in single-person households (Costa, 2003; Costa *et al.*, 2002). The aim of these qualitative studies was to ascertain the target market's general views on meals and meal solutions, as well as its evaluation of some specific meal replacement products and the benefits delivered by them, given that very little was known at the time about these topics. Subsequently, with the goal of establishing the relative importance of the motivations behind meal choice in a more precise manner, 25 individual laddering interviews were conducted with target consumers (55-87 years old, 85% retired, 45% living in single-person households) regarding both meal solutions in general and specific HMR products (Costa *et al.*, 2007). Finally, to be able to forecast which of the relevant motives behind meal choice would have the strongest impact on the target market's demand for different HMR products, a target consumers' sample (n=112, 55-85 years old, 70% retired, 15% living in single-person households) was surveyed regarding its meal preparation behaviour and related attitudes (Costa, 2007a). All senior consumers participating in the research project were self-standing Dutch citizens in charge of meal acquisition and/or preparation at their households (about 80% women), and included both HMR users and non-users in an equal proportion.

Target consumers' evaluation of homemade meals

The most striking outcome of the qualitative research performed was the high personal relevance attached to the preparation and consumption of homemade meals. This, in turn, had a strong impact on the target market's evaluation of other meal solutions. Full hot meals were reported to be prepared and eaten daily on weekdays, mainly in the evening time. These meals were said to be essentially composed of one main course – usually stewed or fried meat with gravy, boiled potatoes and boiled vegetables -, often, but not necessarily always, accompanied by soups and salads, as starters or side-dishes,

and a dairy-based dessert. Resembling preferences in several other North European countries (Fjellström *et al.*, 2001; Herne, 1995; Marshall, 2000; Prättälä, 2000), “meat and two vegetables” courses constituted simultaneously the most typical and the most favoured centrepiece of a cooked dinner. On weekends, however, target consumers indicated that they were less willing to cook and rather ate soups and sandwiches (or salads in the warmer months), order meals from the Chinese or Italian take-out or went out for dinner.

Figure 3 depicts the target market’s hierarchical value map of the preparation and consumption of homemade meals on weekdays. Accordingly, the main features of a cooked dinner in an ageing Dutch household are simplicity (*i.e.*, prepared with few ingredients and seasonings and basic, time-saving cooking methods), tastiness, diversity (*i.e.*, main ingredients changing from meal to meal), freshness (*i.e.*, prepared everyday from scratch with unprocessed foods) and safety. The last two features are related not only with the use of fresh, organically-produced ingredients (perceived as being more natural and pure), but also with homemade meals being the outcome of household processing rather than manufacturing. Simple cooking, good sensory quality and healthiness have also been identified as playing an important role in seniors’ choice of foods and meals in other studies (Kronndl *et al.*, 1982; Laureati *et al.*, 2006).

Target consumers viewed preparing their cooked dinner as a mandatory and essential part of their daily routine, to be kept tightly under their own control. In spite of this, cooking was also considered to be fun, especially when there was an opportunity to try out new recipes from magazines or retail brochures. These reportedly introduced new ingredients and flavours that offset the monotony of the typical Dutch diet and helped avoid boredom and lack of appetite. Last but not least, hot meals should always be

prepared with care, served warm and eaten at a set table together with relatives or friends in a cosy atmosphere.

Several key benefit-value links in Figure 3 were associated to the idiosyncratic characteristics of homemade meals. Dutch seniors stated that, although they remained fairly good eaters, they did not have as much appetite as in past years. Therefore, meals that looked and tasted good were essential to stimulate eating and guarantee an adequate food intake. Good appearance and good taste (like potatoes that remained in one piece and crunchy vegetables) were in turn believed to be the result of the simplicity, diversity and freshness of homemade meals, which were thus seen as paramount in leading a healthy diet.

Similarly important to a healthy and safe diet was the amount of control provided by preparing one's own meals over what and how much food was bought, cooked and eaten daily. Moderation was the key word, not the least to avoid overweight and overspending. Cooked dinners reportedly contained only a small portion of meat, which was sometimes replaced by poultry, fish or a vegetarian entrée. Cooking fat and processed fruits and vegetables were equally avoided, as high amounts of food additives, saturated fats and salt were believed to be health-damaging. This negative association between industrial processing and leading a healthy diet was observed in earlier studies with ageing consumers (Fjellström *et al.*, 2001; Hielkema and Kuyer, 1995; Oakes, 2003), as well as the link between the consumption of highly processed foods and lower socio-economic status and prestige (Howarth, 1993).

Clearly, the preparation and consumption of homemade meals was seen by Dutch seniors mostly as a source of joy and pleasure, both on its own right and as a catalyser of togetherness. But it was likewise clear that they mostly saw meal preparation as a (housewife's) duty: regardless of whether a person had time and energy to cook, or

actually enjoyed it, dinner should be prepared from scratch every day. Moreover, people who were not willing to cook regularly or searched for alternatives to their own cooking were considered lazy. Remaining active and independent was given a high self-esteem value by target consumers. Self-esteem played an equally important role in compelling ageing women to put great care, effort and creativity into meal preparation, as this earned them a great deal of approval from relatives and social acquaintances. The notion of the proper dinner being that cooked by the housewife and shared with the family remains thus strongly held social norm by older Europeans (Falk *et al.*, 1996; Herne, 1995; Mäkelä, 2000; Marshall, 2000; Murcott, 1995; Sobal, 2001).

Table 2 depicts the strength of target consumers' associations between attitudes towards and the frequency of several meal preparation behaviours. The frequency with which seniors reportedly prepared their hot meals was strongly associated with their viewing of this activity as a daily habit or chore. A high involvement with food, a low convenience-orientation (Candel, 2001) and a high enjoyment of cooking also increased the frequency of meal preparation and of trying new recipes. Conversely, the same attitudes displayed negative associations with the reported frequency of usage of convenience foods and HMR. This was particularly the case for viewing cooking as a habit or duty, and for low convenience-orientation. Other studies have also pointed out the high self-relevance of cooking and the consequent low moral status of convenience in food preparation, especially among older female meal preparers (Gofton, 1995; Goldsmith *et al.*, 1995; Haire, 1950; Herne, 1995; Milburn, 1995; Thompson, 1996).

Target consumers' evaluation of ready meals

The high personal relevance attached to the preparation and consumption of homemade meals, and the resulting negative evaluation of the convenience features of ready meals, seemed to influence the actual target market's demand for the latter only to some extent.

Half of the Dutch seniors participating in the qualitative study declared to be regular users (\geq once/week) of ready meals, with 34% of all Dutch ready meal consumers being older than 55 years (Costa *et al.*, 2001b). Knowledge about the ready meals on offer was equally very good; even non-regular users knew a wide variety of products and could accurately describe many of them. That the consumption of this type of products is far from being restricted to young and busy singles or dual-income couples with no children - a stereotype overly reinforced by many marketing and public opinion campaigns -, has also been confirmed by other European studies on the dietary habits of the ageing (Hautvast *et al.*, 1992; Schlettwein-Gsell *et al.*, 1991).

Figure 4 depicts the target market's hierarchical value map for the consumption of ready meals on weekdays. As can be readily observed, Dutch seniors reportedly have strong motives both for and against the consumption of ready meals. Their level of convenience in acquisition and storage was a highly appreciated feature, with participants naming a few situations when these would come in hand: when having unexpected guests for dinner, during holidays or when one just came back from them and had no fresh food in store, and when prevented from shopping or cooking due to sudden illness. Another prized feature was the ample assortment on offer. Besides ensuring a varied diet, prepared meals were considered quite handy when wanting to eat a highly liked dish that was too complicated to prepare at home.

Yet another reported advantage of ready meals was their level of readiness for consumption, though only in situations in which the benefits achieved by not cooking conferred to the use of these products the necessary degree of appropriateness. Such benefits were, for instance, having more time to be socially active and more stamina to remain self-standing and enjoy other niceties of daily life besides eating. But not surprisingly, the high level of readiness for consumption of ready meals also rendered

them quite unsuitable in the eyes of the large majority of target consumers. These products were only seen fitting those who could not or would not make the necessary effort and time available to cook and enjoy a good meal in the company of their family (e.g., “the really old and sick”, “widowers”, “young people today”, “working couples”). And although the former were hardly the subject of reproach, the later were seen as sadly neglecting their duties towards others and themselves.

The target consumers’ perception of ready meals being mainly standardised, mass-produced, unappetising and unwholesome foods was the last strong motive supplied against their regular consumption. These products were judged to be prone to quick spoilage and contain poor quality ingredients (e.g., overcooked vegetables), as well as excessive amounts of salt, fat and food additives. Such an overwhelmingly negative appreciation of the quality of ready meals derived mainly from them being seen as the outcome of manufacturing rather than household processing. Nevertheless, Dutch seniors generally conceded that these products, though by far not as tasty and satiating as the result of their own cooking, were still full hot meals and thus preferable to cold meals, snacking or grazing. The role of daily hot meals in preserving important eating and living routines of ageing households has been highlighted in other studies as well (Herne, 1995; Sobal, 2000).

Table 3 shows the strength of target consumers’ associations between attitudes towards ready meals and the frequency of several meal preparation behaviours. The frequency with which seniors reportedly used ready meals was significantly associated with a positive evaluation of their healthiness and tastiness, the appropriateness of their convenience in preparation and the extent to which they lend themselves to be part of a shared meal. This positive evaluation was so also strongly related to a higher consumption of convenience foods and, to a lesser extent, of takeout and restaurant

meals. Finally, it was interesting to notice that while a positive overall attitude towards the consumption of ready meals was not necessarily associated with a higher likelihood of replacing homemade meals with cold meals, warmed-up leftovers or skipping dinner altogether, viewing cooking as a habit and a duty, a high involvement with food, a low convenience-orientation and a high enjoyment of cooking all seemed to lessen the frequency with which such behaviours took place. These findings are amply supported by similar studies (De Boer *et al.*, 2004; Hielkema and Kuyser, 1995; Oude Ophuis *et al.*, 1994; Sobal, 2000).

During the opportunity definition phase, target consumers also evaluated specific meal replacement products – frozen pizza, canned meal soups, dried Italian-style pasta, chilled hotpot and differently processed versions of Oriental-style noodles -, their attributes and the benefits delivered (Costa *et al.*, 2007; Costa *et al.*, 2002). Although all these products were among those regularly consumed by the target market (Costa *et al.*, 2001b), only the frozen pizza appeared to present an acceptable trade-off between convenience in preparation on one hand and healthiness and tastiness on the other. The perceived simplicity of most frozen pizzas gave seniors the opportunity to add extra toppings of their own choice and enough reason to prepare a green salad on the side. Not only adding more ingredients and preparing side-dishes was seen to improve considerably the sensory and nutritional quality of the product, but also, and most importantly, it provided seniors with a welcomed opportunity to feel more involved in the preparation of their own meal. All of the remaining products were mostly viewed by target consumers as unhealthy, unappealing, expensive and not really simpler or quicker to prepare than the homemade versions. This was a somewhat surprising outcome given previous assumptions about seniors' relatively higher preference for products that closely mimic traditional homemade meals (Herne, 1995; Laureati *et al.*, 2005;

Sonneveldt, 1996). In view of this it might be wise not to overestimate the importance of tradition as a determinant of seniors' choice of meal solutions.

Another problematic trade-off represented by ready meals was that between storage convenience and freshness. Some seniors found no ready meal ever to be fresh, since they were all pre-processed. Others found chilled meals to be the most fresh, because they had been packed under cooling right after their preparation and had a short shelf-life. Others yet found frozen meals to be the most fresh and convenient because they had a long shelf-life and their ingredients were "fresh frozen". Finally, dried and canned meals were highly appreciated because of their storage convenience, but unanimously considered not fresh.

Opportunities for development of new ready meals

The NPD process as depicted in Figure 1 might lead to the conclusion that a consumer-led approach to innovation is necessarily one of a highly sequential nature and narrow focus, *i.e.*, a linear, end-to-end search for one product that matches the needs of one target market. However, the everyday practices of food companies' R&D and marketing departments, as well as those of the several other departmental functions involved in the development and launch of new products are far messier. Sometimes they are concurrent and iterative, or partially overlap, to guarantee the efficiency and effectiveness of the process; often enough, though, and to the misfortune of many innovation efforts, they can become downright redundant and even antagonistic (Dahan & Hauser, 2002b; Fuller, 2004; Griffin & Hauser, 1996).

NPD should always start with a broad range of ideas from as many as possible sources, which will later be winnowed down to a few high-potential product concepts. Only some of these, in turn, will be finally developed and launched. It is often cheaper and more effective to test many alternative concepts at an early stage than to modify an

unsuitable product at pre-launch or introduction, or have a market flop. Ideally, consumer-led food product development should support the creation of new product platforms for pre-specified market environments, given that the existence of main common elements enables mass-customisation and more effective development processes (Dahan and Hauser, 2002b).

Taking into account all the information collected from the target market during the strategic assessment and the opportunity definition phases, there clearly seemed to be two main areas where meeting senior needs through the development of innovative technology and new ready meal platforms could be potentially profitable. One was to address the trade-off between the appropriate level of convenience in preparation on one hand, and healthiness and tastiness on the other. This could be achieved by developing meal replacements the preparation of which would require just the right amount of extra ingredients and own cooking. The other would be to develop the necessary processing technologies for such products to be composed of raw or minimally processed ingredients (addressing target seniors' demand for both freshness and suitable levels of convenience in preparation), and yet have a reasonably long shelf-life. Therefore, the development opportunities uncovered were:

- The manufacture of chilled, ready-to-eat meal components for the retail market (but not necessarily pre-packed), so that seniors could “mix and match” their dinners as to resemble the highly popular orders from Oriental take-out outlets;
- The manufacture of ready meals tailored to the needs of ageing consumers following special diets (institutionalised or not), whether due to a particular health condition or just the wish to prevent certain types of illnesses and promote a better overall health status.

3.3 Opportunity refinement

At this stage, a comprehensive analysis of the relationships between the attributes linked to the consumption benefits deemed relevant by the target market and the main technical features to be displayed by the new products takes place. The goals of such an analysis are to give shape to products that fulfil the target consumers' needs in a unique and superior way, and develop marketing strategies that communicate the successful fulfilment of needs. Therefore, this is perhaps the most crucial moment in a consumer-led food product development process in guaranteeing that value to both consumers and producers is created (Costa and Jongen, 2006; Urban and Hauser, 1993; van Trijp and Steenkamp, 1998).

The research project described in the previous sub-section, which studied the motives underlying Dutch seniors' choice of meal solutions and their relative importance, uncovered three main dimensions that could constitute rewarding development opportunities for ready meals. These were: (1) easy to prepare but allowing a certain degree of participation in the making of the final product; (2) freshly prepared from raw ingredients but with a reasonably long shelf-life; and (3) familiar but not necessarily traditional. With the objective of verifying whether these three main themes could constitute potentially rewarding new product platforms, five product concepts were generated to be evaluated by target consumers, the description of which is shown in Table 4 (Costa, 2007b). Given that seafood consumption, a healthy dietary habit, is thought to increase with age (Olsen, 2003), three of the selected concepts exhibited fish/seafood as one of the main ingredients. These products were thought to constitute both potential optimum equilibrium points within one or more of the dimensions structuring the demand and technologically feasible development opportunities.

Fifty-seven Dutch female meal preparers (55-84 years old, 75% retired, 45% living in single-person households, 80% regular users of ready meals, 70% with a high level of category knowledge) were asked to classify 59 HMR according to their written descriptions, including the five product concepts and 54 other products frequently consumed at the time (Costa *et al.*, 2001b), in a choice-oriented, free sorting task (Michela and Contento, 1984; Steenkamp *et al.*, 1994; van Kleef *et al.*, 2005). They were also asked to provide labels for the groups of sorted products and the criteria underlying their classification process. These labels and criteria were content-analysed and the frequency with which each criterion was used by respondents determined.

Eight classificatory criteria were used by more than 75% of target consumers: convenience, familiarity, freshness, healthiness, seasonality, taste preference, type of protein and type of staple. As described in the previous sub-section, all of these criteria constituted important dimensions underlying the target consumers' choice of ready meals, with the possible exception of seasonality, type of protein and type of staple. The latter could be associated with a tendency to favour products seen to guarantee a varied diet - a key benefit for the target market -, thereby constituting a valid preference dimension (Rappoport *et al.*, 1992). However, they could also have been used as perceptual dimensions by participants, *i.e.*, as means to establish comparisons between products based merely on their degree of similarity (Axelson *et al.*, 1986; Moteleone *et al.*, 1997). If that was the case, the last three dimensions may not be necessarily relevant to the target market's product choice (Creusen and Schoormans, 1997).

In a second stage, a matrix containing the frequencies with which target consumers classified the product concepts according to the eight classificatory criteria was generated and submitted to a correspondence analysis (Greenacre, 1994; Snelders and Stokmans, 1994). Figure 5 shows the results of this analysis, indicating that the criteria

differentiated well among each other and between the product concepts. The hotpot kit was perceived by target consumers mainly as a familiar product, typical for wintertime. This meal solution was also sometimes classified as fresh, because it was made out of chilled, minimally processed ingredients, but almost never as healthy or tasty given that it did not contain any green vegetables. Moreover, it was, often seen as inconvenient since it displayed a relatively short shelf-life and was perceived to require approximately the same level of preparation than its homemade counterpart.

Conversely, the steam salmon dish and the frozen paella were essentially characterised by their main components and their perceived freshness, while the pizza kit and the tuna salad were more frequently seen as tasty and appealing meal solutions. The later result is in agreement with the findings described in the previous sub-section, which indicated a high preference of the target market for pizza products, on one hand, and for ready-to-eat meal solutions with a very long-shelf life on another. Nevertheless, both the pizza kit and the frozen paella were more frequently seen as unhealthy and inconvenient meals than the steam salmon dish and canned tuna. This was mainly because the former were judged to contain fewer green vegetables and to be relatively more complex and slow to prepare than the later (though clearly not as much as their homemade counterparts). In another study, North-American women aged 64 years and older have equally indicated to perceive canned tuna as a fairly healthy food (Oakes, 2003). The steam salmon was also more frequently classified as fresh than the paella, indicating that chilled meal solutions were more readily perceived by target consumers as fresh than their frozen counterparts. Finally, the tuna salad, being canned, was almost never perceived as fresh, while the steam salmon was often seen as an unappealing meal solution because of its relatively short shelf-life.

It is interesting to notice that the chilled hotpot kit - a concept based on a fairly innovative technological concept that did not resemble any other ready meal in the market at the time -, was classified as familiar because it closely mimicked a traditional Dutch recipe. This seems to indicate that one of consumers' strategies to create representations for new products is to use information contained in pre-existing product categories, thereby avoiding the creation of new knowledge structures and/or major restructuring of existing ones (Moreau *et al.*, 2001). Such a cognitive strategy might facilitate the acceptability of truly new products (Stayman *et al.*, 1992; Sujam and Bettman, 1989) and novel foods (Tuorila *et al.*, 1994), and could therefore be employed in the development of innovative meal solutions and their respective market strategy. However, the hotpot kit was not often seen as appealing, since it was not perceived to be really simpler or quicker to prepare than its homemade version or offer any welcomed chance of flavour variation. Meanwhile, the chilled pizza kit received a positive evaluation from target consumers because, although fairly innovative and relatively complicated to prepare, it represented a well-known product with an enhanced feature that was highly appreciated – the possibility of one adding his or her toppings of choice. Taken together, these findings support the conclusion earlier drawn that familiarity alone, without any other added value, may not be enough to guarantee a successful meal solution for this target market.

The outcome of the classification task performed by Dutch seniors provides a good overview of how these target consumers perceived product concepts and their underlying technological processes to match desirable attributes of ready meals and their associated benefits. Importantly, it also provides valuable guidance for the creation and communication of the market positioning of potential new products (Cohen and Basu, 1987). Finally, it showed that the ready meal concepts tested, though

for their large majority fairly new and supported in innovative technologies, were only moderately incongruent with the product-category schemes held by target respondents. This could play a role in facilitating their acceptance (Stayman *et al.*, 1992; Sujam and Bettman, 1989). Nevertheless, the classification task outcome equally indicated that congruency and familiarity should not be enhanced, either in new food products or associated marketing strategies, at the expense of other features providing key benefits to ageing consumers.

4. Conclusions and implications

In this review of previous work, we have discussed how the design of new meals for an ageing population can be tackled by a consumer-led approach to food product development. Moreover, we have described in detail research illustrating the practical implementation of this type of approach in the development of Home Meal Replacements for senior households. This research has likewise provided useful findings regarding (1) how ageing consumers go about choosing their meals and ultimately their food, and (2) how their wants and needs regarding meal choice can be addressed in a way that adds value to both them and the food sector in general.

Future trends in technological development will most likely continue to focus on the sensory and nutritional needs of the ageing. More effective and wholesome strategies will have to be devised to compensate for age-related impairments in odour, flavour, trigeminal mouth feel and texture perception. These will open the door for important developments in the food ingredients' industry. Similarly, the perspective of being able to prevent the onset or worsening of many ailments affecting the ageing – heart disease, osteoporosis, diabetes, kidney disease and certain types of cancer – through an adequate intake of essential nutrients and dietary fibre will continue to drive the exponential

growth of R&D efforts in the area of functional foods and dietary supplements (Fillion and Kilcast, 2001; Herne, 1995; Kremer *et al.*, 2006; O'Donnell, 1994; Roberts, 2002; Rolls, 1993; Russel *et al.*, 1999; Wysocki and Pelchat, 1993).

There are often many remarks made by seniors about the packaging and labelling of foods. Portion sizes are seen as excessive for single or two-person households and packages as too big, too difficult to handle and creating too much waste. Most related complaints also stress the need for easy-to-open packages that keep components separate and allow buyers to see the food inside. Labels, on the other hand, are generally thought to be vague and not informative enough, besides being written in impossibly small fonts. These are all well-known aspects of concern in regards to the packaging of manufactured products targeted at the ageing that, for the most part, still await to be properly addressed by the food industry (Fillion and Kilcast, 2001; Roberts, 2002).

The consumption of plenty of fluids (water or any non-alcoholic, caffeine-free, low on sugar equivalent) is increasingly recommended for older individuals (Russel *et al.*, 1999). Ageing people can suffer from a reduced thirst mechanism (Rolls and Phillips, 1990; Phillips *et al.*, 1991), and must make a conscious effort to drink more and keep well-hydrated, particularly in this era of global warming. Consequently, the current bloom of the mineral water, natural fruit juices and herbal tea industries will be increasingly sustained by the need of the many ageing to quench their thirst in a healthy but pleasant manner.

Seniors' food choice differ little from everybody else's: a constant struggle between equally strong desires for taste and health, convenience and autonomy, routine and variation, the safety of the familiar and the allure of the new. The only significant difference is that to keep on winning that struggle everyday is harder and more vital for them than for most other people. The food industry, as everybody else involved in better

feeding the ageing, should have the ability and the willingness to alleviate that for them. Not the least because in less than twenty years time, one out of ten people in the world will be older than sixty (WHO, 1991), and the most and the most fortunate of us will, sooner or later, be one of them.

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Table 1: Overview of the percentage of senior respondents (55-94 years old) from the DNFCs who consumed HMR products in each level of combined convenience in storage and preparation (n=121).

	Ready to cook (%)	Ready to end- cook (%)	Ready to heat (%)	Ready to eat (%)
Shelf-life < 1.5 weeks	0	0	6	26
1.5 weeks ≤ shelf-life < 1.5 months	0	0	7	8
1.5 months ≤ shelf-life < 1.5 years	0	11	15	0
Shelf-life ≥ 1.5 years	0	5	22	0

Table 2: Significance and strength of target consumers' (n=112, 55-85 years old) associations between self-reported attitudes towards meal preparation and the frequency of meal preparation and consumption behaviours (two-tailed Spearman's rho: ^a significant at the .01 level, ^b significant at the .05 level).

	Cook	Try new recipes	Conv. food use	Ready meals	Take- out	Eat out	Cold meal	Warm- up leftover	Skip dinner
Involvement with food	.21 ^b	.25 ^b	-.01	-.09	-.12	.08	-.13	-.24 ^b	-.34 ^a
Enjoyment of cooking	.22 ^b	.44 ^a	-.21 ^b	-.18	-.08	-.08	-.25 ^a	-.02	-.35 ^a
Conv.-orientation in cooking	-.36 ^a	-.30 ^b	.23 ^b	.29 ^a	.17	.20 ^b	.30 ^a	.15	.27 ^a
Cooking as a habit	.47 ^a	.13	-.34 ^a	-.40 ^a	-.41 ^a	-.41 ^a	-.21 ^b	.00	-.27 ^a
Cooking as a duty	.35 ^a	-.04	-.21 ^b	-.27 ^a	-.34 ^a	-.35 ^b	-.16	-.20 ^b	-.19
Being expected to cook	.31 ^a	.04	.03	-.21	-.22	-.18	-.10	-.13	-.21
Being appreciated for cooking	.14	.15	-.20	-.15	-.00	-.09	-.05	-.12	-.14
Being the family's caregiver	.20	.30 ^a	-.06	-.24 ^b	-.17	-.02	-.08	.17	-.31 ^a

Table 3: Significance and strength of target consumers' (n=112, 55-85 years old) associations between self-reported attitudes towards ready meals and the frequency of meal preparation and consumption behaviours (two-tailed Spearman's rho: a significant at the .01 level, b significant at the .05 level).

	Cook	Try new recipes	Conv. food use	Ready meals	Take out	Eat out	Cold meal	Warm- up leftover	Skip dinner
Appropriateness of ready meals' conv. in preparation	-.17	-.11	.22 ^b	.21 ^b	.19	.22 ^b	.04	-.14	-.07
Healthiness of ready meals	-.14	-.12	.22 ^b	.22 ^b	.05	.18	-.03	.23 ^b	.02
Tastiness of ready meals	-.05	-.10	.32 ^a	.19	.14	.14	.09	.10	.03
Fittingness in a shared meal	-.08	-.14	.36 ^a	.28 ^a	.33 ^a	.17	.16	.11	.05

Table 4: Ready meal concepts submitted to the target consumers' evaluation (Costa, 2007b). ^a Resembled products in the market at the time but unfamiliar to target consumers; ^b Resembled a product recently launched; ^c Did not resemble any product in the market at the time.

	Ingredients	Preservation method	Shelf-life	Preparation instructions
Paella ^a	Seafood, chicken, peas, peppers, onions and rice	Minimally processed, mixed and frozen	1.5 years	Heat oil in a pan. Add the contents of the package and fry for 15 min.
Tuna salad ^a	Tuna, potatoes, green peppers and maize	Mixed, sterilised and canned	2 years	No preparation required.
Hotpot kit ^c	Meatballs, potatoes, carrots and onions	Minimally processed, packed under controlled atmosphere in separate containers and chilled	5 days	Cook the potatoes, carrots and onions in boiling water. Mash and season to taste. Fry the meatball and prepare the gravy according to your own recipe.
Steam ^b salmon	Salmon, potatoes and green beans	Minimally processed, packed together under controlled atmosphere and chilled	5 days	Heat in the microwave for 2-4 min. without opening the pack. Cooks in its own steam until pressure is released through the valve.
Pizza kit ^c	Dough, tomato sauce, ham and grated cheese	Minimally processed, packed under controlled atmosphere in separate containers and chilled	12 days	Spread the dough; cover with the sauce. Add ham and other favourite toppings; season to taste. Cover with grated cheese and bake in the oven 'til ready.

Figure 1

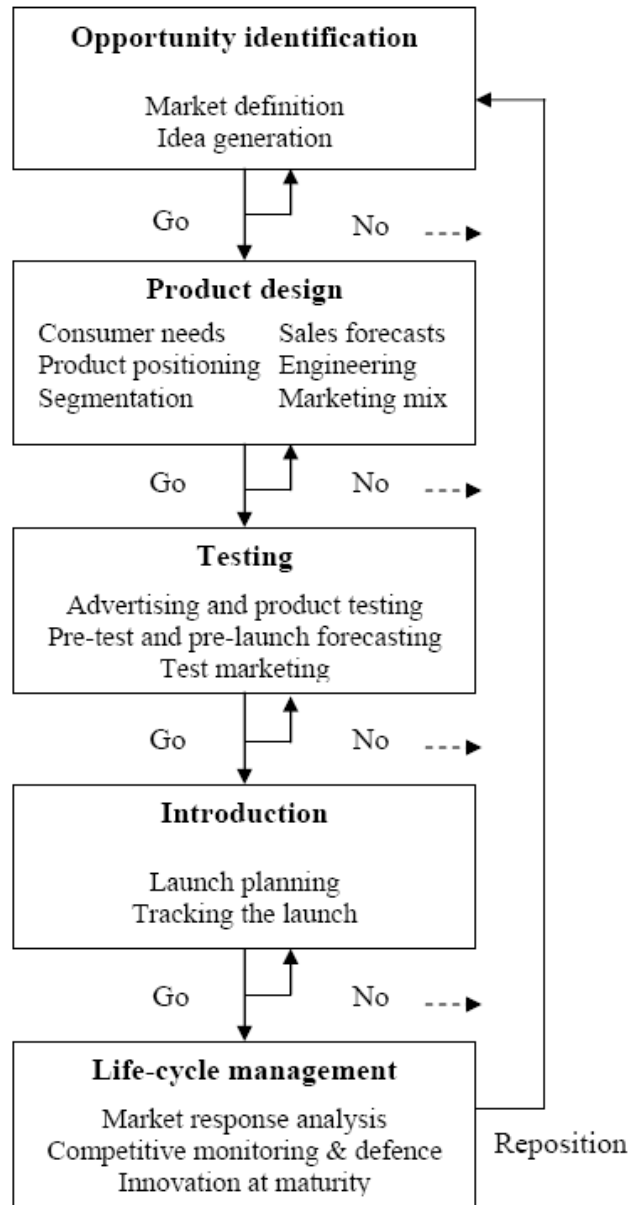


Figure 2

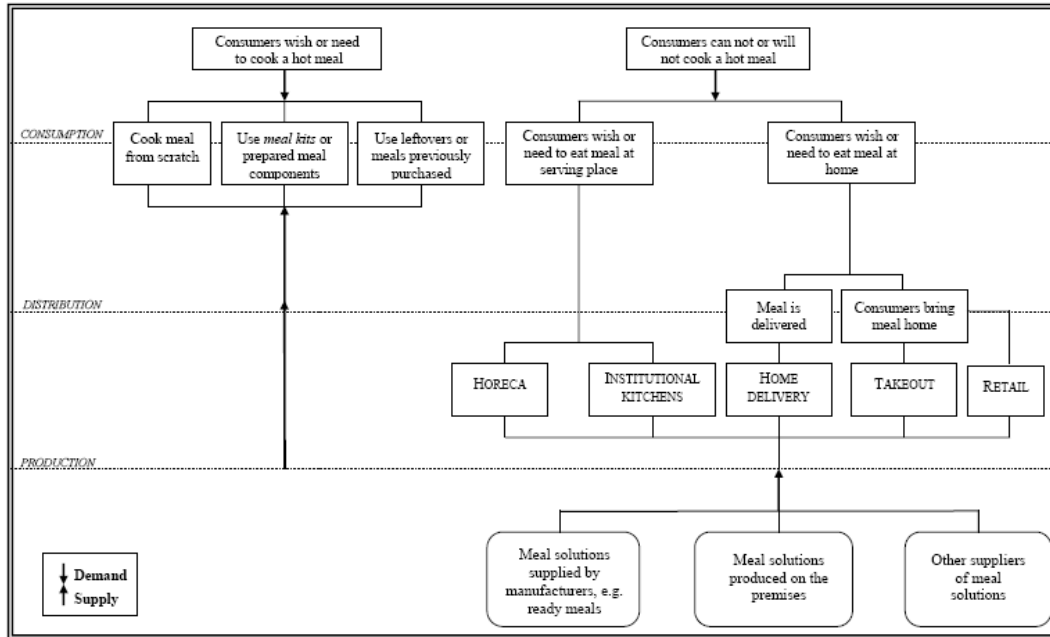


Figure 3

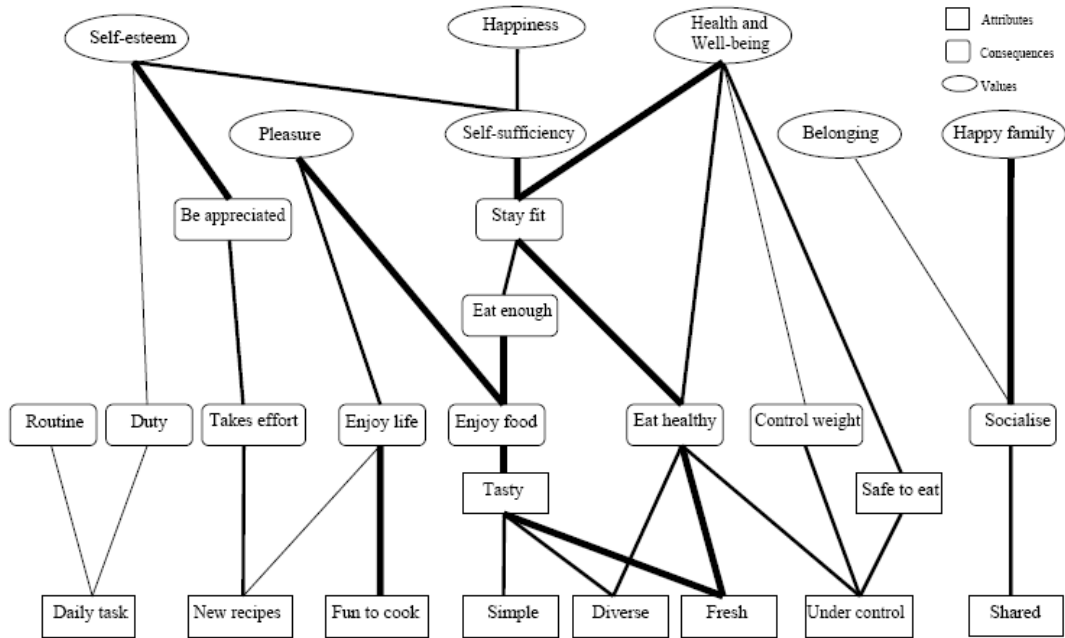


Figure 4

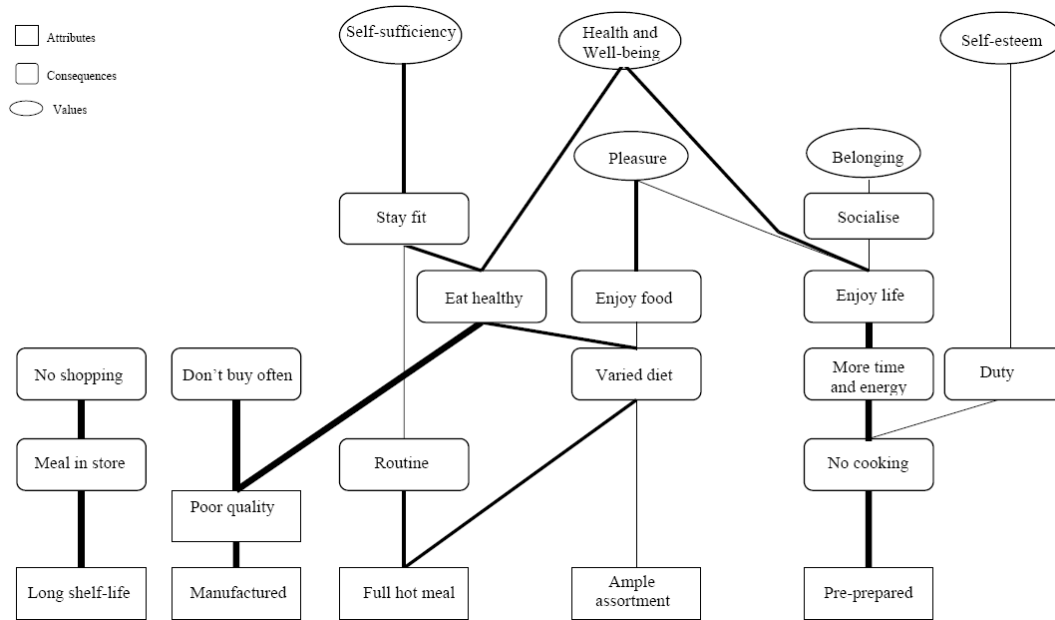


Figure 5

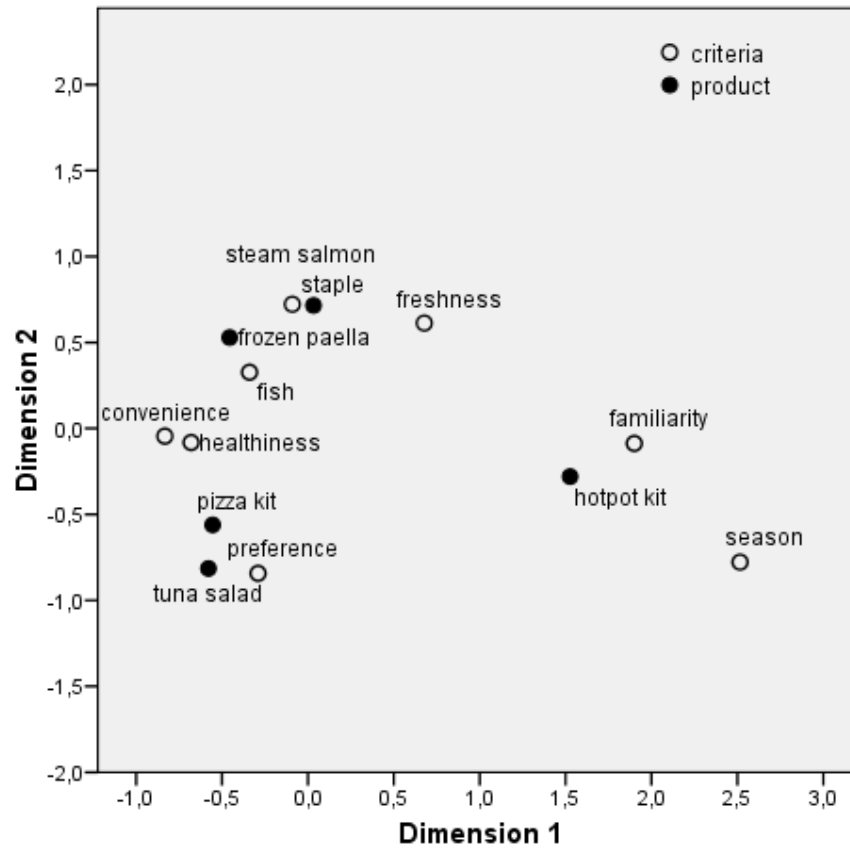


Figure Captions

Figure 1: The consumer-led new product development process (Costa & Jongen, 2006).

Figure 2: The multi-stage decision-making process underlying consumers' choice of meals (HORECA: HOtels, REstaurants and CAtering) (Costa, Dekker & Jongen, 2004).

Figure 3: Seniors' (55-87 years old) hierarchical value map of the preparation and consumption of homemade meals on weekdays (n=25). The thickness of the connecting lines indicates the strength of the associations between the cognitive elements.

Figure 4: Seniors' (55-87 years old) hierarchical value map of the consumption of ready meals on weekdays (n=25). The thickness of the connecting lines indicates the strength of the associations between the cognitive elements.

Figure 5: Correspondence analysis map resulting from seniors' (55-84 years old) categorisation of five ready meal concepts according to eight sorting criteria (n=57).