

Your health!?

Transforming health perception into food product characteristics in consumer-oriented product design

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Your health!? - Transforming health perception into food product characteristics in consumer-oriented product design

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Food is part of everyday life and few things have changed more drastically in the last century than the way food is produced, processed, distributed, marketed and consumed. Food companies want to be more successful in product development, therefore this needs to be consumer oriented.

This thesis develops a conceptual framework that enables transforming consumers' health perception into product characteristics, using health as a quality attribute.

First, food perception is disentangled and presented in a model – the food perception model. This model represents the four main determinants of food perception, that is, individual consumers (demography, physiology, psychology, attitudes), environment (family, society), product (product characteristics, production system) and consumption moment (time, place). In this thesis these determinants are represented by consumers as well as product developers and components of a traditional Dutch meal.

In expressive and associative group discussions with female consumers, images were generated in order to unravel health perception in consumer terms. These group discussions proved to be a promising and participant-friendly way to gain insight into both affective and cognitive health-promoting product characteristics. These aspects were then related to characteristics, ingredients and affective aspects for eight traditional Dutch meal components. These meal components were differently perceived in terms of their healthiness. Four consumer clusters grouped according to their health opinion had different perceptions of the attributes, ingredients and affective aspects related to product healthiness.

Because product developers play a crucial role in product development – which is not an objective process – the perception of product developers (N=58) and that of consumers (N=344) was compared. Based on a questionnaire it seems they both perceive health and its relation to product characteristics in the same way; however, the perception of product developers is more extreme. Four orientations of product developers were distinguished: technology and cost orientation – which are related to the use of more traditional work methods – and customer and consumer orientation, which are related to the use of more modern and interactive work methods. In turn, these four orientations are related to different opinions about factors influencing the failure of products, working with models and cooperation.

Product designers must take into account consumer groups, products, product attributes, ingredients and affective aspects. They must be aware of their own perceptions when translating consumer's perceptions into product characteristics.

Improving consumer-oriented product development requires integrated use of various disciplines. This thesis proposes a stepwise iterative approach for consumer-oriented product design. Implementation of this approach will result in products which come closer to consumer wishes, and therefore contribute to the shift from a food supply chain to a food demand chain.

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1. General introduction

What is healthy food
in the menu of nature
and flow of seasons?

1.1. The changing food system

Food is part of everyday life and few things have changed more drastically in the last century than the position of our food. For example, in the first part of the 20th century my grandmother lived on a farm, where she and her family grew potatoes, prepared their own food, and milked cows and sold the milk. My grandmother was familiar with food and its cultivation, preparation and consumption. In the second half of the 20th century my mother lived in a village, where she took care of the household while my father was at work. She shopped at the greengrocer's, butcher's and dairy, and prepared seasonal food for her family. Things are different now: I have a paid job – as does my partner – and we can buy all our food in one supermarket where vegetables of all seasons and food from all corners of the globe are sold. It takes only a short time to prepare this preserved, processed and packaged food for consumption.

There have been dramatic changes during these three generations. The most important was the transition from scarcity and limited choice of food, to abundance. Another is that consumers are no longer self-sufficient, and so are not familiar with food cultivation, production and preparation. Nowadays, food is part of a consumer's lifestyle, and only a very few people grow and produce the raw materials and the food. The number of farmers is decreasing and the production of food is becoming more industrialized. Moreover, the preparation is increasingly being done by industries, so that the role of technology and the food industry is becoming bigger. This has resulted in a greater distance between the consumer and his or her food (Davies, 2001). Because of this increasing distance between food production and consumer – and also as a result of various food scares – consumers' perspective of food safety is different. Furthermore, there has been a shift from consuming a limited number of regional products to consuming products from all over the world. This factor – the increasing globalisation of the food supply – has had the greatest impact on consumer choice in recent years (Davies 2001). Moreover, quality perception has become more complex (Jongen, 2000). While quality used to be related to physical product characteristics, now also the production system is taken into consideration. All these developments are interrelated with the function of food. People have not only a physiological but also a social and a psychological need for food (Sijtsema *et al.*, 2002), and the last two mentioned needs are becoming increasingly important. These needs and the position and function of food in daily life and its relation to the consumer have changed a lot in industrialized countries parallel with demographic changes. During the period of three generations, several important demographic changes have occurred: the population is ageing and there have been major changes in household composition (Meulenbergh & Viaene, 1998), the general educational level has increased, more women are participating in the labour market and per household income has increased.

From the perspective of food science and food-processing companies, there have been several other remarkable developments. In times of scarcity the main concern of consumers is to obtain enough nutrition and caloric intake. This used to be the perspective of nutritionists and food product developers, too. Over the course of time the interest in obtaining enough nutrition shifted to the optimisation of nutrients and, later, of micro-nutrients; today, even the so-called non-nutrients are studied by nutritionists. This development evinces that food science is closely related to health. Market growth is limited by the reduction in the rate of population growth, and in a number of countries the saturation point for caloric intake has been reached (Jongen, 2000). Parallel to this development, the position of technology and product development has also changed. In times of scarcity, technology was used to preserve food and optimise production,

and product development was technology-driven. Nowadays, in times of abundance consumers exercise more power. Thus, today product development is based not only on technology: to be successful, the consumers have to be taken into account. As a result of these developments many things are happening in the food production chain. Agricultural and food markets have changed drastically in the last few decades. Perhaps the most important change for food production is the shift from production to market orientation (Meulenberg & Viaene, 1998). All these developments have led to a big shift from food supply to food demand chains.

1.2. Position of product development

The future success of food-processing companies will increasingly become a question of their ability to handle the process of product development (Kristensen *et al.*, 1997). Because such information is confidential, it is difficult to reliably assess the true level of failure, but generally accepted percentages are as high as 33% of all products actually launched in the market and up to 75-80% of all new product ideas (Cooper, 1993; Kotler, 1994, in Van Trijp & Steenkamp, 1998). The Western food industry seems to be aware that product innovation must be a continuous process. However, translating this awareness into a systematic strategy and a coherent set of innovation programmes is not yet common practice in this sector (Jongen & Meulenberg, 1998), even though food companies are aware that the position of the consumer has changed. The interdependency between consumer desires and the development of technologies and research has been recognized by many food-producing companies, but it has not yet been implemented systematically and requires more attention (Linnemann *et al.*, 1999, Jongen, 2000). Here, consumer-oriented product development seem to be the keywords. Such product development takes consumer needs as the starting point for the new product development process, and for the product and production technology as a derivative thereof (Van Trijp & Steenkamp, 1998). In other words, a new product and its production technology are not seen as a goal in and of themselves, but as a means which is instrumental to the realization of consumer value through need fulfilment. The key challenge in consumer-oriented product development is to translate consumer needs into tangible product features. The aim of this thesis is to develop a conceptual framework that enables transforming consumers' health perception into product characteristics, using health as a quality attribute.

The field of research consists of three basic topics, that is, product development, perception and health. The way these are demarcated is described in the following paragraphs. First, product development is described. In this thesis both product design as well as product development are used, while in the discussion the most appropriate term is selected. Product development consists of various steps in which interaction is needed between consumer, product and product developer. The complexity of the issue of product innovation and product acceptance requires an integrative approach (Linnemann *et al.*, 1999). As mentioned, food and – as a part thereof – successful food product development requires a multidisciplinary approach in which attention is paid to the food demand chain. For this study, the first steps of product development were selected based on the new product and service development process of Urban and Hauser (1993). Their first step is 'opportunity identification', which is based on market definition and idea generation; the second is the 'design' step, which comprises customer needs, product positioning, segmentation, sales forecasting, engineering and marketing mix. These steps are used as a starting point.

Second, the position of perception is dealt with. The idea that we choose freely what we eat is perhaps a comforting one – and one that fits into the free will philosophical tradition cherished

by millions of people – but the truth is that food habits are shaped to a considerable extent by a combination of objective and subjective factors, many of which are beyond individual control (Fieldhouse, 1995). When studying food and consumers, various aspects can be considered, for example, food choice, consumption, food perception and food preferences. During the first steps of product development especially the ideas and beliefs of consumers are of interest, while at a later stage it is more important to have insight into the actual behaviour of consumers. For this thesis food perception has been chosen as the link between consumers and food. Perception is the process of selecting, organizing and interpreting stimuli in order to produce a meaningful picture of the world around us (Steenkamp & Van Trijp, 1996).

Third, the position of health is reflected. As stated, food and health have been strongly related for a long time. Consumers are interested in health in general (Lennernäs *et al.*, 1997) and in health and food (Rozin *et al.*, 1999). Because of socio-demographic changes it is expected that health will become even more important in the future. This has prompted food-producing companies to become interested in health. Also governmental organizations are interested in gaining insight into the relation between food and health. In this study, health is regarded as an aspect consumers confer on a product, not as a characteristic of a product itself. In that sense ‘health’ is synonymous with ‘appetizing’ and ‘pleasurable’. However, because health is not the only factor people take into account when considering or choosing their food, a focus on health may lead to exclusive emphasis on a set of motives that are of limited significance to many people (Steptoe & Pollard, 1995).

The following research questions were formulated for this thesis:

- Which variables influence food perception and how are they interrelated?
- Do different segments of consumers have different perceptions of health?
- How can one measure and unravel the health perception of consumers in a qualitative study?
- How can one link subjective consumer terms to product characteristics?
- Do product developers have different orientations towards product development?

1.3. Outline of the thesis

The aim of this thesis is to translate consumers’ wishes into product characteristics. To do so, some elements of consumer-oriented product development are explored. Before a translation can be made, however, insight into food perception is required. Chapter 2 presents an extensive overview of the variables influencing food perception. A model based on socio-psychological literature is presented. This model contains four determinants (individual, environment, product, consumption moment), on which the remaining chapters are based. In Chapter 3, a method to measure perception by means of expressive and associative group discussions with Dutch women is described. These discussions provided insight into the cognitive and the affective health perceptions of these women. The results of this qualitative study were tested in a quantitative setting, as described in Chapter 4. Consumers filled in a questionnaire about their perception of eight different products as meal components of a typical Dutch meal. In Chapter 5 a description is given of the perception of these consumers compared to that of product developers; this is done because of the former group’s important role in the product development process. Chapter 6 presents an overview of the main findings and elaborates the methodological considerations of the study and the implications for product development. Finally, suggestions for further research are given.

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2. Variables influencing food perception reviewed for consumer-oriented product development

Abstract

Consumer wishes have to be translated into product characteristics to implement consumer-oriented product development. Before this step can be made, insight in food-related behaviour and perception of consumers is necessary to make the right, useful and successful translation. Food choice behaviour and consumers' perception are studied in many disciplines. Models of food behaviour and preferences were therefore studied from a multidisciplinary perspective. Nearly all models structure the determinants related to the person, the food and the environment.

Consequently, the overview of models was used as a basis to structure the variables influencing food perception into a model for consumer-oriented product development. To this new model, referred to as food perception model, other variables like time and place as part of consumption moment were added. These are namely important variables influencing consumers' perception, and therefore of increasing importance to consumer-oriented product development nowadays. In further research the presented food perception model is used as a tool to implement successful consumer-oriented product development.

2.1. Food and consumers' perception

During the last century important developments in the position of food in daily life of consumers¹ and producers took place. In former times consumers were self-sufficient, but during the last century this changed into an industrialisation of the food production process. At the beginning of the 20th century there still was scarcity of food, while at the end of this century the amount of food was abundant in the industrialised countries. In times of scarcity the main focus of consumers is on getting enough nutrition, whereas farmers and producers try to maximise the amount of production. In those times new product development was mainly technology-driven. Nowadays, however fundamental changes in demographics, labour force participation, and income distribution, dictate changes in the food system (Kinsey and Senauer, 1996). Producers realise that the food supply chain has to become a food demand chain driven by consumers' priorities. This has impact on the food product development process. In times of abundance, consumers are getting more power. So, if producers want to be successful, they have to make the product development process more consumer-oriented. Thus, market orientation in the food industry helps to build a better competitive position for future (Grunert *et al.*, 1996).

Moreover the above mentioned developments do not only have big influence on the food production chain, they also have great impact on attitudes and beliefs of the way consumers see their food. Many disciplines study this area in which food, choice, behaviour, perception and product development are researched in their own perspective. For being a successful producer an integrative approach is necessary, therefore in this study a multidisciplinary approach is used. Food perception will be discussed from consumers' perspective with focus on the relevance for product developers in the food industry. The food industry requires insight in food perception to develop new products successfully. In this study a multidisciplinary approach is used as an integrative approach is necessary for being a successful producer. This approach can be seen as a first step towards Quality Function Deployment (QFD), which is a planning tool to support the process of product development. QFD is a systematic means of ensuring that customer or market requirements are accurately translated into relevant technical requirements and actions through each stage of product development (Fortuna, 1988). Dekker and Linnemann (1998) describe an application of the QFD method. The voice of the customer is the starting point of the QFD method, every next step is based on this information. So for successful implementation of QFD it is important to select the most relevant product attributes and moreover have insight in consumers' perception of the product attributes. Therefore this study can be seen as an approach to gather the right input for the QFD method. Food perception will be discussed from consumers' perspective with focus on the relevance for product developers in the food industry. Product developers require insight in food perception to develop new products successfully. In this study a multidisciplinary approach is used to structure the variables influencing food perception to gather the most relevant input for a consumer-oriented product development process. This is the first step to reach consumer-oriented product development as part of a food demand chain.

Many interrelating factors or determinants, such as demographic variables, and factors like preference and aversion, attitudes, habits and status influence consumers' perception of a

¹ A consumer is the person who buys, prepares or eats the product. Consumption is defined as the use of a product (Peter and Olson, 1996). Food consumption refers to a behavioural act involving the acquisition of food.

particular food product. A literature overview of these aspects is presented, as well as an evaluation of models used to describe food-related behaviour. At first different functions of food will be described to put the topic of food in the right perspective.

2.2. Functions of food

Food carries symbolic meanings and has psychological significance beyond its nutritive value, which becomes secondary for many consumers (Kahn, 1981). So people have a physiological need for food and besides that they have a social and psychological need. The physiological need for food, i.e. alleviating one's hunger, contains functions like growth, maintenance, reproduction and activity. This need for food was for ages in times of scarcity the decisive element of food consumption. Nowadays the physiological need is more and more optimised in terms of content of nutrients like carbohydrates, fat and vitamins and minerals. Moreover, in the industrialised countries many people eat too much or do not have the right eating habits; which results in the increasing of the average weight, which reached an unhealthy level for a quarter part of the Dutch society.

During the period of scarcity the social and psychological need for food developed. The social need of food concerns the rules and habits associated with which products can and cannot be eaten in a particular way on a specific occasion, and are considered as culture and traditions. The social and psychological need consists of the following functions (Toors and Veen, 1985):

- The **gastronomic** function. People eat because of the pleasant taste of food, the hedonistic part of eating. A combination of different spices and herbs or a combination of different dishes and drinks makes people enjoy food. Moreover, atmosphere, entourage and a nicely dressed table influence the hedonistic part of food. Taste is based on an observation of sensorical characteristics of the food, influenced by the environment. Taste preferences are partly innate and partly influenced by culture and its traditions. This gastronomic function is studied by disciplines related to sensorical analysis, but also some of the work of nutritionists, anthropologists, sociologists and marketers deals with this topic. The impact of this function changed drastically since consumers of industrialised countries live in an environment of abundance.
- The **communication** function. Eating together is usually considered more pleasant than eating alone. During the meal the members of the group can talk about daily experiences. It can strengthen the solidarity within the group. This is for example an essential part of a business dinner. Anthropologists as well as sociologists study these social aspects of food in society.
- The **status** function. With certain food habits people are able to discern themselves from others and show who they are. Serving an exclusive dinner to guests can be a way to show a certain status. This means that some people buy products from a certain brand only when serving them to guests. This example shows that this topic is of interest to marketers, but it is also studied in economics, sociology and psychology.
- The **power** function. Ways to enforce something by food can be a hunger strike or a boycott for food products from a certain factory or country, which, for instance, annoys human rights. Even in a parent-child relation the child can refuse to eat to get to know its power. Sociology and psychology study the position of power in families or societies.
- The **safety and security** function. The satisfaction of needs by the use of food is influenced by the culture in which someone is living. While eating together people get to know certain habits about what to eat and what not to eat. People get to know rules about how to belong

to the group. So people living in a certain country or region, get used to certain habits about when and what should be eaten. People try to maintain these habits in case of emigration. Even during holidays people prefer their own type of food. An example is the Dutch restaurants in Spain. This function has obtained an additional meaning when taking the BSE-crisis in consideration. Trust of consumers in the food production system is decreasing, especially in those countries where the role of the government towards this topic is subject of discussion. Disciplines like anthropology, sociology and economics study this function.

- The **magic** function. Some foodstuffs are considered as having a special meaning that can not be physiologically explained. These products are expected to have a positive influence on healthy or sick people. In the Netherlands, for instance, many people think that eggs have an influence on potency. Such specific characteristics which consumers relate to food are studied by anthropology.
- The **religious** function. In religion food often has a symbolic meaning. Jewish people will not eat pork and have their own way of slaughtering. Not only certain products have a different symbolic meaning for different religions, also the amount and the time of consumption can have a meaning, for example a period of fasting. Theology and anthropology study these aspects of food.

The above description of the functions of food should not suggest that each function is linked to specific products or consumers. Moreover, the content of a function varies over time and is influenced by the context or consumption moment and differs per consumer. For example, during the last decades in industrialised countries consumers choose from many products, which might indicate that the social and psychological need for food obtained a different meaning. The social need for food changed, because of increasing labour participation of women. The increased labour force participation of women is one of the major social and economic phenomena of our time with far reaching implications, like a rising demand for convenience (Kinsey and Senauer, 1996). Like the changes in the social and psychological need for food, the physiological need for food is optimised in these times for abundance. It becomes more related to optimisation of nutritional components and healthy aspects of food i.e. the development of functional foods.

In the aforementioned paragraph already some disciplines are mentioned studying the area of consumers, food and topics related to it. The basis of food intake, namely a physiological need, is a topic for biologists and nutritionists. These scientists began studying relations between the amount of macro-nutrients and illnesses. Nowadays the focus is on optimisation of macro- as well as micro-nutrients, and on so called non-nutrients related to well-being and the prevention of illnesses.

The need for food in relation to its function in groups of people is studied by anthropologists, psychologists, sociologists, marketers and economists who place food in a societal perspective. In psychology, most literature about food that deals with eating concerns quantity: regulation of food intake, and disorders related to food intake, such as obesity, anorexia nervosa and bulimia (Rozin, 1996), while economists translate food consumption into elasticity curves of price and income. The cultural aspects of food and the function of food in a group were first studied by anthropologists. Recently also sociologists started to study the differences of food use and choice in different countries (Menell *et al.*, 1992).

2.2.1. Multidisciplinary topic

The above description about food and its functions shows that food and consumers are studied by many disciplines. In 1982 Barker edited a book about food selection in biological,

psychological and socio-cultural perspective. Another example is MacBeth (1997) who also edited a book with chapters written by specialists from different disciplines. That food is a multidisciplinary research field is also described by Fieldhouse (1995): “Whereas it is easily seen that the direct consequences of food intake are biological - food meets the energy and nutrient needs of the body - it is also apparent that nature of food intake is shaped by a wide variety of geographical, social, psychological, religious, economic and political factors.”. Shepherd (1990) underlined this: “In order to arrive at an overall understanding of reasons for food choice it will be necessary to adopt an interdisciplinary approach taking into account inputs from these various sources”. Rozin (1996) stressed that in particular the social context is important: “The act of eating is usually overtly social, and the context of eating is invariably social, in many ways” This is further described in paragraph 2.3.6.

It is recognised that an integrative approach is necessary to reach consumer-oriented product development.

2.3. Consumers’ terminology concerning food (perception) and food products.

The process of food perception always consists of an actor, the consumer or purchaser, and an object, the food product, which are inextricably related to each other. To fully understand the complexities in the models describing consumers and their food in the next paragraphs, the term ‘perception’ is explained and supplemented with different variables and characteristics describing consumers, food products and the relationship between these.

2.3.1. Perception

The Oxford dictionary defines perception as ‘to take in or apprehend with the mind or senses’. ‘Apprehend with the mind’ means ‘to become aware or conscious of, to observe, understand’. This explanation of perception shows the cognitive as well as the affective part of perception. So besides ratio also emotions play a role when the world around us is perceived. Each consumer perceives the environment in his or her own way. People differ in their perception of reality depending on their own experiences, life histories, and personal situations (Antonides and Van Raaij, 1996). Consumers perceive the product while they buy, prepare and consume it. Perception is based on sensorical observations of individual (perceptor) and product characteristics (stimuli). So product characteristics like package, appearance, taste and smell are part of what has influence on perception by the consumer. Besides these characteristics other aspects influence the perception like experiences, atmosphere while perceiving the product and indirect product characteristics like environment-friendly breeding and production methods. Perception is a complex process of the senses and the brain, influenced by many variables that are hard to disentangle.

Perception is based on the way consumers interpret reality. Antonides and Van Raaij (1996) distinguish four types of reality (see Figure 2.1), which are in this study linked to aspects related to food in daily life:

- The **objective reality** of people, products and brands. This kind of reality is based on the scientific knowledge of food. The objective reality of products is, for example, described by its physical characteristics. In the Netherlands the *Voedingscentrum* is an organisation which gives consumers guidelines for a healthy diet, based on scientific research. Its aim is to be an independent organisation to inform the Dutch consumer. Consumers can consult this

organisation with questions about the quantity or frequency of specific food products in their eating pattern.

- The **reality as constructed** and represented in advertisements, usage instructions, and information given by consumer-organisations and information from other sources. This type of information is given to the consumer in many different ways more or less with or without an objective character. The difference between the aforementioned type of reality and this one is not always clear to the consumer. Examples of transfers of this type of information are recipes and claims of ingredients on the package or in the shop. Or the information consumers get from interest groups, for example, the *Consumentenbond* in the Netherlands, or Greenpeace.
- The **reality of other consumers**, their experiences and judgements. Information of this type of reality is closest to the consumers, as their daily environment includes relations with family and friends.
- The **subjective reality** (perception) of consumers. This subjective reality is influenced by all three aforementioned viewpoints of reality. Depending on characteristics of the consumer, e.g. education level, the individual will be more or less influenced by the other types of reality.

The starting point of perception is the aforementioned objective reality, but it might be disputed whether there really exists such an objective reality, because reality is always perceived and interpreted by a person with his or her own framework of thinking. This division is used in this study, although the author is aware of this problem. It is useful since this division enables us to group the different sources of information that influence the consumer.

Reality is the starting point of the individual's perception. Every individual will observe and interpret this reality in his or her, own way depending on the context. This perception of reality can be divided in different types. These will be described in combination with health-related aspects of food in the next paragraph.

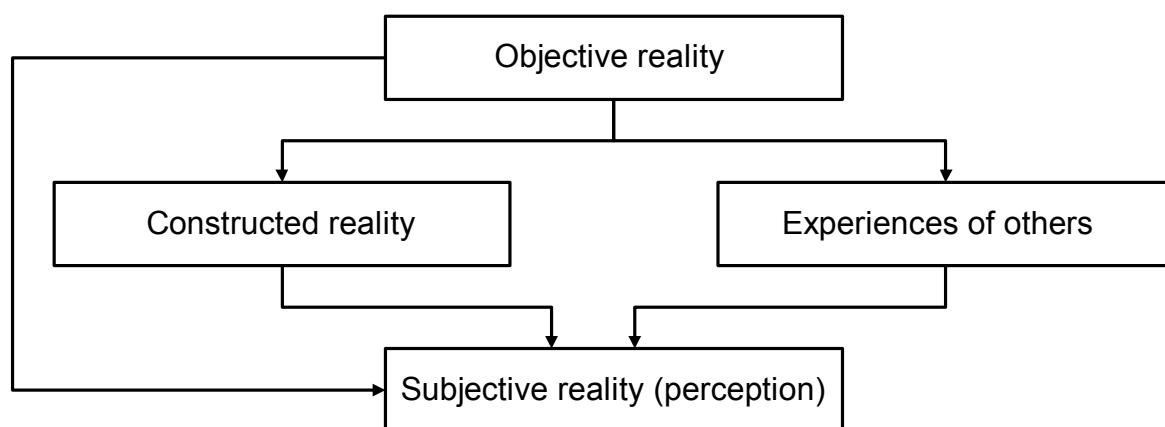


Figure 2.1 Three levels and four types of reality

Four mechanisms of perception (Antonides and Van Raaij, 1996)

Completing perception; people are inclined to complete their observations. If a product is good on three product attributes, consumers tend to assume that the product will be good on a fourth attribute as well. A consequence of this attitude could be that if a product has one characteristic related to health, consumers assume that it is a healthy product. An important question for product development is on which level consumers complete their observation? Is it

only based on ingredient level or more generally based on price, taste and health or, for example, related to biologically grown and produced under animal friendly conditions?

Selective perception implies that people observe certain aspects of reality and do not note other aspects. For example, if consumers get an overload of information about healthy food, they might continue to drink coffee for its good taste although they are aware that this is unhealthy. Especially for health-related topics this is an interesting aspect of perception, because in a next step of this study is tried to establish what people observe if they look for healthy food.

Biased perception; Because of different life histories, circumstances, moods, tasks and goals, reality is perceived differently by each consumer. Moods and feelings can strongly influence what we observe. The integration of moods in the process of product development might be hard because it is related to aspects, which are hard to control in a study. In product development is it a specific job regularly done by marketing departments. The marketers try to give a product an image, which suits to a specific mood of the consumer.

Perceptual differentiation; Differentiation in perception implies that more aspects are included in the judgement and that more categories are formed to classify phenomena. When a person is more knowledgeable about food and health, he or she can identify more healthy aspects and will probably arrive at a more differentiated image of reality. When talking about health, this is an important issue to consider.

Different intermediaries are important to get insight in the aforementioned types of perception. The most useful intermediaries for product development will be described and, if possible, an example of perception in relation to food is given. For a more detailed description, see Antonides and Van Raaij (1996).

- **Prior knowledge** and experience result in specific or different expectations and lead to involvement. People with certain knowledge about food have a different perception than people without this knowledge. In the description of Antonides and Van Raaij (1996) is not clear whether this knowledge is already part of the consumer (i.e. knowledge about healthy diet) or given to the person at the right moment (i.e. health claim on the food product).

- The **orientation** of the consumer leads to a more selective observation of the environment. If the consumer is convenience-oriented, he or she will note more advertisements about this topic. An orientation is a direction, a purpose or goal of the behaviour of the consumer. This means that consumers can be divided in groups based on orientations. An example is the division of different types of consumers by Meulenberg (1996). He divides food orientation of consumers in, amongst others, price, health, variation and convenience. This orientation is probably connected to attitudes or lifestyles of consumers. For food a relation is expected between prior knowledge and orientation.

Perceptions can be coloured or biased by the circumstances of a **situation**. Especially for food perception this is an important point. When time is limited, people choose products with other characteristics than when time is not a constraint. Selective and biased perception and perceptual differentiation take place.

- **Expectations** deal with the fact that we largely see what we expect to see. What we know and feel influences each observation. Colouring the observation is mainly affective or emotional.

2.3.2. Preferences

In sensory evaluation food preference is defined as the degree of like or dislike for a food (Pilgrim, 1957). Preference is often used to refer to affective ratings (liking/disliking) of food names. This agrees with a definition of Randall & Sanjur (1981) that, more generally, food preference is a phenomenon that rests predominantly in the affective domain and can exist

independently of consumption. Another way of describing preference is integrating a behavioural component in it. Cardello *et al.* (2000) for example describes preference to be a behavioural measure, i.e. “choice of one sample over another”. The complexity of preference is explained by Rozin (1996): “Liking is one reason for preferring A to B, but not the only reason. One might like B more, but think it is unhealthy or impolite to eat it”. Food preferences have been used as predictors of behaviour in a wide variety of situations. There is evidence that food preference constitutes one of the strongest single predictors of food choices and food acceptance (Meiselman, 1986). Hence, it should not be expected that food preferences can predict product acceptance or intake in specific situations (Meiselman, 1996). The above description of preference is in accordance with the different definitions of preferences discussed by Axelsson and Brinberg (1989).

2.3.3. Acceptability

Food acceptability denotes the consumption accompanied by pleasure (Pilgrim, 1957). This definition emphasises that, unlike consumption, acceptance is comprised of both a behavioural and an attitudinal component, the pleasure inherent in it. Nowadays food acceptance is treated as a perceptual/evaluative construct (Cardello, 1996). It is a phenomenological experience, best categorised as a feeling, emotion or mood with a defining pleasant or unpleasant character. Since it is a subjective construct, measurement of food acceptance relies on the use of psychometric, psychophysical, and/or behavioural methods. In common practice, those investigators who are more interested in the consequences of food acceptance will use behavioural measures, e.g. choice and consumption, as a primary index. In contrast to preference, acceptance is reserved for affective ratings of foods that are actually tasted (Cardello *et al.*, 2000).

2.3.4. Wishes and demands

Consumer wishes are defined as food characteristics formulated in a general way, not specifically related to a certain product, with a long-term component and partly based on ideology. Food ideology is a combination of attitudes, beliefs, customs and taboos affecting the diet of a given group (Fieldhouse, 1995). The consumer is rarely aware of the influence of this ideology on his or her behaviour. Consumer wishes can be described by general terms, like for example healthy, quality and taste. American consumers say that health, price, taste, convenience, appearance of the food, calorie content and brand, are variables which influence their food choice (Sterwart & Tinsley, 1995). European consumers give the next five variables influencing their food choice: quality and freshness, price, taste, try to eat healthy and family preferences (Lennernäs *et al.*, 1997). Sensory appeal, health, convenience and price are important factors for food choice (Stephens *et al.*, 1995). These variables influence food choice behaviour, but they do not say anything about the choice for a single product as part of the consumption behaviour.

Next to consumer wishes there are consumer demands defined as product attributes which, the product at least should have, otherwise the consumer will not choose the product.

2.3.5. Attitudes and lifestyle

Attitudes of consumers towards food are studied in many different ways. A few relevant examples are given in this paragraph. Roininen *et al.* (1999) gave a short overview of different instruments to measure food-related attitudes. These attitudes deal with motives, ideas, and intentions of consumers towards food. An attitude refers to a person's feelings towards and evaluation of some object, person, issue, or event (Fishbein and Ajzen, 1975). Based on this definition it is said that an attitude has an affective or evaluative component. On the other hand

the cognitive part is represented by the term beliefs, which is defined as the information that a person has about an object (Fishbein and Ajzen, 1975).

In a cross-cultural study of Rozin *et al.* (1999) attitudes are put on a concrete level, to be more specific, they put the attitudes towards food along the pleasure (one extreme) to stress/worry (the opposite) “axis”.

Attitudes of consumers are closely related to lifestyle. Lifestyle is described as a certain type of behaviour, or preference for a certain type of behaviour, in which consumption plays an important role. Recent literature discusses the relation between lifestyles and preferences for certain food characteristics, *i.e.* types of cultivation, preparation, healthy, fast, or easy. For example Schifferstein and Oude Ophuis (1998) discuss health-related determinants of organic food consumption.

2.3.6. Context

In recent years there has been increased attention to the eating environment or context (Meiselman, 1996). As already described in paragraph 2.2 the social-psychological functions of food became more important. These are closely related to the contextual aspects of consumption. Rozin and Tuorila (1993) state that contextual factors are recognised as absolutely central in the psychology of perception and cognition. They suggest three potential organising principles for contextual variables (Rozin and Tuorila, 1993).

1. A distinction between variables that are simultaneous to eating and variables that are separated in time, which they call **temporal**. This distinction depends on the unit of analysis: bite, dish, meal or dietary pattern. Rozin and Tuorila recognise that this fundamental distinction is not quite unambiguous. For example, hunger as a temporal variable is there before, during and after the moment of consumption/ reference event.
2. A distinction by **reference unit** could be used, distinguishing a single food exposure (e.g. bite) from a meal and a pattern of eating.
3. Distinguish between food and non-food. Especially nowadays the non-food component is of increasing importance, since the social-psychological function of food is more important.

Another division, by Bell and Meiselman (1995), is into those influences, which are antecedent to food choice, and those influences which are present at the food choice situation. Thus, they also emphasise the temporal dimension.

2.3.7. Product-related variables

Characteristics, attributes, ingredients, are terms to describe properties of food products. In the context of food choice a food product has specific characteristics that suit in the food pattern or diet of a consumer. Consumers take different characteristics of the food in consideration when perceiving, choosing or consuming, in relation to the different functions of food. Not only the attributes that are recognised by the consumer have to be taken into consideration, also technological characteristics that are related to the production process of the product are relevant.

During the choice process-quality indicators are of significance. Intrinsic and extrinsic signals are noticed just before the buying decision and influence the choice process. The intrinsic factors, like colour and texture, are part of the physical product. They can not be changed without changing the physical product itself (Van Trijp & Steenkamp, 1998). Extrinsic factors are related to the product, but are physically no part of it, like price, brand name, country of origin, and store name (Van Trijp & Steenkamp, 1998).

Another possible distinction is based on three groups of characteristics, namely instrumental, rational and emotional (Leeflang, 1986). The instrumental characteristics have a physical and technical identity, which is measurable, like the percentage of fat in margarine. The rational component can be described with the rational meaning of the consumer, for instance, given a certain fat percentage a consumer thinks that it is not a cause of concern for coronary artery. Finally, there are the emotional characteristics, for example, consumers are eating the product because they think that it is healthy for him or her.

2.3.8. Comparison of terminology

In the aforementioned paragraphs many different terms are reviewed as part of the food-related issues concerning food and consumers. How are these terms related to each other? The following argument is based on Kahn (1981) who takes food habits as the starting point for his study. He states that food acceptance leads to food preferences, which are based on selection of food items from choices available among acceptable foods. Food preferences can be classified further on appropriateness. In the present study wishes and demands are seen as a more detailed completion of preferences in which context plays an important role. The position of attitudes and lifestyle is on a higher more abstract level. Perception is not mentioned in this description till now although it is an essential element. In the present study perception is seen as a variable influencing the observation related to the consumers' acceptance as well as their preferences or selection. So perception comprehends all the elements of these food related items.

2.4. Models of food related items

In the next part an evaluation is given of models, frameworks or schemes which consider factors influencing food choice, acceptance or preferences. It is based on Shepherd (1990) who gave an overview of models about factors influencing food choice from nutrition literature. Three models with relevant variables for consumer-oriented product development are selected for discussion, viz. Pilgrim (1957), Kahn (1981) and Randall and Sanjur (1981). In addition, models from Tolksdorf (1974) and Gains (1996) are discussed. These models describe other variables influencing food choice or related aspects, which seem to be interesting to integrate in the consumer-oriented product development process. In literature also models with a focus on the product are found, for example quality guidance (Steenkamp and Van Trijp, 1998). Here we start with the combination of models with a consumer-oriented perspective, because of their larger applicability to consumer-oriented product development. At a later stage the product perspective probably has to be integrated.

As mentioned in the introduction, many changes in the position of food in society occurred over time, and therefore the description of the models will be in a chronological order.

2.4.1. Model of food acceptance – Pilgrim (1957)

Pilgrim developed a model in 1957 in which perception is the main aspect influencing food acceptance (see Figure 2.2). He describes perception as being influenced by three components: the physiology of the person, the sensation as a result of the combination of the food and the person and the attitudes of the individual. Already in 1957 he concluded that discovery and integration of the mechanisms by which sensations, attitudes and physiologic phenomena lead to the development of preferences for and behaviour toward foods stands as a challenge to research ingenuity (Pilgrim, 1957).

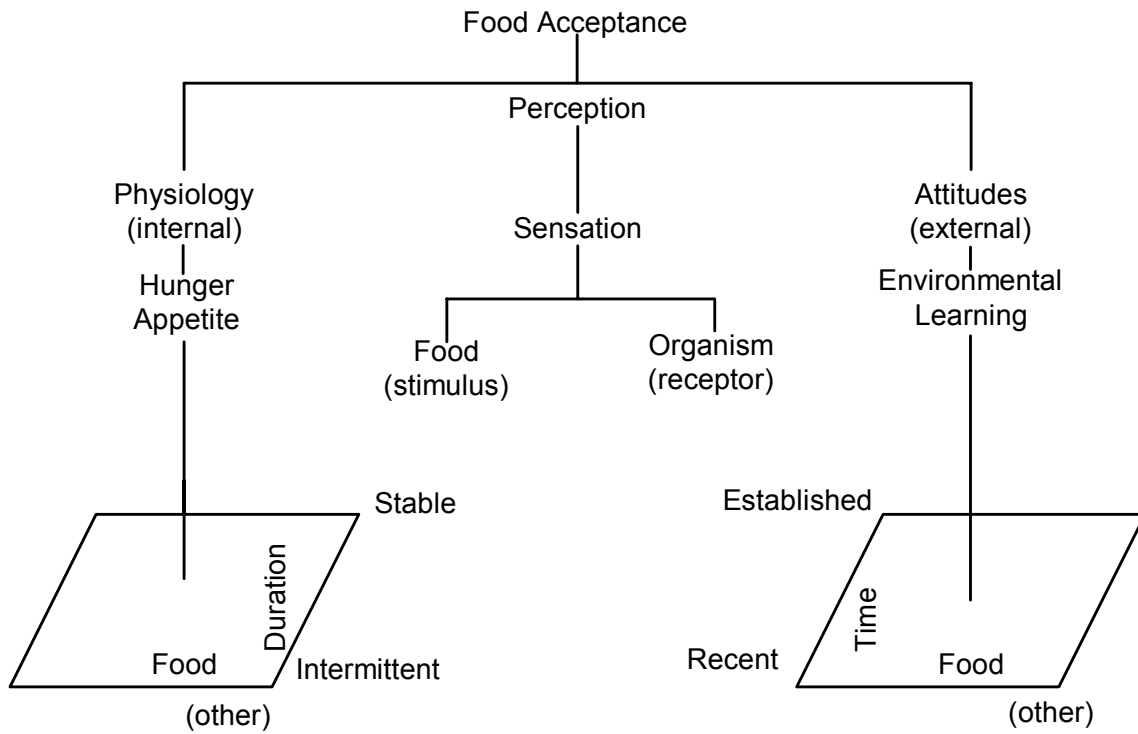


Figure 2.2 Model of food acceptance (Pilgrim, 1957)

The way perception is integrated in the model is more general than merely perception of the sensory attributes of the food but is also seen as including both internal physiological signals, related to hunger and appetite, and external environmental and learning influences on attitudes (Shepherd, 1990). The position of perception in this model is interesting because it is a separate element between the three components and the acceptance of food. It supports the idea that perception is a central element when taking consumers and food acceptance into consideration.

Pilgrim constructed the model to systematise the research work in the area of different disciplines, in particular nutrition and sensorical analysis. This might be the reason that the individual perspective is central in this model.

Compared to the models of Kahn (1981) and Randall and Sanjur (1981) it is striking that only two components related to the individual, namely physiology and attitudes are mentioned. This is probably due to the traditional way of consumer segmentation during that time. Nowadays additional segmentation criteria are used to describe consumer behaviour.

In 1957 the optimisation of production was the main reason for product development, which was technology-driven. Therefore it is surprising that the product or stimulus is so summarily defined in this model.

The impact of physiology and attitudes can be relatively stable or variable over short periods with ingestion of food. There are also external influences of the environment, which can be described as a learning effect. It means that individuals are able to establish ideas and attitudes based on earlier experiences. An advantage of this model is the incorporation of the variables influenced by time like satiety and learning effects. The division in this model of physiology and attitudes is comparable with the division of the physiological and social psychological functions of food. A disadvantage is that there is no structure for individual-related and product-related components. Moreover, the variables related to the individual are divided but in practice the influence of physiology on attitudes can not be split up, which makes the model hard to operationalise.

In conclusion the model of Pilgrim gives interesting starting-points about perception and the time aspect. However, additional characteristics of product and consumers have to be integrated to have useful input for consumer-oriented product development.

2.4.2. Model of dinner - Tolksdorf (1975)

In ethnology dinner is object for study to describe the complexity of food-related behaviour (Jobse van Putten, 1995). A dinner is appreciated as a representation of the complex term food. Based on the structural vision of dinner by Tolksdorf (1975), a dinner exists of two parts, the meal and the situation, see Figure 2.3. This division is in accordance with the food and non-food organising principles for contextual variables of Rozin and Tuorila (1993). The meal, in turn, can be divided in a food product and the preparation. The situation refers to the circumstances in which dinner is eaten; it can be divided in time and place. Time means weekday, weekend or holiday. Place is considered as at home, a restaurant or somewhere else. The food product, preparation, time and place have their own cultural value and are connected with each other. Each society has its own norms and values concerning a dinner. As discussed in the introduction, the position of food in terms of a dinner has changed over the last century, and this also influenced norms and values towards specific products, preparation time, consumption during the week and the place where people consume their food. In conclusion, nowadays all different aspects are much more variable, there are more products to choose from, more preparation techniques available, and increasingly more possibilities for places where food is consumed.

Although the model is quite simple, the components are not described and defined very well. The merit of the model is the fact that situation in terms of time and place is taken into account. These components are more and more important for consumption, because consumers make or have less time to prepare the meal. Moreover, the meal and the preparation obtained a different position in the society during the last decades.

The simplicity of the model is an advantage as well as a disadvantage. The position of the individual is not worked out in this model. So for consumer-oriented product development this model should be integrated with others, such as the model of Pilgrim (1957), Randall and Sanjur (1981).

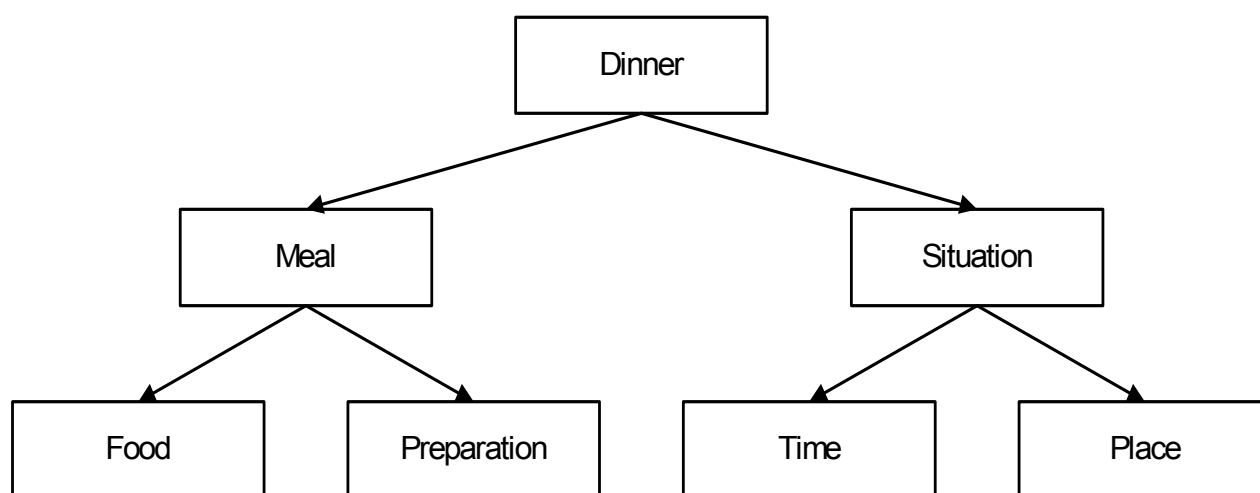


Figure 2.3 Model of dinner (Tolksdorf, 1975)

2.5. Factors influencing food preferences - Randall and Sanjur (1981)

In the model of factors influencing food preferences of Randall and Sanjur (1981), a clear division in three groups of characteristics: individual, food and environment is made, see Figure 2.4. This model is developed to ascertain the relative importance of characteristics of the food, the individual, and the environment on the relationship between food preference and consumption (Randall and Sanjur, 1981).

The independent variables were selected on the criteria of the frequency with which they were isolated in past studies and/or the strength of the proposed association with food preference. The arrows joining the types of variables indicate inter-relations. In the 1980's, when this model was developed, demographic variables were generally used to describe consumption behaviour of people. Therefore it is logical that mainly demographic variables are mentioned in this model, but nowadays these are not sufficient to describe consumers, as mentioned before. Moreover, it is surprising that no physiological characteristics of the consumer are mentioned as in the model of Pilgrim (1957).

Other striking features of this model are, firstly, the allocation of the variables into the three groups of characteristics. For example, the variable "stage of family" is classified in the environment characteristics, whereas it could also be part of the individual characteristics, and the variable "the method of preparation" is also influenced by culture, which is a characteristic of the environment. Secondly, if this model is compared to the model of Pilgrim, one misses a link to changes over time. It is expected that the variables in this model are fairly easy operationalised.

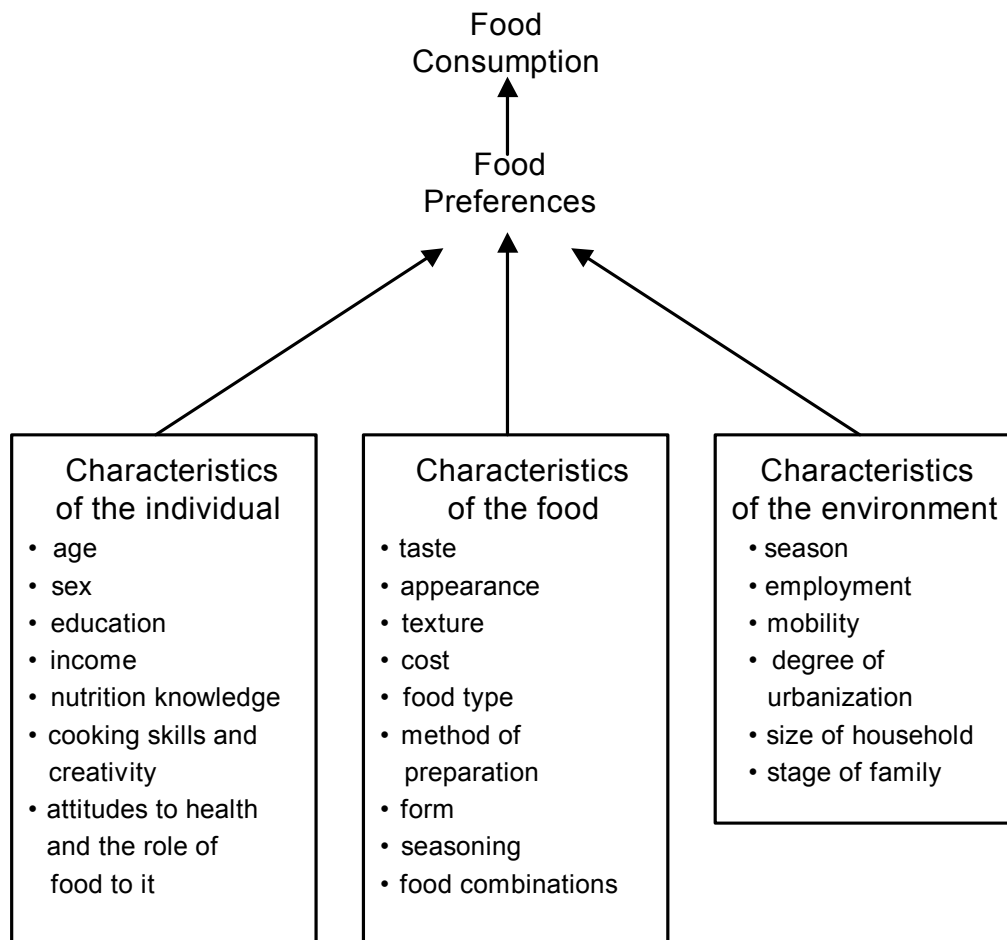


Figure 2.4 Factors influencing food preferences (Randall and Sanjur (1981))

2.6. Factors influencing food preferences – Kahn (1981)

Kahn (1981) made a model with seven groups of factors which influence food preferences, see Figure 2.5. The selection of the different types of variables is mainly based on research results from a nutritional perspective, but also results of other disciplines are integrated. Although an effort is made to classify various factors, the list is not exhaustive (Kahn, 1981). Compared to the aforementioned model of Randal & Sanjur (1981) the seven groups of factors are connectable to the division of terms related to food, the person and environment. Moreover, this model also shows the interaction between the groups of factors. Within certain groups of factors variables are mentioned on different levels, for example related to the individual, the family or the society. Further, constant variables are mixed up with varying variables. Although this model includes many variables about consumers and their preferences, it is hard to operationalise them all together in a study.

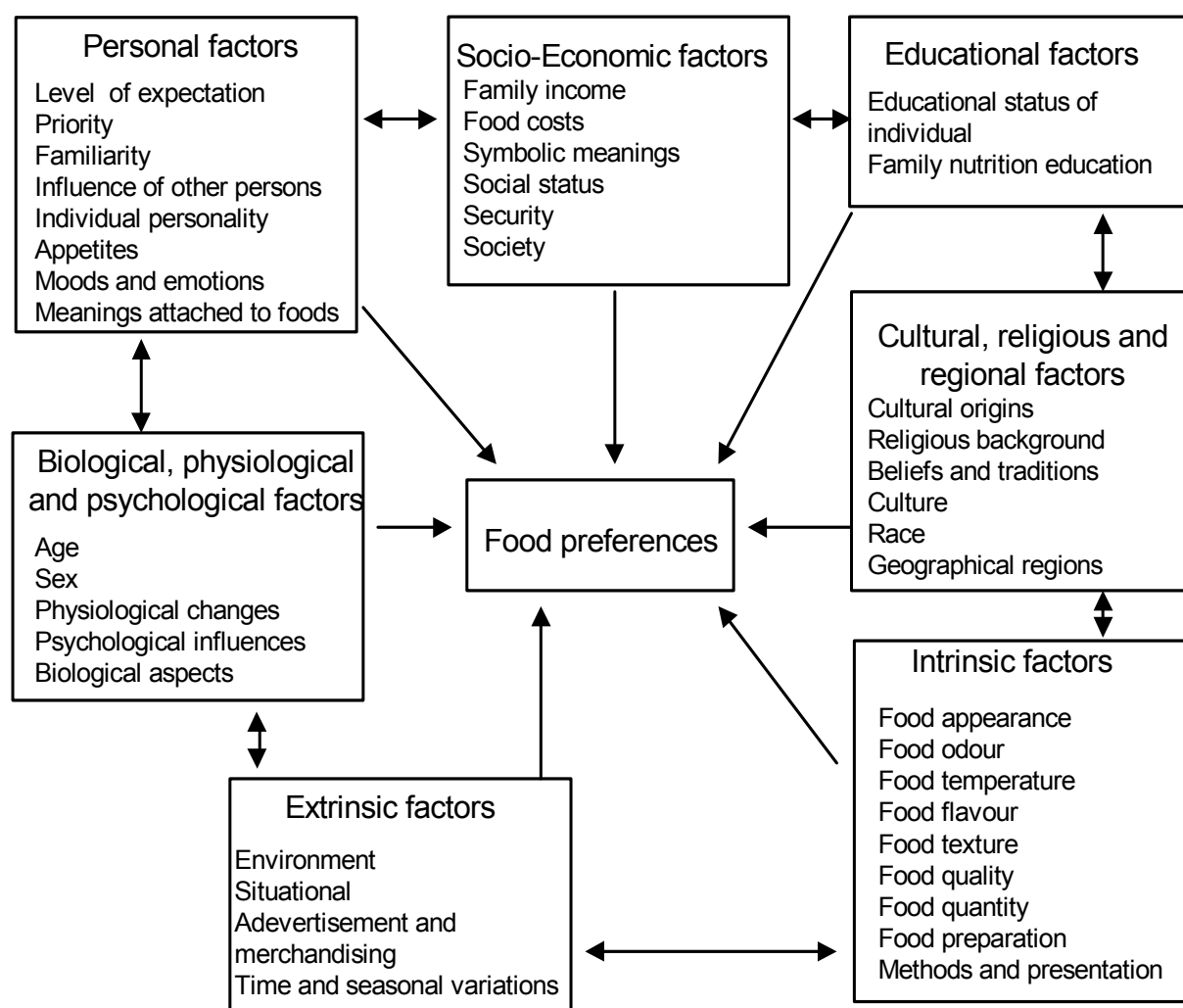


Figure 2.5 Factors influencing food preferences (Kahn, 1981)

2.7. Factors influencing food choice - Gains (1994)

The schematic representation of the factors influencing food choice of Gains (1996) shows that any form of food-related behaviour is the result of the interaction between three things, namely the food itself, the consumer and the context or situation within which this interaction takes place (see Figure 2.6). Food, consumer and context are themselves bundles of various factors and phenomena (Gains, 1996). Compared to the above-mentioned models this model does not give additional information about the consumer or food component. However, the contextual part is of interest as already mentioned in paragraph 2.3.6, where the importance of the context as viewed by many authors has been discussed. The position of context is defined by Gains (1996) as a product of time, place, circumstance, manner and who and what the food is consumed with. Gains (1996) mentioned that it is important to food manufacturers to understand who might buy their product, what the potential buyers perceive the product to be like, and where and when they might consume it. This model is of particular interest because it defines context as a separate variable influencing food choice. Moreover, it shows that all the variables are related to each other. If this model is going to be used for product development, the variables have to be divided more clearly.

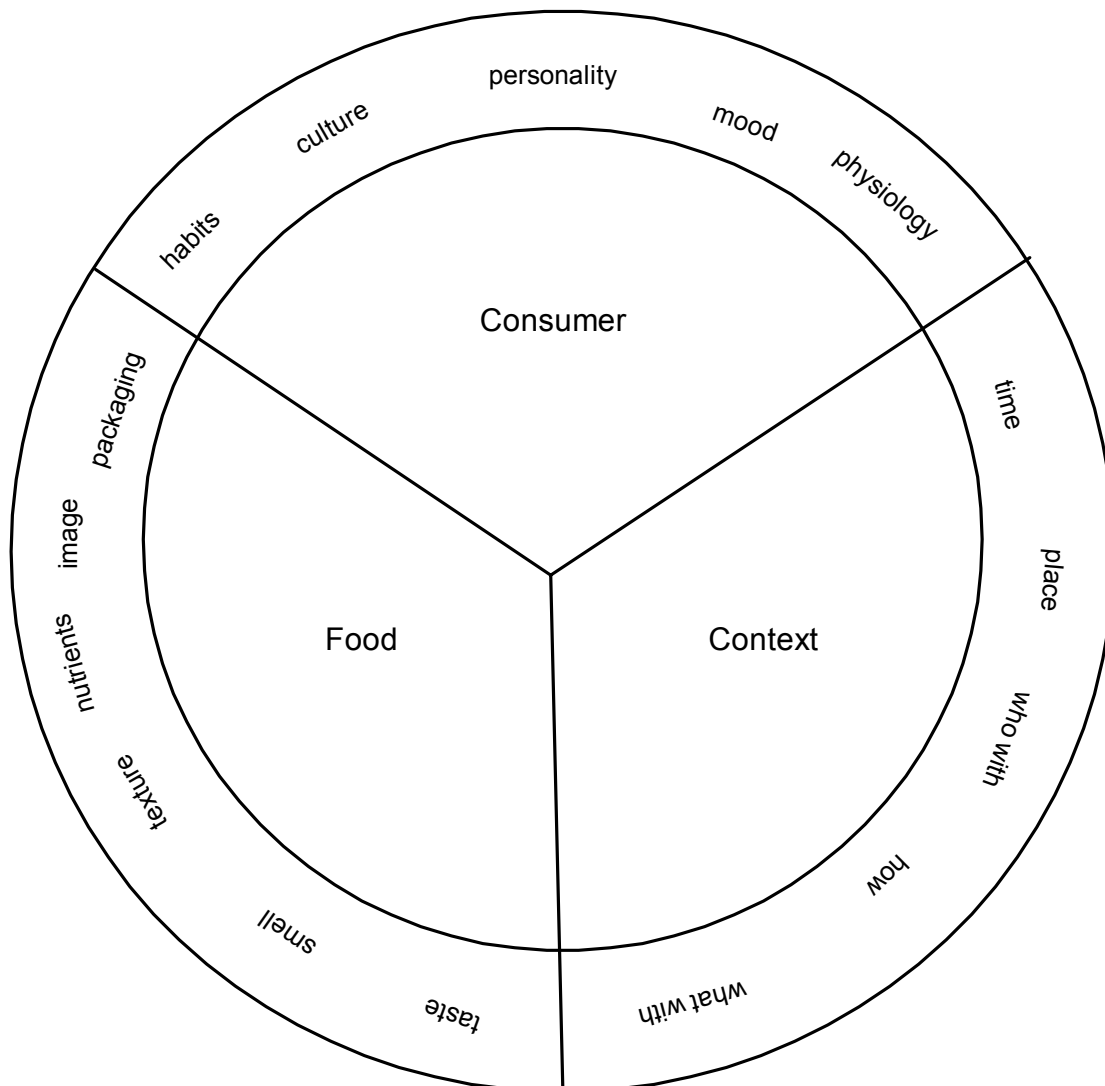


Figure 2.6 Factors influencing food choice (Gains, 1994)

2.8. Conclusion and discussion

2.8.1. Demands and possibilities

From the previous paragraph 2.4 is deduced that usually three main determinants, namely individual, environment and product, are used to structure variables related to food related behaviour or perception. Before a comprehensive model can be made, additional criteria have to be defined to construct a model for consumer-oriented product development. Therefore we started with the positioning of the food-related terms based on Kahn (1981). Perception comprehends all aspects of food acceptance as well as food preferences or selection of consumers. So each model described gives its own useful input to create a model for food perception to support consumer-oriented product development.

Another interesting aspect to consider deals with the multidisciplinary character of the research field. Product development is a process, in which different departments of different companies are involved to link technology to consumer knowledge and the quality of a product. Because of the interrelating character of the field there will be always discussion about the division of some variables in a specific group. In our study is tried to fill it in from a consumer-oriented perspective for new product development. This means that on one side specific characteristics of consumers are incorporated, which can not be manipulated. On the other side the characteristics of the product which is to be optimised or adapted by technologists or marketers are included.

The variables can be organised on different kinds of levels. Variables related to food consuming people can be linked to the individual, family or society. Product variables can be related to a bite or, on a higher level, to a meal or dietary pattern. Paragraph 2.3.6 already gives some possible divisions to make for contextual variables.

Since consumers have more and more products to choose from, it becomes increasingly important to relate the conceptual product to the moment the product will be consumed. In that sense contextual variables are very important, particularly mentioned in the models of Tolksdorf (1975) and Gains (1996). Therefore a description of the context has to be given. Moreover, elements like moment, time, place, mood have to be clear. If possible, also the time aspects like satiety and learning effects have to be integrated.

The different schemes about determinants for food choice behaviour show that there are many variables discerned on different levels and described with different terms. In the model of Pilgrim (1957) there are two aspects, food and organism, which influence food perception. This division is also made in the schemes of Randal and Sanjur (1981), Kahn (1981) and Gains (1996). Next to these variables with an individual or a product character there are variables opted with environmental or economic and social aspects. The subdivision in three categories, individual, product and environment are present in nearly all the models mentioned in this chapter (Kahn, 1981, Randall and Sanjur, 1981, Gains, 1996). In general, these schemes have not attempted to quantify the relative importance of the factors nor have they elucidated the likely mechanisms of action or how the factors might interact (Shepherd, 1990). These models give a qualitative picture of determinants of food choice and the mutual relations. Often these models are used to relate one product characteristic to a certain food habit (for example Saba *et al.*, 1998).

Many of the environmental aspects that are mentioned, such as cultural, social and economic variables, are of a different level, on one side related to the individual and on the other side related to the product. To structure these variables the model of dinner of Tolksdorf (1975) is used. In former times the consumer prepared food for a certain situation, nowadays the industry

is taking over this task. So for industry the situation with a time and place aspect is important during the product development process.

The time aspect, mentioned in the model of Pilgrim, is important for the perception of food. It seems that it is not included in the food choice behaviour model in this study, because it would make the model too complicated. However, when psychological factors, like mood, and contextual aspects, like the situation, time and place in which the consumption takes place, are defined very specific and clear, it seems possible to integrate this in the model for a specific moment of consumption.

At this stage the main aim is to get a clear overview of all determinants of food choice behaviour, and to put the different levels of the variables central.

When the time aspect hunger and appetite would be incorporated, it would possibly be part of the sensorical evaluation of the product. The time aspect related to attitudes and learning effects of the environment will be included in the model as preferences and attitudes of the individual.

2.8.2. Modelling food perception for consumer-oriented product development

A comprehensive conceptual model was created for determinants influencing food perception, based on the determinants and variables influencing food perception see

Figure 2.7.

The purpose of distinguishing four determinants of food perception on a general level was to emphasise the fact that it is not only complex, but also highly variable. The variables mentioned for different determinants inter- as well as intrarelate.

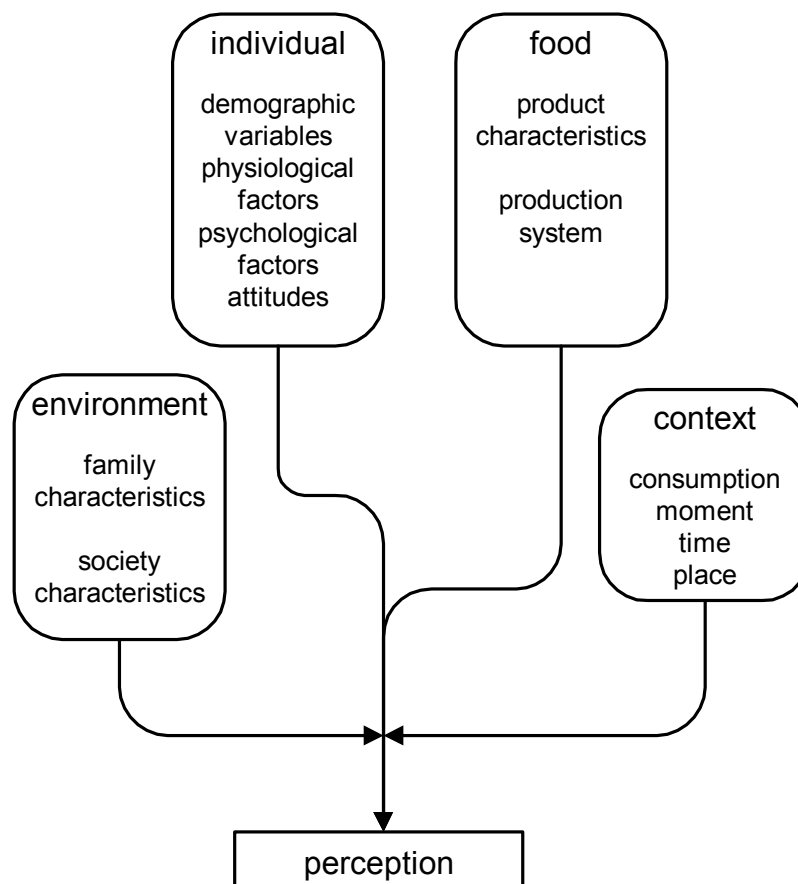


Figure 2.7 Food perception model for product development

2.8.3. Discussion

Nowadays the social-psychological need of food is getting very important for product development as a result of the optimisation of the physiological need of food. Especially the gastronomic, status and communication functions of food are of increasing importance when analysing food choice in an industrial society. This society can be described as multicultural; consumers are getting into contact with many different cultures and habits in their own countries or while on holidays. Consumers are able to spend more money on food. Family size is smaller than before and the communication function changes as people more often go out for lunch or dinner.

This article presents an overview of terms and variables related to food perception as well as models of food choice and related behaviour from a social-psychological perspective. Additional structuring of the variables as part of the determinants is on individual, family and societal level. Variables as moment and situation need to be emphasised because these are the important variables influencing the consumers' perception, and thus are of increasing importance to product development. The result is a schematic overview of determinants and variables influencing food perception useful as a guide to give insight in the complex area of food perception to support consumer-oriented product development. Further research needs to be done to get insight in the variables that can be influenced in the process of new product development. Moreover, insight is needed in the variables which can not be influenced but have to be taken in consideration during the product development process.

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3. Image-based consumers' perception on healthiness of food products

Abstract

The aim of the study is to design, organise and apply image-based group discussions as a projective technique to unravel health perception of consumers in cognitive and affective terms. Four expressive and associative group discussions with six female participants each were organised. The participants related healthy to feeling free and happy. They imply a balance between being active and passive. Health and food are associated with terms of nature like season, water and sun, specific products (vegetables and fruits), ingredients (vitamins, fibres, minerals) and no additives. The expressive and associative group discussion is a promising and participant-friendly tool that gave insight in the affective as well as the cognitive aspects that consumers relate to health-promoting product characteristics.

3.1. Introduction

Consumer-oriented product development takes consumer needs as the starting point for the new product development process, and the product and production technology as a derivative thereof (Van Trijp & Steenkamp, 1998). Such an approach requires insight in consumer needs and the perception of related product characteristics. The implementation of this approach requires a methodology, which is able to give insight in the different aspects of consumer perception and product characteristics. Perception is the process of selection, organisation and interpretation of stimuli to a meaningful picture of the world around us. It includes both cognitive (i.e. the knowledge consumers have about foods) and affective factors (i.e. feelings and emotions) (Van Trijp and Meulenberg, 1996). Therefore, it is important to get insight in the cognitive as well as the affective factors. However, most research methods are biased toward reason (Zaltman, 1997). Separating reason and emotion in this context is misleading (Zaltman, 1997, Zaltman and Coulter, 1995). By using methods for engaging and/or monitoring imagic activity, more complete representations can be provided of consumer thoughts and accounts of their behaviour (Zaltman, 1997).

For consumer-oriented product development it is required to have insight into the health perception of consumers, in their own words. According to the above not only cognitive aspects but also feelings and emotions have to be included. For a better understanding of consumer feelings, beliefs, attitudes and motivation which many consumers find difficult to articulate, projective techniques are beneficial (Goodyear, 1998, Webb, 1992). Projective techniques, in particular psycho drawing and association methodology, might be useful methods for consumer oriented product development.

The aim of this research is to explore and apply expressive and associative group discussions as a projective technique to unravel health perception in cognitive and affective consumer terms for consumer-oriented product development.

3.2. Perception

It is demonstrated that both liking and behaviour attitudinal components towards an object inherently combine a con-summatory affective dimension with an instrumental/utilitarian cognitive dimension (Cantin and Dubé, 1999). The cognitive component of attitude about a food item may contain beliefs about its nutritional value and convenience, whereas the affective component of the food item may contain the encoded sensations, emotions and feelings associated with the object. Categories and subcategories of affective and cognitive origins of food likes and dislikes are reviewed (Letarte *et al.*, 1997). This interesting division demonstrates the relation of cognitive and affective aspects with food products and its characteristics. Sensorial, emotional and social aspects represent the affective part. The physiological consequences, functional and symbolic aspects represent the cognitive part. Consequently, it is important to pay attention to the cognitive aspects as well as to affective aspects of perception when trying to measure perception of consumers. In our study this categorisation is adapted (Letarte *et al.*, 1997) (see Table 3.1). Health was regarded as an example of a physiological consequence of a product (Letarte *et al.*, 1997), while in our study health is considered in a wider perspective, namely the consumer perception of health, which includes cognitive as well as the affective aspects. Besides, the perception of quality, specific ideologies such as nature, environment and production were defined as symbolic aspects all with a cognitive character, but in our study these are described as the extrinsic characteristics (Dekker & Linnemann, 1998). Moreover, a symbolic category is

added to represent the associations of consumer perception of health with an affective nature of origin, comprising aspects like harvest and sun. The authors are aware that sensorial aspects might be considered with cognitive bases, for example when measuring sweetness or crispiness. In our study the sensorial aspects have affective bases, because those aspects comprehend pleasure and are put in contextual perspective. Although this division is useful to structure attitudes and perceptions of consumers, it is emphasised that the affective and cognitive aspects are inextricably related. This description about attitudes shows overlap with the above mentioned description about the two aspects of perception (Van Trijp & Meulenberg, 1996). In this study the background of attitudes is used to interpret consumers' perception. An attitude is a lasting, general evaluation of people (including one self), objects or issues (Solomon *et al.*, 1999). Attitudes consist of opinions towards an item or subject based on value judgement with a long-term character, while perception is an observation of stimuli, an activity of the brains with a more short-term character. Although the terms have a different meaning, there is a mutual influence of attitudes and perception. Moreover, both attitudes and perception are related to behaviour. Behaviour is described as the actual things that people do, like consuming, buying, choosing, and preferring. Many studies in the field of food sciences are related to the actual consumption of products, but in our study the considerations and emotions related to foods are central.

Table 3.1 Codification scheme for the origins of food likes and dislikes (adapted from Letarte *et al.*, 1997)

Nature of origin	Category	Sub-category
Affective	Sensory aspect	Taste, texture, smell, visual appearance, food combinations, pleasure/displeasure, intense pleasure/displeasure, temperature, other
	Emotional aspect	Relaxation, happiness/love/friendship, stress/anxiety, reward
	Social aspect	Family tradition, cultural tradition, interrelation with people, other memories, in family, in pairs (lovers), with friends, alone
	Symbolic	See, sun, flower,
Cognitive	Physiological consequences	Nutritional value, satiety, anticipated reactions, health
	Functional aspect	Flexibility, preparation, variety, price, innovation, consumption, storage
	Extrinsic aspect	Identification of beliefs about origin or about quality, specific ideologies such as nature, environment, etc.

3.3. Demarcation

The research field was demarcated by selecting an important wish of the present consumer in industrialised countries, namely the wish to live a healthy life, and as a part thereof the intention to eat healthy. People are more aware of what is good for their health and what not. In the UK in the mid 1980s consumer attention and concern revolved around the content and ingredients in food rather than around specific products (Armistad, 1998). Consumers paid attention to ingredients like, for example, fat and additives, while nowadays consumers take their whole consumption pattern into consideration. As the 1990s have progressed, a macro view emerged with the focus on the healthiness of the diet as a whole and the benefits of a 'balanced diet' rather than on the healthiness of individual constituents of the diet. Nevertheless, attitudes towards

health and food change relatively slowly over time (Lennernäs *et al.*, 1997). The position of health and other important issues influencing food choice were investigated (Lennernäs *et al.*, 1997). They concluded that European consumers mention ‘quality or freshness’, ‘price’, ‘taste’, ‘trying to eat healthy’ and ‘family preferences’ as the five most important factors. Females are more interested in health aspects of foods than males (e.g. Rozin, 1996, Roininen *et al.*, 1999; Nayga, 1998). Females, older and the more educated people are more likely than others to select “trying to eat healthy” as having a major influence on food choice (Lennernäs *et al.*, 1997). But what is considered as healthy food? In general consumers relate health to feeling fit and/or not being ill. In our study the idea, feeling, image or sensation that consumers have, is part of consumer perception. A consumer might consider a product as healthy because of specific characteristics or image. These characteristics might be related to ingredients like vitamins, fat and additives or production methods. Nutritionists prefer to talk about a healthy diet or lifestyles in which some products suit better than others, like for example fruits and vegetables compared to sweets. In this study a product is considered to be healthy when it is healthy from a consumer’s perspective. Thus, in this phase of the study the scientific viewpoint of what is healthy is not taken into consideration.

Health is the starting point of our study, and additional demarcation is based on the food perception model based on social-psychological literature (Sijtsema *et al.*, 2002). The four determinants of food perception in this model, namely individual (demography, physiology, psychology and attitude), food (product characteristics and production system), environment (family and society) and context (time and place of consumption moment) are used to structure and demarcate the research field.

3.3.1. Selection of individuals, food products, context and environment

Consumers are the individuals who provide us with their ideas and beliefs about health and food. Consumers are the people who buy and / or consume products. In this study consumers are selected who have a more than average interest in food and health, because it is expected that these participants are more willing to talk about it and can give more relevant information. In 1996 27% male and 37% female persons in the EU selected “trying to eat healthy” as one of the three most important influences on food choice (IEFS, 1996). On the other hand, 44% of the male and 32% of the female persons selected taste as one of the three most important influences on food choice (IEFS, 1996). In a study comparing four different cultures, namely consumers in the USA, France, Japan and Belgium, women showed greater concerns about the food-health link, compared to men (Rozin, 1996). Therefore, in this study women are the research group. Especially mothers with young children have a high interest in healthy aspects of food. Moreover, in our ageing societies women at the age of 50 – 65 are interesting participants, because of their interest in functional food, and health (e.g. IEFS, 1996). The comparison of these two groups is relevant because of the different stage of life, which is related to different life experiences.

In this exploratory stage food in general will be discussed to get an overall idea of what consumers perceive as healthy. When going more into detail, the moderator will talk about a traditional Dutch dinner, which consists of soup as a starter dish, a main course with meat, vegetables and potatoes, and a dessert of yoghurt or pudding. Especially vegetables are interesting to study, consumers consider it as healthy, but at present vegetable consumption is decreasing (the Netherlands Nutrition Centre, 1998). Meat is fascinating because on one hand the attitude of consumers is that meat is unhealthy, and on the other hand the food culture associated with meat and the consumption of meat on a daily basis (Holm & Møhl, 2000).

Since a traditional Dutch dinner was selected, context is defined as the consumption moment of a meal at home in a everyday life situation. A traditional Dutch dinner is served at 18.00 o'clock. Besides the aspects related to time and place of consumption also aspects with a social character were used to demarcate the research field. The environment is characterised as a setting, which is embedded in the Dutch culture. For structuring the discussion, talking about situations in the everyday life of a family setting seemed appropriate.

3.4. Methods background and implementation

Projective techniques help to enter the private worlds of subjects to uncover their inner perspectives in a way they feel comfortable (Gordon and Langmaid, 1988). It enables to get a better understanding of consumers' feelings (Goodyear, 1998). Gordon and Langmaid (1988) give five main types of projective techniques: association, completing procedures, construction procedures, expressive procedures and choice ordering procedures. For our study association and expressive procedures were selected, with psycho-drawing being part of an expressive procedure, and indicating words by presented stimuli as associative technique. The chosen techniques were selected together with an expert discussion leader of projective techniques in the sphere of product development. When using expressive projective techniques participants are asked to role-play, act, draw or paint a specific concept or situation (Donoghue, 2000). Association means that the participants are presented a stimulus and they respond by indicating the first word, image or thought by the stimulus (Donoghue, 2000).

For each of the four expressive and associative group discussions 6 participants were recruited. Three of the groups consisted of women with middle or higher education. One of the groups with women of 50-65 years old consisted of participants that were lower or middle educated. The three-hour session consisted of three sections and included a break, see Table 3.2 for the experimental design. The session started with a general introduction of the researcher, the moderator, the method and the participants in order to focus the minds of the participants. After that, the participants introduced themselves by telling their names, ages, family situation, job, hobbies and the shops they visit. The group discussion started with the instruction to make a drawing, on A3 format, with wax crayon of a moment in life when they felt very healthy; this first task was used to get familiar with the topic, the procedure and the other participants. Next each participant elucidated her drawing by explaining why she chose that particular moment and what she wanted to express with it. Afterwards the 6 participants were asked whether they observed differences and similarities between the drawings. The second instruction was to make an abstract painting of food and health on A2 format. It was emphasised that everything they would paint was all right, because there is no good or false in this method. The participants used watercolour to express their ideas. Subsequently, they were asked to write down the title of the painting they made. The following step of this second section was that the group of participants, excluding the person who painted the drawing, extensively discussed what they saw objectively and subjectively. They were also stimulated to think of an appropriate title for the painting, but not forced to mention one. Many terms related to the central theme were gathered during this discussion of section 2. Section 3 started with a selection of the most relevant terms by asking the participants to put stickers behind the terms they thought were very important when talking about the central theme food and health. An extensive discussion, with specific questions about the terms gathered and the related products and product characteristics, followed to get more detailed information about the selected terms.

Table 3.2 Experimental design of the expressive and associative group discussions

Section	Procedure	Instruction
	Plenary introduction	Introduction of moderator, about topic, participants and method
1	Getting familiar with the method and the topic health	Make a drawing of the moment that you felt very healthy. Explanation of drawing and discussion
2	Central part about health and food	Make an abstract painting of food and health. Interpretation of the paintings and discussion
3	Selection terms of section 2	Select the most relevant terms, attributes and discussion

3.5. Results

The results of this alternative approach as part of consumer oriented product development is described in the same steps parallel with the group discussion and the thinking steps the participants made. The authors are aware that this might be confusing in the light of traditional ways of data presentation. However, this way of presenting data makes sense when taking the thinking steps of consumers as guideline. The presentation of the results starts with feelings of consumers and ends with food and its characteristics

First section - Feeling healthy. In the first section the drawings showed for nearly all participants a moment outside in spare time, e.g. celebrating holidays either active or relaxing. Different aspects of nature were depicted: sun, trees, hills, water represented by a sea or a lake. See Figure 3.1 for a representative example and the most frequently mentioned terms. Nearly all participants drew not only themselves, but also their partner or a friend. They used different, realistic colours. In the explanation they mentioned that healthiness means that you feel well, happy or free, that you can do whatever you want to do. After each individual presentation the participants talked about similarities and differences between the drawings. They discussed the importance of a balance in being active or not. In addition, enjoying nature is seen as healthy as well as relaxing.

Second section - Health and food. Figure 1 shows representative example of a painting of a mother with children of 0-8 years old and a women of 50-65 years old, together with the terms generated by the participants and the titles including the one of the painter herself. Only four titles were mentioned in the session, since the participants were not forced to give a title. In all of the sessions the objective terms listed by the participants contain different forms and colours, e.g. yellow circles, blue stripes or red waves. Nearly all participants used all the colours they were given (yellow, blue, green and red). Some participants mixed colours, but in general the participants used the pure colours. Most participants used the whole sheet of paper for their painting. During the discussion about the subjective interpretation of the paintings many terms were enumerated.

Figure 1 Results of the expressive and associative group discussions

Drawing and subjective terms of healthy moment



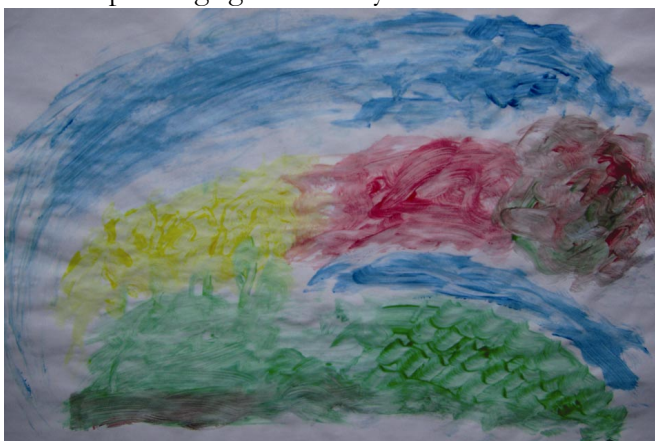
Nature	sun (light), trees (wood), water (sea), nice weather, outside/outdoor
Emotions	happiness, feeling dynamic, enjoyment, relaxing, feeling fine
Miscellaneous	being active, balance of active/passive, spare time, quietness

Abstract painting of health and food, objective and subjective terms describing health and food, and titles of paintings generated by mothers with children between 0-8 years old



Objective terms	dots, curls(spirals), mixed colours, paper is filled
Subjective terms	colourful, flower, bulb – something that grows, heart, love for nature, decorations strings, happy, spring, soil
Titles	outburst, spring, happiness, abundance of fruits and vegetables

Abstract painting of health and food, objective and subjective terms describing health and food, and titles of paintings generated by women between 50-65 years old



Objective	red, blue, yellow and green, 3 stripes, division, waving green, decreasing line wave form, clear division
Subjective	river, wood, blue air, beach, corn field, heath, fire, red monster, course of the seasons
Titles	a bit of everything, everything in it's place, seasons, richness of the earth

Third section - Selection and discussion. In the third section the participants selected the expressions they preferred by putting stickers behind the terms they related to food and health. They selected terms like; water, season, sun, (symbolic); nutritional value, easily digestible, fibres, water and no fat (physiological); variation and balanced (functional). Based on these selected terms a discussion was held. In all groups part of the discussion dealt with nature in a wide perspective, e.g. harvest, landscape, field of corn, sea, season. Talking about health and environmental influences meant clear water, fresh air, no poison or additives. When the group participants came closer to the topic of food and health, they agreed that this implied the absence of additives and the use of raw materials with no or little processing. Moreover, variation was often mentioned in combination with different products and a balanced diet. Also easy digestion was often related to health-promoting food. Closer to the product level, the participants named many different health-promoting food products as part of a diet e.g. apples, strawberries, tomatoes, cucumbers, but also product groups like fruits and vegetables. A very important aspect dealt with the taste and pleasure of the product, which was mentioned every now and then during the discussion. A participant stated it as follows: "*pleasure is healthy*". Thus participants stated that a balance between healthy and pleasant is very important. The participants deemed this balance necessary within a diet and dinner, but also within a meal.

Although most of the topics mentioned in the two groups of women were comparable, yet the level of abstractness was different. Mothers of children talked in quite tangible terms like specific products or processing steps, while the women between 50-65 years used more abstract terms to describe their paintings. Moreover, the young mothers related health often to the environment, whereas the women of 50-65 put it in a personal perspective.

With respect to the design and the implementation of the research methodology it was noted that the participants at first hesitated and felt insecure about doing it right. They could easily be reassured by stressing that what they did was always right, because *their* ideas and beliefs were the central issue. After a while the participants lost themselves in the discussion and afterwards they claimed that they really liked this way of dealing with and talking about the subject. Further, starting each section with an individual task was very satisfactory since this resulted in valuable input of all individual participants, and decreased the influence of dominant persons. In addition, an expert moderator proved important to guide the discussion, because not only aspects related to the topic were put forward, but also strong personal opinions and emotions. Considering this, an expert moderator is important to deal with these personal emotions to avoid confounding with the research objective. Finally, a group of 6 participants was efficient to work with.

3.6. Discussion

The application of the expressive and associative method resulted in data on both affective and cognitive aspects. In the first section only affective aspects, particularly social and emotional aspects related to health, were mentioned. The participants described health-related emotions like feeling happy, no stress and enjoying life. The presence of a partner, family or friends illustrated the social aspect related to consumers' health experience. As there are no right or wrong answers, it is hoped that the participants projected their own unconscious feelings in their answers. The second section consisted of the transition of affective aspects, like optimism, love and interaction, via aspects with a symbolic character like sun, season, and harvest to cognitive aspects such as vegetables. In the third section mainly cognitive aspects were discussed, in terms of product characteristics related to the more abstract terms mentioned in section one and two. An exception was the sensory aspect, a part of the affective component, which was mainly

mentioned in the third section. During the session there was a change from talking about affective aspects to cognitive aspects. This might be caused by the questions stated in section three, which rationalise participants' thoughts. The verbalisation of the perception might cause the disappearance of the affective component of health perception.

In the sessions the participants mainly mentioned the aspects that have a positive influence on health, e.g. vitamins, feeling well. They had less attention for the aspects which have a negative influence on health. This was probably caused by the instruction stated in the first section, which dealt with the positive associations of health. In the first section positive aspects were discussed, while in section three the discussion covered details about health and food, which included also the negative aspects; i.e. presence of fat, sugar and additives.

Participants view health and pleasure as inextricably related aspects of food. Especially in section three the participants mentioned pleasure often as an aspect influencing their food choice. This suggested that although healthy food is important to them, pleasure is an even more decisive element in food related behaviour. An important aspect of discussing pleasure and its inextricable relationship with health might be the awareness of the discrepancy between their own attitudes and behaviour concerning health and food. It is an indication that pleasure is related to behaviour while health is more related to beliefs and attitudes. However, more research is needed to address the specific relation between attitudes and behaviour considering food and health.

Since women in different stages of their life were asked, different settings of everyday life of the family were considered. The only difference was that women between 50-65 years took health more personal, while mothers of young children put more emphasis on the environment. This different way of thinking could be influenced through their interpretation of the future. Women between 50-65 years old were probably more confronted with health problems of themselves, family and friends, which might influence their attitudes and behaviour according to food choice and daily activities. Moreover, they seemed to have more time for reflection, while the mothers of young children put health in an environmental perspective to emphasise the health of their children, now and in the future. Although this difference is observed, no differences showed up concerning the affective aspects and product characteristics or attributes. The rule of thumb is that at least 3 focus groups are conducted about each group you are interested in (Casey & Krueger, 1994). This is in accordance with the four expressive and associative group discussions in this study.

With respect to the methodology of the expressive and associative sessions, an accurate instruction is necessary to achieve an open-minded discussion atmosphere as soon as possible. The first drawing assignment might be considered as difficult, because in general adults are not expressing themselves by drawing. But after making the first drawing the initial hesitation invariably changed into inspiration. The alternation of individual and group tasks made that each participant was highly involved and that the possible influence of dominant participants was minimised. Moreover making the paintings themselves means that the participants had a high involvement in the topic. This is important because the nature of the stimuli should however offer enough direction to evoke some association with the concept of interest (Gordon & Langmaid, 1988). During the discussions the participants showed that they liked to talk about the topic in this setting. Afterwards they said that they appreciated this way of exchanging experiences and beliefs about food and health.

The selection of terms by participants in section three is an important step in the procedure, because it gives additional value to the method. The selected terms are the most relevant ones to the participants and therefore are an interesting starting point of consumer-oriented product

development. The discussion about the selected terms is crucial to get insight into the terms and product characteristics, which the participants relate to the central topic. In the four group discussions participants selected terms with a cognitive basis. Whether those terms are more relevant than the terms with an affective basis needs further research, methodological as well as with respect to content. Points of attention are the questions stated during the discussion and more insight is needed into the position of the affective and cognitive aspects influencing food perception.

Usually focus-group discussions encompass 6-9 persons (Casey & Krueger, 1994). In our sessions 6 participants were selected because it was feared that in a larger group the discussion about the paintings would take too much time and would easily become boring to the participants. In a smaller group, with less than six participants, there might be too little inspiration and material to discuss, and the participants might not feel free to talk.

In conclusion this research method of expressive and associative sessions was a useful tool to investigate consumers' perceptions of health-promoting product characteristics. The method appears suited to investigate other consumers' wishes as well, e.g. convenience, food safety or environment-friendly production. For those wishes cognitive and affective aspects influencing the perception will be unravelled and relevant product characteristics for food product development will be assessed.

3.7. Implications for research and practice

Variation was mentioned as a component of a health-promoting diet in the group discussions. This means that the participants consider their diet in general when they talk about food related to health. Consequently, the consumption of a specific product or meal is always put in the context of the diet, this observation is in accordance with Armistad (1998).

In the expressive and associative sessions the participants mentioned several health-promoting products, terms describing product attributes and product characteristics. These will be useful input for the development of health-promoting food products. The terms the participants mentioned were still on an abstract level, e.g. fresh and natural. Additional research is worthwhile to link these terms to product characteristics of a specific product. In a quantitative approach those generated terms will be made tangible for different groups of consumers to support the product development process (see chapter 4).

The food perception model for consumer-oriented product development (Sijtsema *et al.*, 2002) is a useful tool to select relevant variables which have to be taken in consideration in the food product development process. Additional steps have to be made to get insight into the contribution of the different variables of the determinants influencing perception to develop this approach into a fully-fledged tool. It requires, for instance, directions to make a well-balanced selection for operationalisation of the most relevant variables. Based on the determinants of the food perception model the next remarks are made. First, the implementation of the method with other groups of consumers will increase our knowledge on the perceptions of different consumer groups. A suggestion is to investigate the perceptions of e.g. men and women of different ages, with a different kind of health interest. Second, the consumption moment and social environment have to be researched as important influences on health perception. For example, health perception related to out of home consumption is of interest because the amount of out of home consumption is increasing. Third, the perception of health is measured related to a specific topic and under specific circumstances. It has to be realised that both situation and environment and also the other determinants of the food perception model are important aspects

influencing health perception of consumers. Especially context might be seen as an important one. Therefore generalising these results of consumers' health perception needs caution.

The participants in this study were very enthusiastic after the expressive and associative sessions. This might be a result of the way they talked about the topic, they experienced it as learning from one another, they were not confronted with threatening questions and whatever they did it was right.

In the expressive and associative group discussions mainly positive health-related aspects were mentioned, which might be a result of the introduction in which the participants were asked to imagine a healthy moment in their life and in that sense rendered a positive perspective of health in their minds.

After applying this projective technique in food product development it would be worthwhile to get insight into whether this method is complementary or alternative to existing models. Furthermore it is interesting to get insight into the usefulness of the approach for other food related topics. For example Costa *et al.*, (2002) did a comparable research on convenience using collages in product design. Moreover, Ells (2001) mentioned that qualitative methods have proved effective in offering some insight into the changing role of food.

To get insight into the appropriateness of the method comparison of other methods to the expressive and associative group discussion would be worthwhile.

The external validity is quite small because the sample consisted of only women living in the same province of the Netherlands and therefore not representative for the Dutch female population.

3.8. Concluding remarks

In this exploratory research the expressive and associative group discussions have turned out to be a method with enthusiastic participants and interesting results which seem a worthwhile contribution to consumer-oriented product development. It gave insight into the affective as well as the cognitive aspects consumers relate to health-promoting product characteristics. The major findings are that health and pleasure are inextricable related to food perception of the participants, and that participants always consider their diet in general. The terms linked to health promoting product attributes are interesting starting points for a quantitative follow up to increase the insight into food perception.

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4. Linking consumers' perception of health-promoting food attributes to tangible product characteristics

Abstract

The aim of this study is to relate consumers' perception of the healthiness of eight traditional Dutch meal components to characteristics, ingredients and affective aspects, and to quantify such. Cluster analyses based on the health opinions of consumers produced four clusters of consumers: (1) deviant definition of healthy and not ill, (2) no interest in health, (3) feel healthy and (4) health problems, with sample percentages of 21, 10, 50 and 18, respectively. The four clusters have a different perception of the ingredients related to product healthiness. It was concluded that the eight meal components are differently perceived with respect to health. The health perception of consumers is correlated to attributes, ingredients and affective terms. Consumer-oriented product development should take into account consumer groups, products and product attributes, ingredients and affective aspects when translating a consumer's wish into product characteristics.

4.1. Introduction

The degree of fit between a new product and consumer needs is the key determinant of the success of new product development (Grunert and Harmsen., 1997). Integrating consumers' needs and wishes into the product development process seems to be one way to become more successful. Such consumer-oriented product development takes consumer' needs as the starting point for the new product development process, and for the product and production technology as a derivative thereof (Van Trijp & Steenkamp, 1998). As part of the implementation of consumer-orientation in the first phase of product development, it is important to understand the consumer and how to make the first steps in translating needs and wishes into product characteristics. Thus, the translation of consumer's wishes into product characteristics is part of consumer-oriented product development. This is not a normal translation from one language into another: the consumers' terminology has to be transformed into product attributes and characteristics which product developers will understand and be able to implement. This is a multitasking step because consumer's perception has to be integrated into the food development process, and the complexity of different characteristics of food products has to be taken in consideration. In other words food perception has to be understood in terms of the different functions of food in the daily life of the consumer as part of habits and cultures and moreover related to the product with its large number of characteristics like quality, food safety, freshness, as well as such sensory aspects as taste and smell. An essential part of this translation is the obtention of an insight into the perception of consumers. In earlier research, food perception was studied from a social-psychological and product development perspective (Sijtsema *et al.*, 2002). Furthermore, expressive and associative group discussions provided insight into affective and cognitive aspects related to food and health perception (see chapter 3). The participants related healthy feeling to feeling free and happy, and to a balance between being active and passive. Health and food are associated with such nature terms as 'season', 'water' and 'sun', specific products like 'vegetables' and 'fruits', and such ingredients as 'vitamins', 'fibres', 'minerals' and 'no additives'. In the perspective of consumer-oriented product development, these health-related aspects should be linked to products and product characteristics.

The aim of this study is to link healthy and health-related consumer terms (product attributes) of traditional Dutch meal components to products and their characteristics, ingredients and affective aspects in the perspective of health attitudes of consumers, and to quantify such.

This translation comprises two inextricably related components: health perception as the topic of research, and the methodology needed to implement consumer-oriented product development. In the perspective of this research into consumer-oriented product development, special attention is paid to the methodological part.

Preliminary qualitative research, by means of expressive and associative group discussions, was carried out in order to gain insight into consumers' wishes (see chapter 3). In the present study it is tested whether the results of this qualitative study are indeed related to food and health for a bigger group of consumers, and whether different health orientations of consumers are related to different perceptions.

The translation of health as a consumer's wish into product characteristics is represented in the following stepwise approach (Table 4.1), which is described in more detail in the following sections.

Table 4.1 Stepwise approach for consumer-oriented product development

Step	Contents	Method
1 Demarcation research	Choose group of consumers and meal components or products	Discussion with involved experts
2 Selection	Selection of attributes, ingredients and affective aspects	Expressive and associative group discussions with consumers
3 Additions	Addition of product characteristics and ingredients	Discussions with involved experts
4 Formulation and pretesting of the questionnaire	Avoiding mistakes, misinterpretations and misunderstanding	Discussions with involved experts and consumers
5 Data gathering and analysing	Measuring health perception of 8 products and 15 terms	Questionnaire

This stepwise approach makes the translation from health as a consumer's wish into product attributes and characteristics more tangible with the aim of supporting consumer-oriented product development throughout the product development process.

4.2. Subjects and methods

Food perception is influenced by four determinants: product, individual, social environment and consumption moment (Sijtsema *et al.*, 2002). Each of these determinants is an essential part of demarcating the research field and formulating the questionnaire, which is described below.

4.2.1. Meal components, product attributes and characteristics (product and consumption moment)

In unstructured exploratory interviews, people spontaneously describe their food consumption in terms of whole meals, or meal-like dishes, rather than the more specific food items usually found in nutrition surveys (Rappoport *et al.*, 1992). Therefore, in preliminary qualitative research, the traditional Dutch meal was a central element in the expressive and associative group discussions (see chapter 3). In these discussions, different consumer terms related to food product attributes, characteristics, ingredients and affective aspects were mentioned. These are the starting points in this quantitative study. Linking those terms to meal components and tangible product characteristics will provide a better understanding of what consumers mean by these terms when talking about food. The meal components of a traditional Dutch meal were chosen to make it more applicable in product development. The advantage of choosing meal components rather than a meal in general is that links can be made to concrete product characteristics. If a meal in general were the starting point, it would be hard to analyse which components are responsible for the judgement of the consumer, making it even more difficult to link it to concrete product characteristics. A traditional Dutch meal consists of vegetables, meat, potatoes and dessert; sometimes soup is served as a starter. In this study two specific products (broccoli and lettuce, beef and pork chops, French fries and white rice, yoghurt and ice-cream, respectively) each represented a meal component. The choice of the products was based on the expressive and associative group discussions, and the products' representative character of having a healthy, less healthy or even unhealthy image.

In general, vegetables are of interest because people are aware that they are healthy meal components but the consumption of vegetables is decreasing (The Netherlands Nutrition Centre,

1998). In contrast to vegetables, meat consumption is stable in the Netherlands (The Netherlands Nutrition Centre, 1998). But negative attitudes towards meat are frequently expressed, and with more emotion than comments about any other food (Holm & Møhl, 2000). The study by Holm and Møhl showed that despite holding critical attitudes, the interviewees consumed meat on a daily basis. Fries represent a staple food, as does rice (of which consumption is increasing). The dessert in general has a kind of indulgence image; for this meal component we chose two possibilities, that is, yoghurt and ice-cream. In the qualitative study the participants mentioned and selected different health-related terms (see Table 4.2).

Table 4.2 Terms related to health and food selected by participants and authors (terms marked with an asterisk have been selected for further research)

Category	Terms
Sensory	Pleasure*, appetizing
Emotional	Optimism, love, happy*, enjoy*
Social	Interaction, harmony
Symbolic	Water, season, sun, fresh* air (natural)
Physiological	Nutritional value*, easily digestible, fibres, water, no fat*, vitamins*, carbohydrates*
Functional	Variation, balanced
Extrinsic	No poisons, no additives, unprocessed, environment-friendly*
Food-related items	Vegetables, fruits, tomato, fresh* products, spinach, fish

In addition, the participants in the expressive and associated group discussions talked about which product characteristics, attributes and ingredients they relate to these selected terms. In these discussions consumers used many terms to express product attributes and product characteristics. The main important attributes mentioned were 'natural', 'fresh', 'nutritious' and 'unprocessed'. The participants also mentioned such ingredients as vitamins and fat. The terms given in Table 4.2 were selected according to their relevance for the different meal components and the possibilities to relate them to tangible product characteristics. Based on the qualitative study it was expected that the different terms used by the participants in the expressive and associative group discussions (attributes, ingredients, characteristics and affective aspects) were related to health for different components of a traditional Dutch meal. Because the aim is to come to product characteristics, also some concrete product characteristics were selected, for example, 'organic', 'packed' and 'long-lasting'. Some of these terms were mentioned in the group discussions and were chosen because of their expected influence on health perception. To get a more complete overview, also 'protein' was added to the ingredients. These ingredients are not present in all the various meal components in considerable amounts, but were included in the questionnaire in order to see whether consumers have any idea about the contents of products.

Besides the more cognitive aspects of food described above, some affective aspects associated with health perception of food were integrated into the research. During the expressive and associative group discussions, such affective aspects as 'happy', 'enjoy' and 'appetizing' were discussed in the context of health. It is expected that these can be linked to health perception. Probably there is a difference between healthy and unhealthy products. In Table 4.3 an overview is given of all terms used as a starting point for the questionnaire.

Table 4.3 Selected meal components, attributes, characteristics and ingredients, and added product characteristics and ingredients

Category	Products and terms
Meal components	Broccoli, lettuce, beefsteak, pork chops, rice, fries, ice-cream, yoghurt
Attributes	Natural, fresh, nutritious, unprocessed
Characteristics	Packed, long-lasting, organic
Ingredients	Vitamins, protein, fat, carbohydrates
Affective aspects	Enjoy, appetizing, happy

4.2.2. Consumers (individual, social environment)

Respondents answered questions on the following socio-economic and demographic variables: sex, age, household size, having children, education level, working situation and income category. Also different attitudes towards health and towards product characteristics related to such trends as convenience and environment were measured on a five-point scale ranging from disagree, slightly disagree, neutral, slightly agree, agree (-2=disagree, 2=agree).

Health opinion, health consciousness and food trends

Granzin *et al.* (1998) present the health promotion model, which explains a person's likelihood of selecting health-promoting as opposed to health-repressing behaviours, in terms of three classes of influencing variables. The first class – modifying factors – include a person's demographic and other personal characteristics, the influence of others, and the decision-making environment. These factors are represented in the questionnaire by demographic variables such as gender, age, education, household size, income, marital status and interpersonal influences in propositions concerning the influence of family and friends on eating habits. The second class – cognitive-perceptual factors – represent beliefs and perceived health status, and were represented in the questionnaire by propositions about definitions of health. The third class – cues to action, such as communications from others – were represented by items about searching for information on healthy food.

Along with items about health opinion, health consciousness was part of the study. Health consciousness is the degree of readiness to undertake health actions (Becker *et al.*, 1977). Health consciousness was operationalized with an eleven-item scale developed by Oude Ophuis (1989) also implemented by Schifferstein and Oude Ophuis (1998). For reasons of uniformity, the items were judged on a five-point scale.

There are also many other aspects related to the food perception of consumers. Therefore also propositions were formulated about food trends and product characteristics related to this. For example, convenience and hedonism – which often are seen as having a negative relationship with health (Costa *et al.*, 2002). Also 'environment-friendly', which is often related to more healthy (Schifferstein & Oude Ophuis, 1998, Torjussen *et al.*, 2001), was used in the study. Deviant attitudes towards health and other trends are expected to have an influence on a consumer's perception.

An inquiry was considered an adequate way to explore the field of quantification of health perception. Because of the number of questions to be asked and propositions to be made, a written questionnaire was prepared. It was distributed in paper form in order to reach a sufficiently large group of consumers. It was of less importance to have a representative sample of the Dutch population because the aim of the study is to explore the translation of consumer's wishes into product characteristics. The authors are aware that partial non-response and social

wish fullness might influence the quality of the data. To test this qualitative health perception in a quantitative perspective a questionnaire is a useful tool to measure the relation between the selected meal components and several product characteristics and attributes. While the relation in general was the most important in this phase of the research, when choosing this research design it was taken for granted that different consumption moments are hard to take into consideration.

During the construction of the questionnaire some important aspects were taken into account. First, the formulation of the questions had to be logical; therefore in some cases the sentences or terms had to be adapted. Second, a long list of questions must be avoided to prevent carelessness. Third, the authors are aware that some aspects are hard to measure in a questionnaire, for example, such affective aspects as sensory aspects which are judged without seeing or tasting a product. In this case their judgement is based on the internal standard the consumers have in mind.

Experts with a methodological and with a technological background were consulted during the selection of the terms and the formulation of the propositions for the questionnaire. The questionnaire was then intensively pretested on consumers and adapted according to the findings. The questionnaire was divided into three parts: (1) 50 items about health and food-related attitudes, (2) 15 items for each of 8 products with product attributes, characteristics and affective aspects for each of the products, and (3) 7 general questions about demographics (e.g. age, sex, income, education). To ensure uniformity, all the propositions were responded to on a 5-point scale ranging from 'disagree' through 'slightly disagree', 'neutral' and 'slightly agree', to 'agree', except for the last part of the socio-demographic questions.

4.2.3. Data analysis

Factor analysis was considered an appropriate method to identify underlying dimensions, or factors, that explain the correlations among a set of variables (Malhotra, 1996). Factor analysis (principal component analysis with varimax rotation) was used to group the various items concerning consumers' health consciousness.

Hierarchical cluster analysis was used to form relatively homogenous groups of respondents that were based on the similarity of their opinions about health. Clustering was performed using a hierarchical grouping algorithm based on Ward's criterion, which maximizes the sum of the squared distances among clusters (Hair *et al.*, 1998). A four-group solution was employed to represent the sample of consumers. Pearson correlation analysis was used to link health to attributes, characteristics, ingredients and affective terms.

4.2.4. Sample

Questionnaires were distributed to 400 public transport passengers, 100 company employees and 100 parents of primary school children in the middle and the south-west of the Netherlands in January 2002. The questionnaire was returned by 53% of the persons approached (participation was rewarded with the sum of € 3, either to be kept or to be donated to charity), giving a sample of 344², of which 38% were men and 62% women. The average age of the respondents was 39 (a range of 18 to 76). Of the respondents, 32% live in a two-person household, 14% in a one-person household (48 cases), 41% in a 3- or 4-person household, and 12 % in a household with 5 or more persons; 47% of the respondents have children, while 52% do not. The educational level of the sample is low for 11% of the respondents, average for 50 %

² In the end, 45% chose the Dutch foundation for Cancer control, 10% the Dutch Heart foundation, 17% the Dutch branch of the World Wildlife Fund, and 28% their own bank account.

and higher for 39%. Of the respondents, 35% were working full time (32 or more hours a week), 17 % part time (<32 hours a week), 25% were students and 23% did not have a job. The annual family income was less than 27,000 euros for 26% of the respondents, 27,000-54,000 euros for 54% and more than 54,000 euros for 20%. As mentioned, a non-probability sampling technique was used, because it has been shown that such samples can provide good estimates of population characteristics. However, there is no way to determine the exact inclusion probabilities of elements in the sample, and therefore caution should be exercised in extrapolating the results of the sample to the general population.

4.3. Results and discussion

4.3.1. Description of clusters of consumers

The consumers were clustered in four groups based on items of health opinions, related to the health model of Granzin *et al.* (1998). Table 4.4a and Table 4.4b present the results of the clusters of consumers based on items and demographics and product characteristics. See Appendix 1 for the Rotated component matrix of health consciousness scale.

The different clusters of consumers have different opinions about the health and food-related topics. Cluster 1 ('deviant definition health and not ill') differs because the consumers in this cluster do not regard health as 'not being ill'. This group has a deviating opinion about the definition of health and its relation to illness. The other clusters are neutral or slightly agree that health is related to not being ill. Those in cluster 2 ('no interest') described themselves as not having a healthy lifestyle and did not judge their food pattern as being as healthy as that of their peer groups and have no interest in health. They are not at all occupied with health and do not make sacrifices for health. They also score the highest on eating ready-to-eat meals. The largest group of consumers make up cluster 3 ('feel healthy'): they feel healthy and score neutral on the health-consciousness scale. Cluster 4 ('health problems') comprised consumers with physical problems: they are really occupied with health and sacrifice a lot for health.

It is notable that cluster 2 ('no interest') gave more positive responses to propositions about people in their environment (e.g. family and friends) giving them information about healthy food. Compared to the other clusters, cluster 4 ('health problems') scored the highest for importance of variation in meals and chose products with a lower fat or sugar content; they also prefer more organic food and that produced in an animal-friendly way.

Granzin *et al.* (1998) assert that a different view of what constitutes good health is related to the performance of health-related behaviour. Especially those who view health as the absence of illness report performing less health-related behaviour (Laffrey, 1982). Cluster 1 had a deviant perception of the definition of health, which results in a more positive attitude towards eating pattern and environment. Based on the aforementioned aspects it might be expected that consumers in this cluster have a positive attitude about health-promoting behaviour. However, this cluster does not show too many differences in the scores compared to those in cluster 3 ('feel healthy'), except on the ones related to peers or family and friends.

Table 4.4a Clusters of consumers and their scores on health and health consciousness scale. All items shown are significantly different (<0.05) for the four clusters.

	Clusters differ significantly	1 Deviant definition healthy and not ill	2 No interest	3 Feel healthy	4 Health problems
Percentage/number of consumers in cluster		21%73	10%35	50%173	18%63
Average score health opinion items					
I have a healthy lifestyle	*	3.99	2.31	4.09	3.73
I have no physical problems	*	4.23	3.66	4.57	2.51
I feel myself healthy	*	4.49	4.03	4.66	3.08
Health means that I feel fit		4.18	4.17	4.45	4.17
I find myself healthy	*	4.27	3.86	4.52	3.17
I see healthy as not being ill	*	2.38	3.80	4.21	3.33
I think that sports is important for a healthy life		4.16	4.26	4.38	4.38
My eating pattern is more healthy than contemporary	*	3.58	2.17	2.92	3.40
Healthy food occupies my mind	*	3.34	2.57	3.32	4.00
I am more healthy than contemporary	*	3.36	2.69	2.84	2.75
I read ingredients on the package	*	2.95	2.29	3.05	4.16
I have a healthy eating pattern	*	3.93	2.46	3.74	3.79
I search for information on health	*	2.32	1.94	2.50	3.87
I am interested in healthy food	*	3.56	2.94	3.76	4.29
In my environment is talked about healthy food	*	3.68	3.94	2.87	3.65
I often talk about healthy food with family or friends	*	2.84	3.23	2.39	3.49
Family and friends often give me advice about healthy food	*	2.16	3.31	1.88	2.73
Factor score health conscious scale					
Health sacrifice	*	.03	-.69	-.04	.46
Occupied with health	*	.06	-.51	-.07	.42

Table 4b Clusters of consumers and their scores on product trends and demographics. All items shown are significantly different (<0.05) for the four clusters.

		1	2	3	4
	Clusters differ significantly	Deviant healthy and not ill	No interest	Feel healthy	Health problems
Percentage/number of consumers in cluster		21%73	10%35	50%173	18%63
Average score on propositions about product characteristics					
Products with added vitamins or minerals have my preference	*	2.55	3.06	2.98	3.35
I prefer food with a positive influence on my health	*	3.99	3.43	3.91	4.24
I often eat a ready to eat meal	*	1.82	2.54	1.96	1.68
I change food preparation at home with going out for dinner	*	2.40	2.83	2.25	2.08
I eat a dinner every day	*	4.58	4.14	4.64	4.52
Variation of my dinners is very important	*	4.42	3.86	4.38	4.52
Country of origin of food is very important.	*	2.40	2.54	2.46	3.11
I like cooking	*	3.75	2.97	3.65	3.95
I prefer products with a lower fat or sugar content	*	3.38	3.00	3.79	4.17
I prefer organic food	*	2.84	2.69	2.71	3.35
I prefer animal friendly production	*	3.68	3.69	3.57	4.05
Demographics Group means					
Sex: Man =1;woman = 2	*	1.49	1.54	1.68	1.65
Age (years)		38.22	34.60	39.03	40.37
Income i: $i < \text{modal} = 1$; $\text{modal} \leq i \leq 2 \times \text{modal} = 2$; $i > 2 \times \text{modal} = 3$	*	2.15	1.68	1.91	1.89

4.3.2. Health perception of products, characteristics, ingredients and terms

The product perception part consisted of eight products and fifteen terms, resulting in 120 judgements (see figures for all products and terms in Appendix 1). The four clusters of consumers gave a significantly different average score for only nine propositions³. Thus, in general the clusters have the same perception of health, product attributes and product characteristics, ingredients and affective aspects. Therefore the following description about

³ I enjoy fries, yoghurt is natural, chops are packed, I enjoy broccoli, broccoli is packed, I eat broccoli for the vitamins, rice is natural, rice is unprocessed, I eat rice because it contains no fat.

health, attributes, ingredients and affective aspects concerns the entire sample. Appendix 2 presents the figures of all mean scores for the eight products and all terms.

Health

The different meal components were differently perceived concerning health (Figure 4.1). Vegetables were judged as the most healthy component, in contrast to fries and ice-cream, which were perceived as unhealthy. The products from the same meal component were significantly differently judged for health (e.g. broccoli is perceived as being healthier than lettuce). The products perceived as healthy and unhealthy are described in the text as healthy or unhealthy products. The authors are aware that a product in itself cannot be healthy or unhealthy, although it can be part of a unhealthy or healthy diet. So in this article a healthy or unhealthy product means it was perceived as such by the consumer.

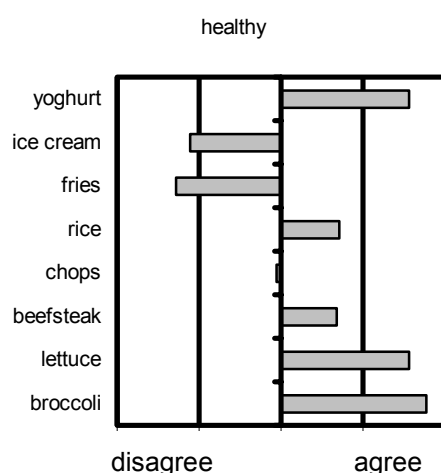


Figure 4.1 Health perception of the different meal components

Attributes

For products perceived as healthy, the 'natural' score is a little less than that for the 'health' score. The unhealthy products score higher on naturalness than on healthiness. Although it seems that 'healthy' and 'natural' receive nearly the same score, only beefsteak scored the same on 'natural' and 'healthy'; all the other products received a significantly different score on 'healthy' and 'natural'. Nearly all products were perceived as nutritious; fries were regarded as neutral and ice-cream as not nutritious by the respondents. Thus in the perception of consumers, only healthy products can be nutritious.

Characteristics

The products were differently judged on the three product characteristics. The products perceived as being healthy (broccoli, lettuce, yoghurt) were perceived to be more organic than the other products. Ice-cream, yoghurt, fries and rice were scored significantly less on 'organic', while broccoli and lettuce were scored little positive and beefsteak and pork chops were little negative. The proposition about 'organic' might have confused the respondents, and this may be why products which can be found in an 'organic' version on the shelf in the shop score higher. So,

probably 'organic' does not give a good impression. Nevertheless it is not surprising that organic is related to health according to, for example, Schifferstein and Oude Ophuis (1998) and Torjussen *et al.* (2001).

For 'packed' the same pattern is found: the products which are sold packed in the shop score high for packed. This shows that consumers judge according to their internal standard or the product they are familiar with. In this setting it could not be tested whether 'packed' influences the health perception. The products were described by the consumers as they are presented in the supermarket. Thus, in this study the product characteristics related to the products do not provide additional information about their relation to health perception, because both the products and the product characteristics are formulated in too general terms. In further research it would be worthwhile to compare two variants of the same products with different characteristics (e.g. 'packed' or 'organic').

Ingredients

The respondents stated that they do not eat a certain product because of its ingredients (e.g. carbohydrates, fat, protein, vitamins); the three exceptions were broccoli and lettuce (for their vitamins) and yoghurt (for its protein). Products perceived as being unhealthy are not eaten because of their ingredients.

Affective aspects

All products are enjoyed when eaten and are perceived as appetizing. Fries, ice-cream and yoghurt have the highest score on appetizing. The eating of most of the products does not make the respondents happy, except for ice-cream and fries which have a neutral score. It is notable that beefsteak scores the most negatively on 'making happy'.

'Enjoy' and 'appetizing' are affective aspects, which the respondents linked to products. However, feeling happy got a neutral response probably due to the formulation. Consumers do not see a relation between a product and feeling happy; this might be different, though, if the context were integrated into the research design.

4.3.3. Combinations of health with attributes, characteristics, ingredients and affective aspects for four clusters of consumers

The correlations for health and all the terms for the four clusters are given in Appendix 3. Taking all consumers in the sample into consideration, nearly all attributes and affective terms are correlated to health of the different meal components, except for 'appetizing' with fries, 'appetizing' with ice-cream and 'feeling happy' with yoghurt. This is in accordance with the expectation based on the expressive and associative group discussions. A different picture is seen when comparing the correlations for the different judgements for product attributes, characteristics and affective aspects and health of the four clusters.

Attributes

Nearly all attributes for the clusters of consumers are related to health, with the exception of 'fresh', 'nutritious' and 'unprocessed' for broccoli judged by cluster 4 ('health problems'), and fries and yoghurt judged by cluster 2 ('no interest'). Thus, nearly all clusters of consumers have the same perception of the attributes related to the healthiness of a product, although those with health problems and a higher consciousness of health have a different perception of fresh, nutritious and unprocessed of the healthy perceived broccoli. Also the consumers who have a low interest in health gave a different judgement for healthiness and attributes of fries and yoghurt.

Product characteristics

The correlations between health and the product characteristics provide a very diffuse picture, perhaps due to the misinterpretation of these characteristics or the general formulation of the characteristics as explained earlier in section 4.3.2.

Ingredients

The correlations with health and the ingredients show the following. All clusters related 'vitamins' and 'health' to broccoli and lettuce. Only cluster 3 ('feel healthy') related all four ingredients to the healthiness of beefsteak and yoghurt. On the contrary, cluster 1 ('deviant definition of health and not ill') did not correlate the healthiness of pork chops and fries to the ingredients. Cluster 4 ('health problems') did not correlate the healthiness of ice-cream to one of the ingredients. Thus the four clusters have a different perception of the ingredients related to health for specific products.

Affective terms

All four clusters related all affective terms to the healthiness of beefsteak. Cluster 4 ('health problems') did not relate affective aspects to the healthiness of lettuce. Cluster 3 ('feel healthy') related all affective aspects to the healthiness of pork chops and ice-cream, but did not relate these affective aspects to the healthiness of fries. Thus for some products and some consumers the affective aspects are related to the healthiness of a product.

4.4. General discussion

4.4.1. Health perception

Consumers with different opinions about health have different perceptions of health-related product attributes. Products are differently perceived in terms of attributes, ingredients and affective aspects related to the healthiness of the product. This means that consumers as well as products and the product characteristics, attributes, affective aspects and ingredients have to be carefully selected, and must be taken into account in consumer-oriented product development.

4.4.2. Consumers

In this study not only traditional segmentation criteria but also consumer opinions about health- and food-related aspects were used. The results show that these opinions are useful criteria with which to group consumers; this is in accordance with Granzin *et al.* (1998). The authors are aware that some groups were not reached, so probably the balance of the four clusters is different in Dutch society.

4.4.3. Method

The selection of the terms and the formulation of the propositions using these terms was a complex and difficult task. It is very important for further studies to work this out with all experts and consumers involved in the product development process. For example, in this study the questions about 'organic' can be interpreted in different ways. Therefore intensive testing is necessary to avoid interpretation problems. Some of the problems are related to the fact that in this study eight different products of four meal components were compared, while in a product development process the comparison will be of more similar products. In that case the product characteristics can be formulated more precisely.

In this study a questionnaire was used to gather the data for the quantitative part of the study, and this choice had implications for the research. A questionnaire is useful for comparing eight different products. But the measurement of consumers' perception of products with questions and one word representing a product has big implications for the interpretation of the results. In general, consumers had their internal standard in mind when completing the questionnaire. They had in mind a product of a standardized quality for example when buying or eating it. We have to be aware that the judgement of a concrete product might be totally different. Measuring such affective aspects as sensory aspects is even more complicated in a questionnaire. Our respondents also related this to their internal standard while especially affective aspects are influenced by consumption moment and atmosphere, which were not taken in consideration in this research. Although the authors are aware of this effect the results of the judgements for 'enjoy' and 'appetizing' give a valuable picture. On the other hand 'feeling happy' as a result of eating the specific products shows a different picture. Probably the distance between feeling happy and eating certain food products was in this case too big for the respondents.

This way of questioning makes it possible to compare and find links between health and product characteristics, attributes and affective aspects. The position of affective aspects and the formulation of affective aspects needs further research.

The use of a questionnaire also has implications for the demarcation of the research. Although the authors are aware that the consumption moment influences perception, it was not possible to take it into consideration in this study. Further research is needed to work this out; for example, a description could be given of a specific consumption moment, and with that information in mind the consumers would answer the questions about product perception. This could be implemented in different settings in order to gain an insight into the influence of consumption moment on product perception. It would also be interesting to test other experimental settings.

Expressive and associative group discussions complemented the questionnaire. The perception of health and product characteristics is in accordance with the expectance based on the expressive and associative group discussions.

The stepwise approach needs further adaptation before it can be implemented in consumer-oriented product development. In that case the choice of the product is different. So, additional steps have to be made concerning the selection of the product and the position of the concept by the experts involved by the product development team.

In conclusion, this approach provides an insight into the aspects of a product which are related to health perception: not only ingredients, attributes and characteristics but also affective aspects are related to health. So when producing a product perceived as healthy, product features on different levels must be taken into consideration.

Acknowledgements

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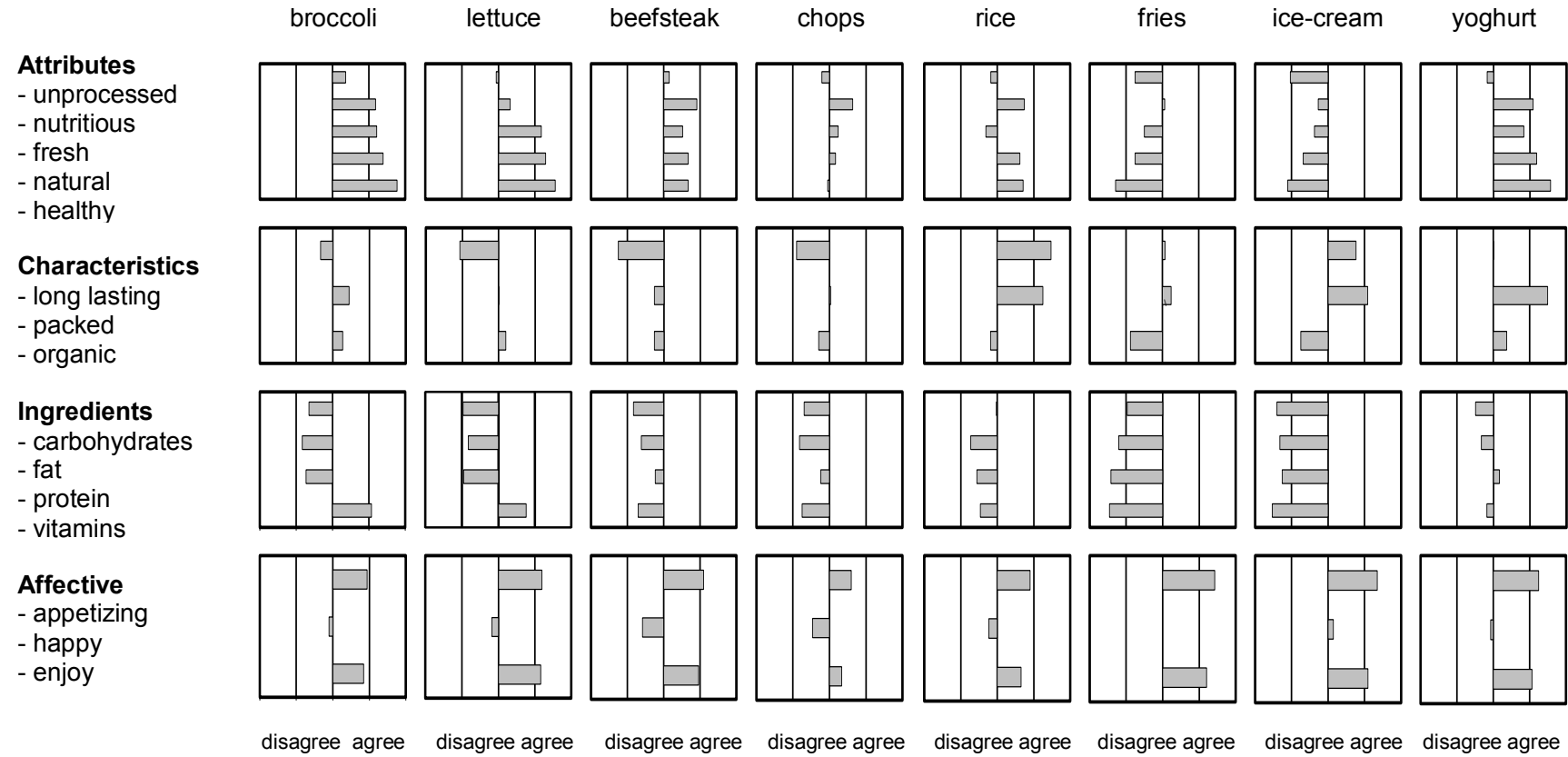
Appendix 1 Rotated component matrix health consciousness scale

Health conscious items	Health sacrifice	Occupied with health
Component	1	2
I have the impression that I sacrifice a lot for my health	.77	
I consider myself to be very health conscious	.71	-.32
I am prepared to leave a lot, to eat as healthy as possible	.69	
I think I take health into account a lot in my life	.76	
I think it is important to know how to eat healthily	.61	
My health is so valuable to me, that I am prepared to sacrifice many things for it	.72	
I have the impression that other people pay more attention to health than I do	-.41	.63
I do not continually ask myself whether something is good for me		.78
I don't often think about whether everything I do is healthy		.78
I don't want to ask myself all the time whether the things I eat are good for me		.74
I often dwell on my health		.62

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 13 iterations.

Appendix 2 Results of judgements of eight products and 15 terms



Appendix 3 Correlations with health

	broccoli				lettuce				beefsteak				pork chops				rice				fries				ice cream				yoghurt			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
respondents	73	35	173	63	72	35	173	63	72	35	167	60	70	35	165	57	73	35	173	63	72	35	172	62	73	35	173	61	71	35	173	61
natural	.51	.65	.43	.26	.52	.74	.53	.47	.61	.64	.57	.29	.48	.45	.56	.58	.74	.64	.58	.68	.47	.42	.39	.31	.39	.27	.44	.40	.53	.38	.52	.47
fresh	.46	.44	.28	.13	.36	.65	.33	.38	.33	.47	.53	.22	.61	.38	.50	.50	.40	.21	.29	.44	.30	.20	.17	.27	.24	-.10	.31	.20	.26	.27	.36	.42
nutritious	.35	.40	.41	.22	.27	.35	.38	.19	.66	.59	.59	.18	.52	.42	.60	.39	.69	.58	.47	.71	.38	.26	.27	.28	.32	.08	.37	.36	.37	.09	.31	.37
inprocessed	.33	.37	.23	.07	.18	.24	.28	.29	.56	.44	.39	.33	.24	.00	.44	.57	.67	.51	.41	.56	.28	-.16	.20	.31	.34	.59	.46	.27	.26	-.08	.23	.29
organic	.13	.21	.16	.23	.16	.59	.17	.17	.30	.41	.26	.20	.33	.37	.36	.51	.50	.13	.44	.51	.20	.00	.31	.19	.38	.39	.33	.13	.01	.05	.33	.24
packed	.10	.13	.17	.09	.04	-.11	.02	.28	-.10	-.15	.15	-.06	.01	.20	-.01	-.03	.04	.19	.13	.10	-.01	.13	-.06	.00	-.06	-.34	.07	-.04	.29	.16	.32	.34
long lasting	-.11	-.08	-.04	.00	.05	.08	-.04	-.03	-.18	-.28	-.09	.13	.15	-.05	.18	.28	.07	-.01	.05	.13	-.09	.17	-.04	.10	-.31	-.02	.05	-.03	.23	.13	.18	.16
enjoy	.23	.39	.24	.25	.12	.63	.34	.06	.45	.53	.50	.46	.22	.23	.41	.17	.50	.38	.44	.42	.21	.17	.05	.21	.11	-.08	.25	-.05	.56	.09	.31	.31
happy	.10	.26	.11	.05	.25	.42	.20	.13	.40	.35	.34	.32	.16	.28	.32	.23	.21	.50	.23	.48	.31	.40	.11	.29	.04	.10	.26	-.03	.02	-.09	.11	.30
appetizing	.29	.46	.20	.22	.10	.61	.38	.23	.40	.49	.44	.47	.26	-.02	.32	.12	.38	.31	.35	.41	.14	.19	.04	.01	.05	-.21	.16	-.20	.42	.12	.23	.15
vitamins	.32	.40	.30	.30	.36	.41	.41	.31	.28	.55	.25	.02	.19	.24	.32	.26	.29	.53	.26	.27	.01	.60	.27	.35	.31	.31	.22	.04	.05	.11	.19	.21
protein	-.05	-.05	-.05	.05	.10	-.12	-.01	.14	.31	.28	.16	.13	.23	.49	.23	.29	.22	.41	.21	.22	.04	.43	.15	.37	.19	.24	.19	-.02	.11	-.01	.27	.15
fat	-.05	.00	.04	-.01	.06	-.07	-.10	.19	.11	.36	.22	.28	.15	.20	.15	.24	.07	.39	.05	.15	.14	.24	.10	.14	.20	.25	.13	-.04	-.03	.18	.17	.09
carbohydrates	-.01	-.06	.05	.02	-.06	-.13	-.09	.14	.08	.57	.17	.24	.07	.16	.18	0.20	.38	.14	.10	.11	.05	.32	.19	.08	.33	.29	.20	-.08	-.12	.14	.17	.12

Bold means a significant correlation at 0.05 level with health

Example: For cluster 1 there is a significant correlation between broccoli is healthy and broccoli is natural of 0.51

5. Consumer orientation of product developers and their product perception compared to that of consumers

Abstract

This paper concluded that product developers (58, response rate 35%) and consumers (344, response rate 57%) perceive health and its relation to product characteristics in the same way, but the perception of product developers is more outspoken. Furthermore, factor analysis reveals four orientations of product developers: technology and cost orientation – which are related to the use of more traditional work methods – and customer and consumer orientation, which are related to the use of more modern and interactive work methods. These four orientations are related to different opinions about factors influencing failure of products, working with models and cooperation.

5.1. Introduction

The degree of fit between a new product and consumer needs is the key determinant of success in new product development (Grunert *et al.*, 1997). Integration of consumers' needs into the complex and multidisciplinary product development process seems to be one of the ways to become more successful. Such consumer-oriented product development takes consumer needs as the starting point for the new product development process, and the product and production technology as a derivative thereof (Van Trijp & Steenkamp, 1998). As part of the implementation of consumer orientation in the first phase of product development, it is important to understand the consumer's perception and to know how to take the first steps of the translation into product characteristics. First, insight is needed into consumers' perceptions of those needs and wishes. Secondly, it is important to gain an insight into the product characteristics related to this perception. Third, product developers must decide how to integrate this perception into product development and formulate the tangible product characteristics.

Tools to support consumer-oriented product development are described in the literature on quality. Steenkamp & Van Trijp (1996) present Quality Guidance, in which quality expectation and quality experience are linked to quality cues and quality attributes. Luning *et al.* (2002) describe a modification of this model in which marketing, production system characteristics and physical product features are the starting points. The Total Food Quality Model (Grunert *et al.*, 1996) is relevant because it is a general framework for exploring quality perception from the consumer's point of view. A combination of the two models can provide a deeper insight into the quality perception process and its links to consumer behaviour on the one hand, and to physical, objective quality on the other hand (Steenkamp & Van Trijp, 1996). These tools are useful for product developers to classify product attributes and product characteristics.

Tools to unravel consumers' perception of characteristics are necessary to realize consumer-oriented product development. In earlier research, the perception of health as a consumer's wish was studied in a qualitative and quantitative approach. For the qualitative study, Dutch women were selected because they tend to be more interested in health matters than men are. In expressive and associative group discussions, they mentioned both cognitive and affective health-related aspects, for example 'sun', 'water', 'trees', 'vitamins', 'enjoy' and 'feel happy' (see chapter 3). The results of these group discussions were translated into a questionnaire to measure the perception of a large sample of consumers. The results of this quantitative study indicate that consumers perceive the healthiness of meal components of a traditional Dutch meal differently (see chapter 4).

In this study, these perceptions of consumers were compared with the perceptions of product developers who integrate and implement their understanding of the consumers in the characteristics of the new product. Product developers are defined as people involved in the product development process, who may have different backgrounds (e.g. technology, nutrition or cooking) and may work in different departments of a company, the product development department or even in external companies. They have a major influence on the development process, the production and the product characteristics of the final product, because they are intermediaries between consumer wishes, trends, production and product characteristics. As a result of their experience with and knowledge about food in general, and products and their production it might be expected that people working in product development not only have more knowledge, but also have a different type of knowledge about food than consumers do. Knowledge is one of the variables influencing people's perception (Antonides & van Raaij, 1996).

This leads to the expectation that the perception of product developers differs from that of consumers. A discrepancy between the perception of consumers and that of product developers might result in misinterpretation and cause an incorrect translation of wishes into product characteristics – which results in the failure of new products. The perception of product developers is studied from the perspective of consumer-oriented product development. It is interesting to gain more insight into the opinions and ideas about issues related to the consumer orientation of product developers. Therefore, in this study consumer-oriented product development was unravelled in terms of opinions and ideas about relevant elements of product development, for example, aspects related to the failure of products, internal and external cooperation, and working with product development models.

The aim of the study was to compare the product perception of product developers with that of consumers, and to explore the orientations of product developers vis-à-vis relevant elements of consumer-oriented product development.

5.2. Subjects and method

5.2.1. Questionnaire

In this exploratory research, various topics related to product development in general and to consumer-oriented product development more specifically were worked out in a questionnaire in order to gain an impression of which topics are important to product developers. A questionnaire is a useful method to acquire insight into opinions on a range of topics concerning product development and perceptions of health related to products and product characteristics of a large group of people who are involved in the product development process. Many of the topics were formatted as propositions, with a 5-point Likert scale ranging from ‘disagree’, through ‘slightly disagree’, ‘neutral’ and ‘slightly agree’, to ‘agree’. The propositions concern information sources, personality, the importance of information about certain topics for their job, information giving rise to ideas for product development, working with product development models, and internal and external cooperation. Additionally, some background variables were sought: for example, the number of employees the company has, the number of years of working experience, the size of the product development team, and the age, sex and education level of the product developers.

Relevant elements for product development

The questionnaire contained propositions concerning various elements of product development. According to Kristensen *et al.* (1998), market orientation is the most important factor for product development success. These authors mention, for example, usage of qualitative and quantitative research as part of market orientation. Therefore, items concerning these topics were included in the questionnaire. Propositions concerning, for example, technology, cooperation, finance and quality were also included (see Table 5.2).

Health perception of products

Based on the expressive and associative group discussions mentioned above, various health-related terms and product characteristics were gathered (see chapter 3). In these group discussions, participants mentioned such attributes as ‘natural’, ‘fresh’, ‘nutritious’, ‘unprocessed’, ‘organic’, ‘packed’ and ‘long-lasting’; such product characteristics as ‘vitamins’, ‘protein’, ‘fat’ and ‘carbohydrates’, and such affective aspects as ‘enjoy’, ‘appetizing’ and ‘feeling happy’. These terms were incorporated into propositions to measure consumers’ and product developers’ health perception of eight selected meal components: broccoli, lettuce, beefsteak, pork chops, white

rice, fried potatoes, ice-cream and yoghurt (see chapter 4). Examples of the propositions are: 'Broccoli is healthy', 'Lettuce is fresh', 'Beefsteak is organic', 'I eat pork chops for the vitamins', 'Fried potatoes are appetizing', 'I enjoy eating yoghurt' and 'I feel happy when I eat ice-cream'.

5.2.2. Analysis

The analyses were geared to unravelling variables related to product characteristics and health perception of meal components. Factor analysis was considered an appropriate method to identify underlying dimensions, or factors, that explain the correlations among a set of variables (Malhotra, 1996). Factor analysis (Principal Component Analysis with varimax rotation) was used to group the various items concerning product developers' starting points when developing new products. Pearson correlation was used to link the various factors to the variables related to product development, and to link health to attributes, characteristics, ingredients and affective terms.

Table 5.1 Background variables of the product developers

Variable	Category	Percentage	Variable	Category	Percentage
Sex	Male	50%	Size of company (employees)	1-50	2%
	Female	50%		51-150	20%
	Non response	0%		151-500	23%
		>500		55%	
				Non response	0%
Age (years)	20 – 30	30%	Size of product development team (participants)	1-3	20%
	31 – 40	39%		4-6	32%
	41 – 50	16%		7-10	7%
	> 51	9%		> 10	41%
	Non Response	6%		Non response	7%
Experience (years)	0-3	27%	Cooperation with external companies (companies)	None	32%
	4-6	25%		1-3	45%
	7-10	20%		4-7	14%
	>10	28%		>7	7%
	Non Response	0%		Non response	2%
Education level	Middle	11%	New products a year (number)	1-2	20%
	High	46%		3-5	38%
	University	32%		6-10	20%
	Other	11%		>10	18%
	Non response	0%		Non response	4%
Education category	Technology	77%			
	Marketing	5%			
	Nutrition	7%			
	Social science	9%			
	Cook	2%			
	Non response	2%			

5.2.3. Sample

The questionnaire was pre-tested by methodological experts and a product development specialist. At a conference on sensory analysis – which was attended by 150 persons from approximately 60 Dutch food-producing companies, as well as representatives of various research institutes and persons with an educational background – copies of the questionnaire were given to 105 people who said they are involved in the product development process and

were willing to take part. Thirty-one of the participants (32%) returned the questionnaire. Additional participants (61) were contacted by phone and asked to take part in the study. In total, 166 questionnaires were distributed; the total response rate was 58 (35%). Most of the respondents described themselves as a product developer, although the sample also included a few process technologists, researchers and quality managers. An overview of the variables describing the participating product developers is given in Table 5.1. A description of the 344 consumers is given in chapter 4.

5.3. Results and discussion

5.3.1. Comparison of the perception of product developers with that of consumers

The two samples of product developers (58) and consumers (344) differed significantly only in education level; for age and gender no significant differences were found. In general, the average judgement of the product developers was more outspoken or less neutral than that of the consumers. The product perception part of the questionnaire consisted of 8 products and 15 terms, which meant there were 120 judgements of consumers and product developers to compare. An example of the results concerning the product 'beefsteak' is given in Figure 5.1. There were 36 significantly different judgements, of which 28 represent more extreme answers for product developers; in 2 cases consumers gave more extreme answers, and in 6 cases the experts and consumers gave an opposite judgement. This difference in evaluation of the various meal components might be a result of the expectation that product developers have more knowledge about the products and thus felt more secure when judging the propositions. The observed more extreme scores might represent this. On the other hand, nearly two-thirds of the judgements were not significantly different; this might be because experts are also consumers. Further research is needed to provide an insight into the effect of the more extreme scores on perception on the process of creating new products. It is of importance to know whether this perception leads to misinterpretation, resulting in an incorrect translation and, consequently, a negative impact on the successfulness of the product.

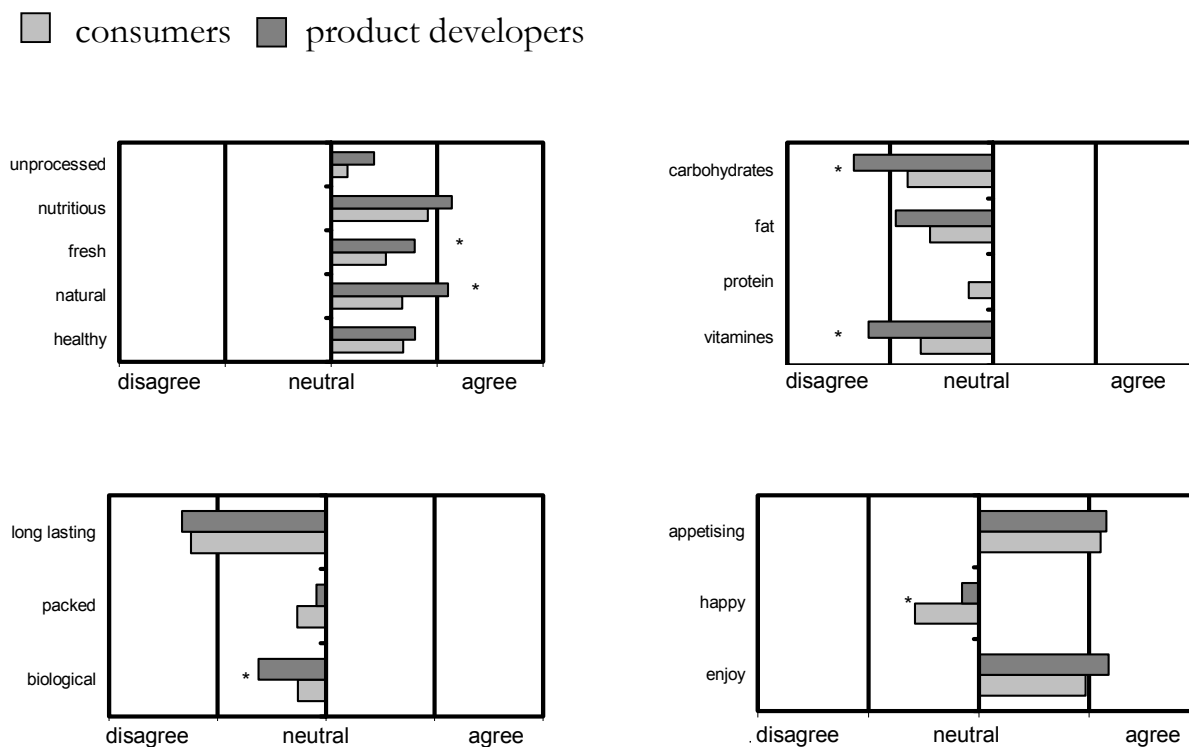
Some notable results concerning specific attributes are described below. Both consumers and product developers perceived meal components differently as regards their healthiness. Products belonging to the same meal component were not similar perceived in healthiness. When comparing product developers' and consumers' 'health' perception, it was not significantly differently judged for the eight different products. Thus, the health perception of consumers and product developers was comparable.

Product developers gave a negative judgement for 'organic' for all of the different products, while consumers gave 'healthy' products (e.g. broccoli, lettuce and yoghurt) a positive judgement for 'organic'. Although this might be due to an interpretation problem, consumers may have a different idea of 'organic'. These results suggest that consumers link 'organic' to healthy products.

Ice-cream was 'nutritious' according to the product developers, while consumers judged it not to be 'nutritious'. This means that 'nutritious' is differently perceived by the consumers of this product. Consumers relate 'nutritious' to healthy products and not to unhealthy products, while product developers do not make this distinction.

Product developers also judged 'fresh' differently for beefsteak, lettuce, yoghurt and white rice.

Figure 5.1 The perception of beefsteak on a Likert scale. Significant differences (level 0.05) are marked with an asterisk (*)



For consumers it was found that nearly all terms, characteristics and ingredients correlated to 'healthy'. This is in accordance with the expectations based on the results of the expressive and associative group discussions. But for product developers, a different picture emerged: there were fewer significant correlations with health. No significant differences were found between the correlations of product developers and those of consumers for terms and product characteristics. This might be due to the relatively small number of product developers in the sample. But it is also noteworthy that consumer and product developers do not have a totally different perception of products and health. Consumers and product developers think in the same way about the direction of health and other terms, but the consumers' perception score is more neutral.

In this study, health was related to attributes (e.g. 'natural' and 'fresh'), product ingredients (e.g. 'vitamins' and 'carbohydrates') and product characteristics (e.g. 'packed' and 'organic'), as well as to affective aspects (e.g. 'enjoyment', 'appetizing' and 'feeling happy'). There were no significant differences found between the correlations of product developers and those of consumers for attributes, characteristics, ingredients and affective aspects.

5.3.2. Orientations based on relevant elements of product development

In the questionnaire various relevant elements of product development were judged. Factor analysis was used to group these variables (see Table 5.2). Four factors were found with eigenvalues greater than 1, explaining 62 % of the variance, each representing a different orientation. The first factor is based on items concerning consumer wishes, market research and brainstorming sessions with consumers; it was interpreted as 'consumer orientation'. The second

factor is based on technology and is called ‘technology orientation’. The third factor was determined by societal developments, external cooperation and brainstorming sessions with co-workers; it represents ‘customer orientation’. The fourth factor is interpreted as ‘cost orientation’. The significant correlations of those orientations and relevant issues of product development are described below and presented in Table 5.2.

Table 5.2 Orientations based on relevant elements of product development Rotated component matrix includes factor loadings $> .30$.

	Factor 1	Factor 2	Factor 3	Factor 4
	Consumer oriented	Technology oriented	Customer oriented	Cost-oriented
I take <i>consumer wishes</i> as a starting point for product development ⁴	.80			
I use <i>technique</i> as a starting point for product development		.74		.31
I use <i>sensory analysis</i> as a starting point for product development	.46	.37	.36	
I take <i>technology</i> as a starting point for product development ⁵		.87		
I take <i>package technology</i> as a starting point for product development	.59	.44		
I take <i>profit</i> as a starting point for product development				.80
I take <i>costs</i> as a starting point for product development ⁶				.83
I take <i>brainstorming sessions</i> with consumers as a starting point for product development	.66	-.37		
I use <i>market research</i> as a starting point for product development	.68		.42	
I take <i>societal developments</i> as a starting point for product development ⁷			.81	
I take <i>quality</i> as a starting point for product development	.32		.44	
I take <i>brainstorming sessions with co-workers</i> as a starting point for product development			.55	.50
I take <i>external cooperation</i> as a starting point for product development			.59	

⁴ 60% of the respondents agreed and 26% slightly agreed

⁵ 36% of the respondents agreed and 36% slightly agreed

⁶ 28% of the respondents agreed and 45% slightly agreed

⁷ 38% of the respondents agreed and 29% slightly agreed

Models

Rudder *et al.* (2001) conclude that an organization should not be tied to one particular model but should take on board the basic fundamentals of a food-based model (theory), and adapt and amend it to their particular situation when they develop new food products. In our sample, 38% of the 55 respondents were working with models; 36% were not working with models and 26 % gave a neutral answer. The opinion about working with a model depends on the product developer's orientation. Cost orientation is correlated with the opinion that working with models is complicated, whereas customer orientation is correlated with the opinion that working with models structures product development, is defiant and is rational. Thus, cost-oriented product developers negatively judged working with models, while on the other hand customer orientation is related to a positive opinion about it. Working with models is worthwhile to structure the process of the complexity of product development. A positive attitude towards working with models may indicate that people actually work with models and this may contribute to a more successful product development process.

Cooperation

Cooperation between product development and marketing are correlated with success (Grunert *et al.*, 1996). In our study, opinions were asked about internal, external and chain cooperation. Those with a customer orientation related internal cooperation to 'useful' and 'cost-saving', and external cooperation to 'useful'. Those with a cost orientation related external cooperation to a higher risk for the company. Thus, cost orientation gave a negative opinion, while customer-oriented product developers had a positive opinion about cooperation. Internal as well as external cooperation is important to integrate all the various aspects of consumer-oriented product development. The importance of external cooperation is also shown in the following section (aspects influencing the failure of products). If one takes working with models and opinions regarding cooperation into consideration, the cost-oriented product developers were more conservative in their opinions than the customer-oriented product developers were.

Aspects influencing failure

Customer orientation was significantly correlated with the importance of external cooperation and company philosophy as factors influencing the failure of products. Consumer orientation scored higher on the influence of package technology and lack of sensory research than other factors influencing product failure. Technology orientation was correlated with lack of sensory research, degree of internal expertise and chain cooperation as aspects influencing the failure of products. This means that the four orientations of the product developers are related to different opinions about variables influencing the failure of products. It is notable that consumer-oriented product developers had a high score on the two items 'lack of sensory research' and 'package technology influencing the failure of products', while they use these issues as starting points for product development. This pattern is also shown for customer orientation and the items 'external cooperation', 'technology orientation' and 'lack of sensory research'. Thus, these orientations point at relevant elements which are used as a starting point and at the same time are issues which influence the failure of new products. This means that according to these product developers, these issues need serious attention.

Personality

The product developers in the sample described themselves as very creative, persistent, curious, innovative and precise, and also – but to a lesser degree – as firm and cautious. Product

developers with a higher score on customer orientation described themselves as more creative, innovative and persistent. Technology-oriented product developers described themselves as more precise. Consumer orientation was not linked to the qualities asked about in the questionnaire. Thus, product developers with a different orientation described their own personality in a different way. Whether these product developers indeed have these qualities was not investigated. It might be that a higher score is given to some of the qualities which are thought to be important to a product developer. Besides, it is not known in what sense the qualities of product developers influence the successfulness of the product development team. Thus, based on these results it cannot be said that a broad range of qualities influences the successfulness of a product development team. Further research is needed to discover whether in the formation of a product development team, different qualities should be taken into consideration.

Information sources

In decreasing order, the product developers in the sample keep themselves informed by reading popular scientific magazines, attending conferences, attending congresses and reading scientific journals. Product developers were neutral regarding the gathering of information from universities and via the Internet. Product developers with a higher score on 'consumer orientation' scored significantly higher on using the Internet as an information source. No differences were found for the other three orientations (i.e. obtaining information from such sources as popular scientific journals, conferences and universities). Thus, the use of the Internet was higher for the consumer orientation, which indicates that product developers with this orientation use more modern information sources.

Information about specific topics

A higher score on consumer orientation is related to the importance of information about consumer trends and food safety for their work; also, information about consumer trends engendered ideas for new products. A higher score on customer orientation is related to a higher importance of information about international cuisine. The score on technology orientation is correlated to getting new ideas about food safety issues. Information about food and health, international cuisine and new foreign products correlate to the customer orientation. Thus, the importance attached to information topics and the derivation of new product ideas from various sources of information depends on the orientation of the product developer.

Table 5.3 Significant correlation of the different orientations of the product developers and the opinions about elements of product development (* correlation is significant at 0.01 level (2-tailed) ** correlation is significant at 0.05 level (2-tailed))

	Consumer oriented	Technology oriented	Customer oriented	Cost oriented
Models				
Working with models is complicated				.32*
Working with models is a structured process			.32*	
Working with models is a challenge			.31*	
Working with models is rational process			.60**	
Cooperation				
Internal cooperation is useful			.34*	
Internal cooperation saves money			.41**	
External cooperation is useful			.45**	
External cooperation is a risk for the company				.56**
Aspects influencing product failure				
External cooperation is of importance for the failure of products			.32*	
Package technology is of importance for the failure of products	.30*			
No sensory research is of importance for the failure of products	.38**	.32*		
Chain cooperation is of importance for the failure of products		.35**		
Internal expertise is of importance for the failure of products		.31*		
Company philosophy is of importance for the failure of products		.36**		
Personality				
Creativity is one of my important qualities			.28*	
Cautiousness is one of my important qualities				.33*
Precision is one of my important qualities		.35**		
Innovativeness is one of my important qualities			.41**	
Perseverance is one of my important qualities			.46**	
Information sources				
Informed via the Internet	.28*			
Information about specific topics				
Information about consumer trends is important to my job	.36**			
Information about food safety is important to my job	.47**			
Information about international = cuisine is important to my job			.31*	
Information about consumer trends gives me ideas for new products	.43**			
Information about food safety gives me ideas for new products		.29*		
Information about food and health gives me ideas for new products			.31*	
Information about international cuisine gives me ideas for new products			.45**	
Information about foreign products gives me ideas for new products			.46**	
Perception of own product				
Natural			.32*	
Appetizing	.47**			
Organic	.30*			
Packed	.43**			
To enjoy	.45**			

Perception of own product

The product developers were asked to give their perception of the product they were working with vis-à-vis some of the terms the eight products were judged on. Especially those with a customer or consumer orientation exhibited some different perceptions concerning the terms 'natural', 'organic', 'packed', 'appetizing' and 'enjoy' (see Table 5.3). It is remarkable that especially those with a customer or consumer orientation have a significantly different perception of the products they are working with. It suggests that those with such an orientation attach higher value to the affective aspects of the products.

Summarizing, the results show the following. Cost orientation is related to traditional opinions about product development. Those with a technology orientation have a different opinion about the aspect influencing the failure of products. Those with a customer orientation are positive about working with models, the value of cooperation, and the importance of information about food-related items as regards getting ideas for product development. Those with a consumer orientation have a different perception of the product they are producing, attach higher value to specific information related to food, and regard package technology and lack of sensory research as important failure factors.

In general, it can be said that those with a technological or cost orientation are more traditional, and those with a customer or consumer orientation have more modern opinions.

5.3.3. Impact on product development

Our results show that product developers have different orientations on relevant aspects of the product development process. These orientations are related to the failure of product developments, the value of cooperation, and working with product development models. Product developers also have different opinions about the importance of information sources. They obtain ideas for product development from different information sources and are interested in various types of information, such as food safety or international cuisine. Because the role of the product developer is of immense importance for product development, further research is needed in order to gain a better insight into qualifications of product developers, including their orientations, opinions and personalities. Based on this study, some issues clearly need further attention. First, more knowledge is required concerning the extent to which the distinguished orientations of product developers are present. Therefore, a representative sample of product developers is necessary. Second, more insight is required into valuable qualifications for product developers and the presence of these qualifications in existing product development teams. This influences the communication and cooperation within a team. The third aspect is whether the successfulness of product development is related to, for example, the opinions of product developers about relevant elements of product development.

Although it seems that identifying and analysing those variables increases the complexity of the product development process, in the end the process is made more transparent. Another way to achieve transparency or effectivity in product development is to use models. Models and tools can function as decision support systems in the process of product development. Quality guidance is an interesting tool to structure the objective and mainly measurable product characteristics in our study, for example, the product ingredients 'vitamins' and 'carbohydrates' and such product characteristics as 'packed' and 'organic'. In our study, a translation of subjective consumer terms (e.g. 'natural' and 'fresh') and affective aspects (e.g. 'enjoy' and 'appetizing') into objective, measurable quality cues and attributes had to be made. The model was useful in structuring the results of this translation, although it does not support the translation of needs via

consumer terms into product attributes or characteristics. Quality guidance is useful to structure the product characteristics of a tangible product.

The research described in this article embraced the first phase of translating consumer wishes into product characteristics. Based on these results, a selection of the most relevant attributes and characteristics was made, and was then used as input for Quality Function Deployment (QFD). QFD is a method for structured product planning and development that enables a development team to specify the consumer's demands and needs, and to evaluate the proposed product systematically in order to determine its impact on meeting these needs (Benner *et al.*, 2002). QFD is suitable for product improvements and enables a company to produce a better product with a higher chance of success once the relevant consumer wishes have been determined (Benner *et al.*, 2002). The study described might be part of the determination of consumers' health perception. The approach described will contribute to providing an insight into consumer wishes, which will subsequently be the starting point for QFD. The challenge is to integrate the different approaches and to structure the translation from consumer needs into product characteristics into a balanced design to achieve consumer-oriented product development.

In the questionnaire, the product developers were asked to what extent they agree or disagree with the propositions about issues related to product development; in other words, they were asked their opinion about those topics. It should be taken into account, however, that what product developers actually do was not measured in this research. Thus, there might be a discrepancy between their attitudes and their actual behaviour. This should be considered when interpreting the results.

Further research is needed to gain an insight into the relation between the relevant elements and successful product development. An insight into the orientations of product developers will contribute to a successful translation of consumer needs into product characteristics. This is part of the challenge to integrate different approaches and models in order to achieve consumer-oriented product development.

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6. General Discussion

6.1. Introduction

This thesis described several studies in the field of consumer-oriented product development which have contributed to the transformation of health as a consumer's wish into product characteristics. In qualitative and quantitative studies, only the first stages of product development of meal components are taken into consideration. This chapter starts by presenting the main findings of these studies. Thereafter, a food perception model and a proposed stepwise approach for consumer-oriented product design are presented. Also the contribution to existing methods for product design is discussed. The chapter is rounded off with concluding remarks.

6.2. Main findings of the study

6.2.1. Food perception model

The literature described in Chapter 1 shows that food, food-related behaviours and the functions of food are a multidisciplinary topic. In socio-psychological literature on food perception, frequently the following determinants are described: person, food and environment. But there are also sources that mention the consumption moment or context (e.g. Meiselmann and Mac Fie, 1996). Therefore a food perception model is presented in which four determinants are distinguished, that is, person, social environment, product and consumption moment. In the subsequent qualitative and quantitative study, the model is used to both analyse and demarcate the research field.

6.2.2. Unravelling health perception

Here, the development and application of the expressive and associative group discussions are described. The aim of holding these discussions was to determine and unravel consumer perception of cognitive and affective health-promoting product characteristics. Consumers' terms were generated based on drawings and paintings made by the participants themselves. The four groups of women participating in the study related healthy to feeling free and happy (affective), and to a balance between being active and passive. They also associated health and food with such nature terms as season, water and sun; specific products like vegetables and fruits; and such ingredients as vitamins, fibres, minerals and no additives (cognitive). The discussions proved to be a promising and participant-friendly way to gain an insight into the affective and the cognitive aspects that consumers relate to health-promoting product characteristics. This first step towards understanding consumers' perception is an important one in making product development more consumer oriented.

6.2.3. Consumer groups and health perception

Consumers' health perception of traditional Dutch meal components is related to characteristics, ingredients and affective aspects from the perspective of consumers' health opinions. Cluster analysis based on health opinions of consumers produced four clusters of consumers: (1) deviant definition of health and illness, (2) no interest in health, (3) feels healthy and (4) health problems, with sample percentages of 21, 10, 50 and 18, respectively. The various meal components were differently perceived regarding their healthiness. The health perception of consumers is correlated to attributes, ingredients and affective terms. Consumer-oriented product development must take into account consumer groups, products and product attributes, characteristics, ingredients and affective aspects.

6.2.4. Orientations of product developers and health perception of consumers and product developers

Product developers play an important role in product development. Therefore it is interesting to test whether product developers' perceptions of food products are similar to those of consumers. Based on the results of a questionnaire it is concluded that product developers (58, response rate 35%) and consumers (344, response rate 57%) perceive health and its relation to product characteristics in the same way, but that the perception of product developers is somewhat more outspoken. Factor analysis revealed four orientations of product developers (technological, costs, customer, consumer) that can be linked to relevant elements of the product development process. Technological and cost orientation are related to the use of more traditional methods, whereby the product developer can be described as precise (technological) and cautious (cost-conscious). Customer and consumer orientation are related to the use of more modern and interactive work methods. The customer-oriented product developer uses models and has a preference for cooperation. The consumer-oriented product developer can be characterized by his or her use of sources of information. Food companies should take these orientations into account when establishing food development teams.

6.3. Implications for consumer-oriented product design

6.3.1. Food perception model

Insight into consumers' ideas and beliefs is necessary as a starting point for consumer-oriented product development. Therefore consumers' perception of health is studied and is related to food. Although there is a relation between perception and food choice behaviour it is not studied here. Additional research is needed to relate health perception to the actual choice behaviour of consumers.

Although it is very important to take consumers' perceptions into account, product developers must be aware that there is also a nutritional perspective. If the two are in contradiction, food business companies must shoulder their corporate social responsibility. Moreover, effective communication strategies and new institutional arrangements are required to stimulate more healthy consumer behaviour. Sweet and sour are not opposites – nor are healthy and unhealthy. In this study health perception is the main topic. However, it would be interesting to gain an insight into the unhealthy perception of consumers. Worthwhile additional insights may be obtained by studying perceptions of unhealthy.

The food perception model produces four determinants, that is, person, social environment, product and consumption moment. All four are present in the studies described, but the consumption moment is underexposed due to the development of methods to determine perception. Further research is needed to explore the relationship between consumption moment and perception.

The food perception model is developed and used to both analyse relevant aspects of consumers' perception and to demarcate the research field. As the research shows, selection of the most relevant variables and terms is still up to the product developer. Product developers can apply knowledge of products, consumer segments and additional information provided by qualitative research. But also emerging trends in consumer preferences, technologies and socio-economic developments should be considered and related to quantitative research. Moreover, product developers must be aware that their own choices can be biased as a result of their own perceptions. Three of the four components are expected to be clear, that is, individual,

environment and product. The problem of interpretation comes in when the interaction between food and the person – namely the consumption moment – becomes the research field. This aspect can be situated in various ways, at-home or out-of-home consumption. For at-home consumption, a preparation step might be included, while for out-of-home consumption both the way the food is served and the purchase costs might have an influence. In both situations the mood of the consumer and the setting of the consumption moment are relevant. Before the actual consumption moment has passed there are several stages in which the product is perceived by the consumer (e.g. advertisements in various media, talking it over with friends and the purchase moment in the supermarket). All these stages influence the perception of the consumer.

It would be interesting to gain an insight into consumers' perception in supermarkets, school canteens, etc. Because all four determinants appear to be inextricably related to each other, the design of the model presented in Chapter 1 has been adapted (see Figure 6.1). The model represents the structure and connection of the four determinants in the total picture of perception.

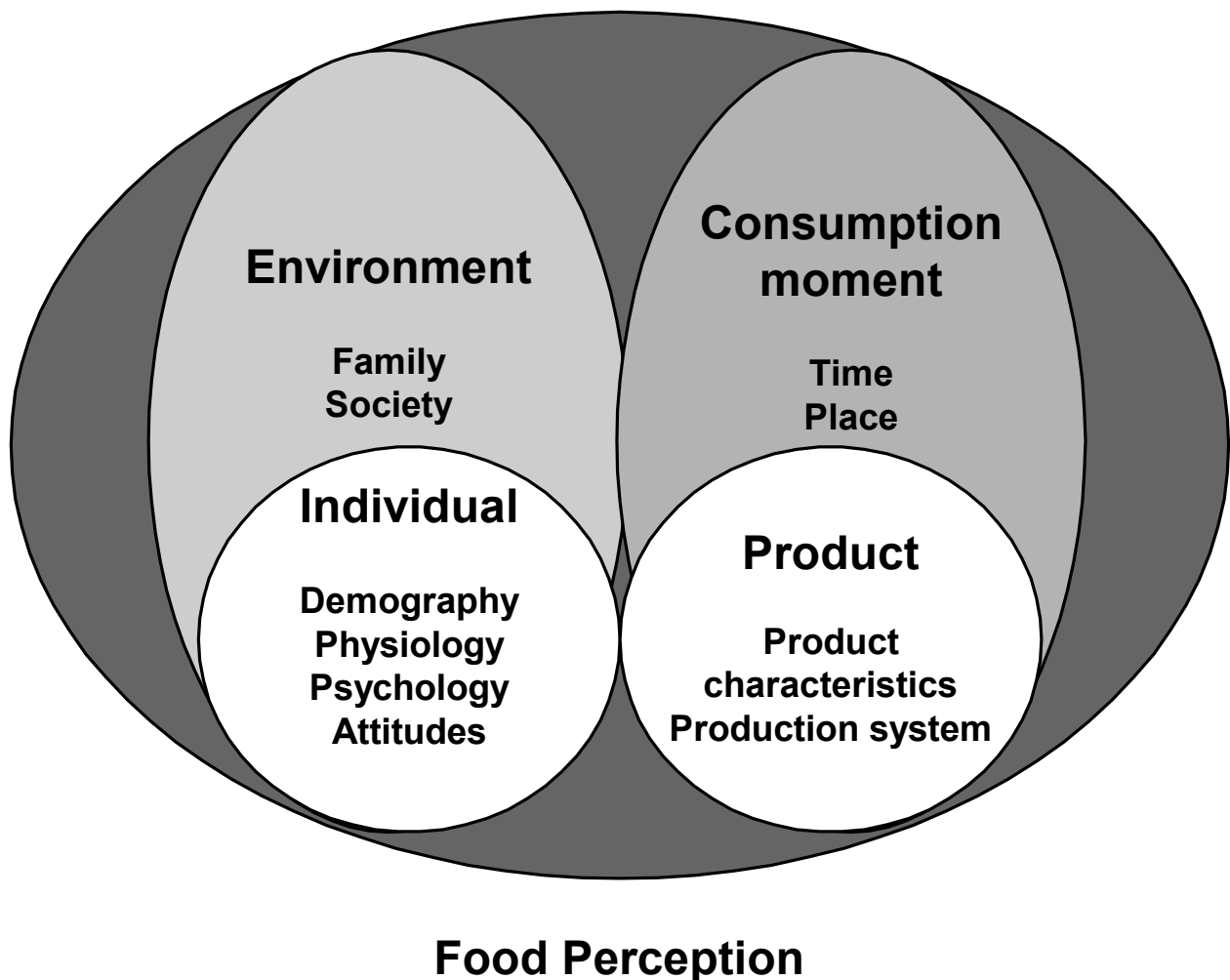


Figure 6.1 Food Perception Model

6.3.2. From product development to product design

Product development is a complex topic, of which implementation is hindered by practical restrictions. But one of the major problems is that the various parties in the product development team do not understand each other's language. Thus, communication and integration are the keywords to becoming more successful. The complexity of the issue of product innovation and product acceptance requires an integrated view (Marshall, 1995; Linnemann *et al.*, 1999).

Besides that, there is the product which is produced in a chain or network. It is important that the whole chain contributes to the quality of product which is in accordance with the perception of the consumer. Consumer trust in the food production chain is of vital importance. Successful product development requires insight into chain aspects. Moreover, profound knowledge is needed about the chain elements which are important to the consumers. Probably this differs for products or product categories.

The aforementioned aspects related to production and product development demand that product development adopts a new multidisciplinary approach. Let's make a comparison between building a house and architecture, which includes not only planning but also design. Successful food product introductions require both science and art, and it is therefore better described as food product design. Such design requires experts who are able to base the creation of new food products on consumers' perspectives (along with all their cognitive and affective perceptions) and the possibilities of technology, and to interpret and translate the language of different disciplines. This needs attention already during the training and education of product designers and the establishment of product teams.

6.3.3. Proposed consumer-oriented product design approach

The aim of product development is to create a successful new product. But what is a 'new' product? A new product should include only original products or product improvements and modifications that the firm develops through its own R&D efforts (Kotler & Armstrong, 1991). In this thesis a methodology is described that is useful during the first stages of product development. While in our study existing products are tested, further research is needed to apply the methodology to a new product.

Measuring perception is a complex task because it involves both cognitive and affective aspects. Especially the latter are difficult to measure because consumers have difficulty in expressing their emotions using only verbal language. Therefore working with additional (visual) communication methods was regarded as being necessary to gain an insight into the affective aspects. In this, thesis painting was applied as a technique to support the process of unravelling health perceptions. Five main types of projective techniques are described: association, completion procedures, construction procedures, expressive procedures and choice ordering (Gorden & Langmaid, 1988). Costa *et al.* (2002) describe the use of collages as an expressive technique in consumer-oriented product design.

The expressive and associative group discussions were very fruitful, because the involvement of the participants was very high once they passed a certain threshold. At the beginning, the participants needed some time to feel free to express their feelings, but afterwards all participants were enthusiastic and stated that they had learned a lot from each other. This involvement cannot be realized by applying questionnaires. An important advantage for product development is the incorporation of both cognitive and affective food-related aspects into the process.

The linkage from terms resulting from the expressive and associative group discussions should allow for considering the opinions of all involved parties – product developers, consumers, nutritionists, technologists and marketers.

The expressive and associative group discussions show that emotions and food are related. Of the eight food products in this study, some were related to feeling happy or enjoyment, while others gave an opposite impression. Further research is needed to gain an insight into the health perception of other groups of food products. It would also be interesting to establish whether perceptions differ between different groups of consumers (men, women, old, young). Moreover, changing lifestyles make it important to relate health perception to the consumption moment. In addition, it would be worthwhile to apply the proposed method to other food-related topics, such as food safety, convenience, genetically modified organisms, and obesity. Last but not least, further research is required to develop appropriate guidelines for the design of the group discussions.

Implementing affective elements in a questionnaire is difficult because, as mentioned, it is hard to verbalize emotions. Thus, special attention is required when formulating such questions. There are different levels of affective terms; for example, enjoyment and appetizing do not present problems, but ‘feeling happy’ is more complex for most consumers because they do not see a direct relation. Further research is needed to gain an insight into which terms can be used in a questionnaire and which are too difficult to apply.

Additional research is also required regarding the possibilities of taking into account different consumption moments in a questionnaire. Perhaps a situation sketch could be described in a questionnaire before specific questions about products and terms are asked. Another possibility would be to ask which of two products best suits a specific consumption moment. In this way different products, product characteristics, and atmospheres or other emotions could be investigated.

From the perspective of consumer-oriented product development, both qualitative and quantitative methods are useful; each method has its own advantages and makes a specific contribution to the product development process.

Based on the stepwise approach described in Chapter 3, an approach is proposed for the first stages of consumer-oriented product design. The first step in this approach resulted in the choice for health because of its increasing importance due to demographic developments and its relevance for food product development. The approach in chapter 3 is carried out with existing products. In practice, the situation is somewhat different. Because most times there is a concrete product or product category as the starting point, the presented approach differs from the one given in Chapter 3.

Depending on the phase of product development, a product concept can be integrated into the process. The sooner the product is put into the process the more concrete the perception of the consumer will be.

This approach shows that there is a continuous iterative relation between the three components of the process, that is, the product developer, the consumer and the product itself.

Table 6.1 Stepwise approach for consumer-oriented product design

Step	Aim	Method
1 Demarcation	Choose group of consumers and product or product category.	Discussion with involved experts. Thorough analysis of socio-economic developments.
2 Selection	Selection of attributes, characteristics, ingredients and affective aspects.	Measuring perception of those variables in expressive and associative group discussions with consumers.
3 Additions	Addition of product characteristics and ingredients.	Discussions with involved experts.
4 Formulation and pretesting of the questionnaire	Avoiding mistakes, misinterpretations and misunderstanding.	Discussions with involved experts and consumers.
5 Data gathering and analysis	Linkage of consumer terms of perception to product characteristics.	Questionnaire.

In general product development consists of different steps. Based on the new product and service development process of Urban and Hauser (1993), the first steps of product development are selected. Their first step is ‘opportunity identification’ based on market definition and idea generation, followed by the second step ‘design’ consisting customer needs, product positioning, segmentation, sales forecasting, engineering and marketing mix. These steps are used as a starting point. Some elements of these two steps are worked out in the studies described in this thesis. The authors are aware that there are other interesting models, too. An overview of different product development models is described in the literature (Rudder *et al.*, 2001). This overview shows that in general these models have the same frame but none of them is based on a consumer-oriented perspective.

6.3.4. Relationship to existing methods

In this section, the contribution of the proposed approach to already available tools (quality function deployment, means-end chain, quality guidance) for product developers is argued for.

Quality function deployment

Quality Function Deployment (QFD) is a method to encourage the members of product development teams to communicate more effectively with each other using a complex set of data (Benner *et al.*, 2002; Costa *et al.*, 2001). QFD might also prove useful if the method is adapted and the specific characteristics are taken into account. The QFD approach will enable a company to produce a better product with a higher chance of success once the right consumer wishes have been determined. In our study, qualitative and quantitative methods to gain an insight into the perception of consumer and related product characteristics are described. This is an important first step to make product development more successful with the use of QFD.

Means-end chain

A means-end chain is a device used to understand how consumers mentally link products to self-relevant consequences (Grunert *et al.*, 1995). Means-end chains structure the translation from

wishes into product characteristics in terms of product attributes, consequences and values (Reynolds and Olson, 2001). Such chains are useful to structure the thinking about attributes and characteristics of products. It is difficult to give health as a consumer's wish and other terms like 'natural' an unambiguous position in the means-end chains. Affective health-related aspects such as 'enjoy' and 'appetizing' are even more difficult to position. This is in accordance with Grunert *et al.* (1995), who state that means-end chains may fall short of tapping all relevant aspects of how consumers think about products. They note that non-verbal imagery, episodic information and procedural knowledge are not included in means-end chains. But despite this implementation problem, means-end chains might be a useful tool to structure the translation of different consumer terms, attributes, characteristics, ingredients and affective aspects.

Quality guidance

Steenkamp and Van Trijp (1996) present Quality Guidance, in which quality expectation and quality experience are linked to quality cues and quality attributes. Luning *et al.* (2002) describe a modification of this model in which the starting points are marketing, production system characteristics and physical product features. The Total Food Quality Model (Grunert *et al.*, 1996) is relevant because it is a general framework for exploring quality perception from the consumer's point of view. A combination of the two models can provide a deeper insight into the quality perception process and its links to consumer behaviour on the one hand, and to physical, objective quality on the other hand (Steenkamp & Van Trijp, 1996).

Quality guidance is used in our study to structure the objective and mainly measurable product characteristics. It is useful in structuring the results of this translation, although it does not support the translation of needs via consumer terms into product attributes or characteristics. Quality guidance is useful to structure the product characteristics of a tangible product.

6.4. Recommendations for future research

In the description above, various topics are mentioned which need further research. The main recommendations concern health perception and consumption moment. Additional research is needed to relate health perception to the actual choice behaviour of consumers, different products, characteristics, ingredients and affective aspects for various groups of consumers. Also the perception of various moments in the process of food selection and food consumption is interesting.

Furthermore it would be interesting to gain an insight into which parts of the chain are important to the consumers and whether this differs depending on the product or product category.

Concerning the methodological part, it would be interesting to apply the expressive and associative group discussions to other food-related topics. Moreover, the implementation of a new product in the proposed consumer-oriented product design needs further attention.

6.5. In conclusion

To realize consumer-oriented product design, it is important to use the perspectives of different disciplines to deal with the problems and to integrate the knowledge of the various participants (consumers and product developers) along with their own perceptions and orientations. Implementation of the above presented iterative approach will result in products which come closer to fulfilling consumer wishes, and will therefore contribute to the shift from a food supply chain to a food demand chain.

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Summary & Samenvatting

Summary

Food is a part of everyday life and few things have changed more drastically in the last century than the way food is produced, processed, distributed, marketed and consumed. We observe that the changing food system leads to a shift from food supply chains to food demand chains. Successful product development needs to be consumer-oriented. Consumer-oriented product development takes consumer needs as starting point for the product development process, and the product and production technology as a derivative thereof (Van Trijp and Steenkamp, 1998). Thus implementing consumer-oriented product development requires translating consumers' wishes into product characteristics. The aim of this thesis is to develop a conceptual framework that enables transforming consumers' health perception into product characteristics, using health as a quality attribute.

Before this transformation can be made, an insight into the variables influencing the food-related behaviour and perception of consumers is needed. Food choice behaviour and consumers' perception are studied in many disciplines. In Chapter 2 models of food behaviour and preferences are examined from a multidisciplinary perspective. Nearly all models structure the determinants related to the person, the food and the environment. Consequently, the overview of models was used as a basis to structure the variables influencing food perception into a model to support consumer-oriented product development. Other variables – such as time and place as part of the consumption moment – were added to this new model, the food perception model. These are important variables influencing consumers' perception, and therefore are of increasing importance to consumer-oriented product development. In Chapters 3 and 4, the food perception model is used as a tool to implement consumer-oriented product development.

Expressive and associative group discussions were designed, organized and applied (Chapter 3) in order to unravel consumers' perceptions of cognitive and affective health-promoting product characteristics. A trained moderator led four group discussions, using projective techniques, in which 24 Dutch women divided into 2 groups of 6 women aged between 50 and 65, and 2 groups of women with young children (0-7 years old) participated. The participants selected and discussed relevant terms related to food and health based on their interpretations and associations of images. The participants related healthy to feeling free and happy (affective), and to a balance between being active and passive. 'Health' and 'food' are associated with nature terms (e.g. season, water, sun), specific products (e.g. vegetables, fruits) and such ingredients as vitamins, fibres, minerals and no additives (cognitive). The expressive and associative group discussions proved to be a promising and participant-friendly approach to gain an insight into the affective and the cognitive aspects that consumers relate to health-promoting product characteristics. This understanding of the consumer is important in order to make product development more consumer-oriented. However, further research is needed to better assess scientific contribution of this approach to food product development.

In Chapter 4 the qualitative results of Chapter 3 are related to and quantified for consumers' perceptions of the healthiness of eight traditional Dutch meal components to attributes, characteristics, ingredients and affective aspects. Consumers (344, response rate 57%) responded to a questionnaire containing propositions about health and food-related attitudes, product perceptions and various questions about demographic variables. Cluster analyses based on the health opinions of consumers produced four clusters of consumers: (1) deviant definition of

healthy and not ill, (2) no interest in health, (3) feel healthy and (4) health problems, with sample percentages of 21, 10, 50 and 18, respectively. The four clusters represent different perceptions of the ingredients related to product healthiness. For some products and some consumers, the affective aspects are related to health. The eight meal components are differently perceived regarding their healthiness. The health perception of consumers is correlated to attributes, ingredients and affective terms. Consumer-oriented product development must consider consumer groups, products and product attributes, ingredients and affective aspects when translating a consumer's wish into product characteristics.

Product developers play a crucial role in the complex process of product development. In Chapter 5 it is concluded that product developers (58, response rate 35%) and consumers (344, response rate 57%) perceive health and its relation to product characteristics in the same way. However, the perception of product developers is more outspoken. Furthermore, factor analysis revealed four orientations of product developers, that is, technology and cost orientation – which are related to the use of more traditional work methods – and customer and consumer orientation, which are related to the use of more modern and interactive work methods. In turn, these four orientations are related to different opinions about factors influencing the failure of products, working with models and cooperation within the product development process.

In the general discussion, various topics for further research are mentioned. The main recommendations concern health perception and consumption moment. Additional research is needed to relate health perception to the actual choice behaviour of consumers, different products, characteristics, ingredients and affective aspects for different groups of consumers. The perception of various moments in the process of food selection and food consumption is also a promising topic for further research.

Consumer-oriented food product design requires experts who are able to create new food products based on consumers' perceptions (along with all their cognitive and affective aspects) and the possibilities of technology, and to interpret and translate the language of different disciplines. Therefore, this approach needs a continuous iterative relation between the three entities involved in the process, that is, the product developer, the consumer and the product itself. Implementation of the iterative approach results in products which come closer to consumer wishes, and therefore contribute to the shift from a food supply chain to a food demand chain.

Samenvatting

Niets is zo alledaags voor de mens als eten en niets is in de afgelopen eeuw zo ingrijpend veranderd als de positie van ons eten in termen van productie, bewerking, distributie, vermarkting en consumptie. Alle ontwikkelingen in geïndustrialiseerde landen tezamen met het veranderende voedselsysteem leiden tot de grote verschuiving van de voedselaanbod-keten naar de voedselvraag-keten. Daarom dient succesvolle productontwikkeling consumentgeoriënteerd te zijn. Consumentgeoriënteerde productontwikkeling neemt consumentenwensen als startpunt voor het productontwikkelingsproces en het product en de productietechnologie als een afgeleide daarvan (Van Trijp and Steenkamp, 1998). De implementatie van consumentgeoriënteerde productontwikkeling vraagt om een vertaling van consumentenwensen naar producteigenschappen. De interesse voor gezondheid van consumenten, voedselproducerende bedrijven en overheid geeft de volgende doelstelling van het proefschrift: Het ontwikkelen van een conceptueel raamwerk dat het mogelijk maakt om de gezondheidsperceptie van consumenten te transformeren naar producteigenschappen, waarbij gezondheid een kwaliteitsattribuut is.

Voordat deze transformatie gemaakt kan worden is er inzicht nodig in de variabelen die invloed hebben op gedrag gerelateerd aan voedselkeuze en perceptie van consumenten. Voedselkeuze en consumentenperceptie worden vanuit verschillende disciplines bestudeerd. In hoofdstuk 1 wordt een beschrijving gegeven van de modellen van voedselkeuzegedrag en voorkeur in een multidisciplinair perspectief. Bijna alle modellen structureren de determinanten gerelateerd aan de persoon, de voeding en de omgeving. Vervolgens is het overzicht van de modellen gebruikt als basis om de variabelen te structureren in een model ter ondersteuning van consumentgeoriënteerde productontwikkeling. Aan dit nieuwe model, het voedselperceptiemodel, zijn ook variabelen als tijd en plaats als onderdeel van een consumptiemoment toegevoegd. Dit zijn namelijk belangrijke variabelen die invloed hebben op de perceptie van de consument, en daarom van toenemende belangrijkheid op consumentgeoriënteerde productontwikkeling. In hoofdstuk 3 en 4 wordt het gepresenteerde voedselperceptiemodel gebruikt als een middel om consumentgeoriënteerde productontwikkeling te implementeren.

Expressieve en associatieve groepsdiscussies zijn ontwikkeld en toegepast in hoofdstuk 3, om consumentenperceptie te ontrafelen in cognitieve en affectieve gezondheidsbevorderende producteigenschappen. Een discussieleider begeleidde vier groepsdiscussies, waarin gebruik werd gemaakt van projectieve technieken. Er is deelgenomen door vierentwintig Nederlandse vrouwen verdeeld in twee groepen van zes vrouwen tussen de 50 en 65 jaar oud en twee groepen van moeders van kinderen tussen 0 en 7 jaar oud. De deelnemers selecteerden en discussieerden over relevante termen gerelateerd aan voeding en gezondheid op basis van hun interpretaties en associaties naar aanleiding van door hen zelf gemaakte tekeningen en schilderijen. De deelnemers relateerden gezond aan vrij en gelukkig voelen (affectief), en noemen tevens een balans tussen actief en passief. Gezondheid en voeding werd geassocieerd met termen uit de natuur zoals seizoen, water en zon, specifieke producten zoals groenten en fruit, ingrediënten zoals vitaminen, vezels en mineralen evenals geen additieven (cognitief). De expressieve en associatieve groepsdiscussie is een veelbelovende en deelnemersvriendelijke methode die inzicht geeft in de relatie die consumenten leggen tussen affectieve en cognitieve aspecten en gezondheidsbevorderende producteigenschappen. Dit inzicht in de consument is belangrijk om productontwikkeling meer consumentgeoriënteerd te maken. Vervolgonderzoek is nodig om de

methode te valideren voor andere groepen consumenten en andere aan voeding gerelateerde onderwerpen.

In hoofdstuk 4 zijn de kwalitatieve resultaten van hoofdstuk 3 gerelateerd aan en gekwantificeerd voor de consumentenperceptie van gezondheid van acht componenten van een traditionele Nederlandse maaltijd op basis van attributen, eigenschappen, ingrediënten en affectieve aspecten. De vragenlijst werd teruggestuurd door in totaal 344 respondenten (respons van 57%). De vragenlijst bestond uit stellingen over gezondheid en voeding, daaraan gerelateerde houdingen, productpercepties en enkele demografische kenmerken. Clusteranalyse gebaseerd op meningen over gezondheid gaf 4 clusters van consumenten, te weten 1) afwijkende definitie van gezond en niet ziek, 2) geen interesse in gezond, 3) zich gezond voelen en 4) gezondheidsproblemen, met respectievelijk van 21, 10, 50 en 18 %.

De vier clusters hebben een verschillende perceptie van de ingrediënten die gerelateerd zijn aan de gezondheid van een product. Voor enkele producten en consumenten zijn de affectieve aspecten gerelateerd aan gezond. De acht maaltijdcomponenten worden verschillend op gezondheid beoordeeld. De gezondheidsperceptie van consumenten is gecorreleerd met attributen, ingrediënten en affectieve termen. Consumentgeoriënteerde productontwikkeling dient consumentengroepen, producten en productattributen, ingrediënten en affectieve aspecten in beschouwing te nemen bij het maken van de vertaling van consumentenwensen naar producteigenschappen.

In hoofdstuk 5 wordt geconcludeerd dat alhoewel productontwikkelaars (58, respons 37%) en consumenten (344, respons 57%) dezelfde perceptie van gezondheid en de relatie met producteigenschappen hebben, de perceptie van productontwikkelaars extremer is. Op basis van factoranalyse zijn vier oriëntaties van productontwikkelaars achterhaald: 1) technologie en kosten georiënteerd, 2) gerelateerd aan een meer traditionele werkwijze, 3) klant en consument georiënteerd en 4) gerelateerd aan het gebruik van moderne en interactieve werkwijzen. Deze vier oriëntaties zijn gerelateerd aan verschillende meningen over factoren die het falen van producten beïnvloeden, het werken met modellen en samenwerking.

In de algemene discussie worden verschillende onderwerpen genoemd die om nader onderzoek vragen. De belangrijkste aanbevelingen hebben betrekking op gezondheidsperceptie in relatie tot het consumptiemoment. Bovendien is aanvullend onderzoek nodig om gezondheidsperceptie te relateren aan het daadwerkelijke keuzegedrag van consumenten, verschillende producten, producteigenschappen, ingrediënten en aan affectieve aspecten voor verschillende groepen van consumenten. Daarnaast is het zeer interessant meer inzicht te krijgen in de perceptie op verschillende momenten in het proces van voedselkeuze en voedselconsumptie.

Consumentgeoriënteerd productontwerpen vraagt om productontwikkelaars die het creëren van nieuwe producten in het perspectief van de consument weten te plaatsen en daarbij de cognitieve en affectieve percepties en de mogelijkheden van de technologie in beschouwing nemen. Bovendien moeten zij dit interpreteren en vertalen in de taal van de verschillende betrokken disciplines. Deze benadering vraagt om een continue iteratieve relatie tussen de drie partijen, de productontwikkelaar, de consument en het product zelf. Implementatie van deze iteratieve benadering zal resulteren in producten die dichter bij de wensen van de consument komen, en daardoor bijdragen aan de stap van voedselaanbod-keten naar voedselvraag-keten.

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Gouden kievitsei
een gunst om te bebroeden
met kritische roep
van warme betrokkenheid
voor de herfst opeens de trek

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Uit ei gekropen
al vliegend leren fluiten
op eigen benen

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al van verre veel verve
kleurt het voorjaar in

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waar ooievaar vliegt

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Op mijn vogeltrek
jullie wind steeds in de rug
oogst de pauw gepast

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moeders en vrouwen 50-65 jaar,
deelnemers aan vragenlijst:
productontwikkelaars en consumenten

Zonder ei geen kip
met veren en gekakel
waardevol pallet

Nicolaas, Sil en Lelie

Mijn zwanen dansen
in schitterend zonnig nest
sieren elke dag

Curriculum Vitae

Sijtske Janke Sijtsema werd geboren op 13 juni 1968 te Stiens. De schoolloopbaan begon op de Master Hoogeveen Skoalle Stiens (1974-1980). Daarna MAVO De Foarakker St Annaparochie (1980-1984), en vervolgens HAVO Stedelijke Scholengemeenschap Leeuwarden (1984-1986). In datzelfde jaar begint ze aan de 'suvelskoalle'; eerst MBO Levensmiddelentechnologie Bolsward (1986-1989) en daaropvolgend HBO Levensmiddelentechnologie Bolsward (1989-1992) afstudeerrichting voeding en kwaliteit aan de toenmalige AHoF. In 1992 begint ze aan de studie Sociologie aan de Rijks Universiteit Groningen. Ze koos voor de 'onderzoeksrout' en de specialisatie 'familie en onderwijs'. Haar scriptie getiteld "Smaak naar meer" heeft betrekking op smaakbeleving individueel vergeleken met groepen. In 1996 werd de bul met genoegen uitgereikt.

Van mei 1996 tot september 1997 was ze werkzaam als docent Sensorisch onderzoek, Kwaliteitskunde en Levensmiddelentechnologie aan de opleiding Voeding en Marketing van de Hanzehogeschool te Groningen. In september 1997 werd ze bij het LEI aangesteld voor het promotieonderzoek dat in dit proefschrift staat beschreven, daarbij is nauw samengewerkt met de Leerstoelgroep Productontwerpen en Kwaliteitskunde, departement Agrotechnologie en Voedingswetenschappen aan Wageningen Universiteit. Thans is ze werkzaam op het gebied van consumentenvraagstukken bij de sectie Markt en Netwerken van de afdeling Dier van het LEI.

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stichting **Agro Keten Kennis**



Stichting Agro Keten Kennis

Onder de regie van Stichting Agro Keten Kennis (AKK) werken bedrijven, kennisinstellingen, overheden en maatschappelijke organisaties samen aan het tot stand brengen en managen van thematische netwerken door middel van co-innovatieprogramma's. Kern van de programma's is de ontwikkeling en benutting van onderzoek en het bevorderen van samenwerking (co-innovatie) om maatschappelijke knelpunten in de agro food ketens op te lossen.

De missie van AKK is een bijdrage te leveren aan maatschappelijk gewenste veranderingen in de Nederlandse agribusiness via systeeminnovatie, door de vorming van keten- en netwerksamenwerkingsverbanden en nieuwe (keten-) concepten.

De versterking van de ketenkennisinfrastructuur - het netwerk van kennisinstellingen die zich bezighouden met ketenknelpunten - is binnen het werkveld van AKK een belangrijke activiteit. Middels het uitvoeren van ketenprojecten en het organiseren van werkgroepen met verschillende kennisinstellingen, draagt AKK bij aan de ontwikkeling van de strategische researchagenda van de keten en netwerkkunde. De kennis en ervaring uit de ketenprojecten, waarin kennisinstellingen intensief samenwerken met bedrijven, wordt op deze wijze wetenschappelijk verankerd. Tevens wordt de doorstroom van deze kennis en ervaring naar het onderwijs gestimuleerd.

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