

Young Adults and Seafood

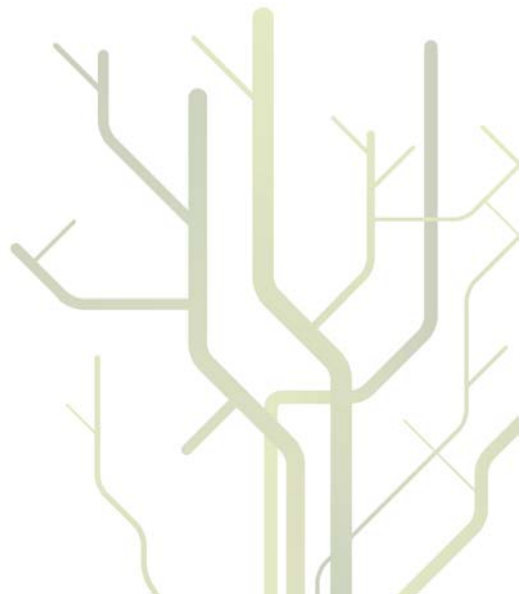
Using the voice of consumers to develop new seafood product concepts aimed at increasing consumption



Themistoklis Altintzoglou

A dissertation for the degree of
Philosophiae Doctor

May 2010



UNIVERSITY OF TROMSØ UIT

Faculty of Health Sciences

Department of Community Medicine

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Title of the PhD thesis:

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Acknowledgements

First of all, I would like to thank, Joop Luten, for always being there, efficient, responsive, optimistic, motivating, utterly practical, to the point and most of all for the amazing amount of trust he put into me in all aspects of this process!!! Joop, you have been coming up with quick advice and solutions in whatever the case was, from housing to publishing papers and all that by always keeping a friendly and positive spirit. Thank you! I would also like to thank Jon Øyvind Odland for bridging the gap between me and the University. Jon, your advice regarding academic matters was very helpful.

I would like to thank Even Stenberg and Heidi Nilsen, consequent research directors of the department seafood processing and product development at Nofima Marin for hosting this work which was financially supported mainly by the Nordic Innovation Center (NICE) via the MmmmmSeafood project.

Furthermore, I would like to thank all pleasant and efficient colleagues from various countries, institutes and fields that were involved in various stages of this process for their insights and collaborative attitude. Most of them are co-authors or acknowledged in the papers presented in this thesis, but those who are not were very valuable for the completion of each study. Working with all you people from different disciplines has taught me a lot!

I would like to thank all colleagues at Nofima (ex Fiskeriforskning) that helped me in any way they could whenever I asked for anything; especially Natalia and Izumi, for living a parallel work life and sharing rooms, problems and solutions. Sharing the experience of being in an academic procedure within an applied-research institute made things feel easier.

I would also like to greatly acknowledge Marie Cooper for ‘translating’ this and all the rest of my manuscripts into English in her own free time. Her help and genuine humour made the dissemination process feel much more enjoyable.

I would also like to use this opportunity to thank Jos Mojet, Adriaan Kole and Ep Köster, for their mentorship, knowledge, inspiration and the kick-start in the real world of research some time before I started the process of working on this PhD.

Additionally, I would like to thank Pantazis Iordanidis and Kalliopi Kleftouri, for exposing me during my bachelor studies to the details of the complex fact that the human brain is the most important part of the human digestive system. Before this extension, human nutrition appeared much less interesting to me.

My parents, you have always been there from the very beginning, giving me all you can, and asking for nothing in return. What could be more pure? You taught me and keep reminding me that whatever the result of each process, all that matters is that I am happy for doing my best. What could be more motivating? My brother, you know the whole process very well from your own experience. This experience combined with your highly developed criticism and perspectivism led to advice which none within my field could ever provide.

Ivonne, whatever I say about you would not describe how much I thank you. You were there, in 'the north pole', listening to all the stories and giving your views. Finishing this and maybe even starting this PhD without you and your support would have been more difficult, to say the least. Herman, I would like to thank you for Ivonne and your genuine interest, support and advice throughout this process.

Last, but not least, my friends, from various times and places, especially those who survived the 'filter' of distance and everything that comes along with distance, thank you for being there. From sharing a desk at school, to sharing a beer, I consider it all absolutely relevant and fruitful in the process of developing academic creativity.

Thank you.

Themistoklis Altintzoglou, Tromsø, 'green winter' of 2010

List of papers

This thesis is based on the following papers and they are referred to in the text by their roman numerals.

Paper I

Altintzoglou T., Vanhonacker, F., Verbeke, W. & Luten J. (2010). Association of health involvement and attitudes towards eating fish on farmed and wild fish consumption in Belgium, Norway and Spain. *Aquaculture International*. Accepted with revisions.

Paper II

Altintzoglou T., Birch-Hansen K., Valsdóttir T., Odland J. Ø., Martinsdóttir E., Brunso K. & Luten J. (2010). Translating barriers into potential improvements: the case of healthy seafood product development. *Journal of Consumer Marketing*, 27(3), 224-235.

Paper III

Altintzoglou T., Einarsdóttir G., Valsdóttir T., Schelvis R., Skåra T. & Luten J. (in press). A voice-of-consumer approach in development of new seafood product concepts. *Journal of Aquatic Food Product Technology*, in press.

Paper IV

Altintzoglou T., Sveinsdóttir K., Einarsdóttir G., Schelvis R. & Luten J. (2010). Evaluation of seafood product concepts by young adults and families with young children from Denmark, Norway and Iceland. *Journal of Aquatic Food Product Technology*, Submitted, under review.

Additional papers

In addition to the papers that this PhD thesis is based on, I have authored and co-authored other papers for international peer reviewed journals. These articles may serve as background material on the explanation of food choice of humans. However, they are not regarded as part of this thesis.

Kole A.P.W., Altintzoglou T., Schelvis-Smit R.A.A.M. & Luten J.B. (2009). The effects of different types of product information on the consumer product evaluation for fresh cod in real life settings. *Food Quality and Preference*, 20(3), 187-194.

Vanhonacker, F., Altintzoglou T., Luten J. & Verbeke, W. (in press). Does fish origin matter to European consumers? Insights from a consumer survey in Belgium, Norway and Spain. *British Food Journal*. in press.

Altintzoglou T., Verbeke, W., Vanhonacker, F. & Luten J. (in press). The image of fish from aquaculture among Europeans: impact of exposure to balanced information. *Journal of Aquatic Food Product Technology*, in press.

Perrea T., Brunsø K., Birch-Hansen K., Altintzoglou T., Einarsdóttir G. & Luten J. (2010). Decomposing the (seafood vs. meat) evening meal decision-making sequence: insights from a diary study in Norway, Iceland and Denmark. *Appetite*, under review.

Summary

Consumers in many European countries do not equally meet the recommended daily intake levels for seafood. Various factors that can influence seafood consumption behaviour have been identified. However, the exploration of potential barriers to seafood consumption could provide knowledge that can assist the development of new seafood product concepts that fulfil the needs of consumers. There is a difference in seafood consumption frequency between age groups. In particular, young adults consume seafood less frequently than older consumers and thus are the point of focus for this thesis.

The main aim of this PhD thesis was to contribute to the understanding of young adults' preference or avoidance of seafood. Additionally, to define and pre-test the relationship of health involvement and attitudes towards eating fish with fish consumption behaviour. Furthermore this thesis can provide input for future seafood product development by exploring barriers and opportunities for increasing seafood consumption. Moreover, advice will be given on how the existing seafood products can be improved through the NPD process in order to increase their acceptability and attractiveness. Finally, insight into young adults' seafood acceptance and potential choices, as well as confidence in seafood preparation and consumption when exposed to specific new seafood product concepts will be given. The results will be used for a next step towards a consumer led development of seafood product prototypes. To reach these aims, four studies were performed in several European countries.

The results of the first study, carried out in Belgium, Norway and Spain, suggested a discrimination of consumer groups, indicating a lower health involvement by younger consumers. Additionally, the results showed a positive association between health involvement and attitudes towards seafood consumption. Furthermore, it was shown that health involvement and attitudes towards seafood consumption were positively associated with total seafood consumption.

The second study used focus group discussions in Denmark, Iceland and Norway and was aimed at a deeper understanding of the barriers towards seafood consumption young adults are facing. The results of this study indicated that the participants thought of seafood as either healthy or convenient, although there were concerns about the amount of effort required to

prepare it. These concerns resulted in an expression of their need for products that are attractive, healthy, palatable and convenient. In particular, newly developed products should be accompanied by clear advice on preparation methods and ingredients. Additionally, an increase in seafood availability coupled with lower prices would encourage these consumers to add seafood to their diet. This study's results led to nine consumer values which were used as input for the development of new seafood product concepts.

In the third study, carried out in Iceland and Norway, various seafood product concepts were developed and tested on a web-based experimental survey. The development of the seafood product concepts was based on the values which were reported by the consumers in our focus group study. The young consumer's evaluations of the seafood product concepts showed a number of preferences for the experimental seafood product concepts. The products which were visible in their packaging, not minced, familiar by means of proposed recipes and consisting of only one or more fish species were preferred. Young consumer's attitudes indicated high interest in natural, new and convenient products.

In the fourth study, carried out in Denmark, Iceland and Norway, a smaller number of seafood product concepts than the previous study were further developed and tested on a web-based experimental survey. The development of the seafood product concepts was based on the evaluations which were reported by the consumers in the previous concept test study. The consumer's evaluations of the seafood product concepts showed a clear ranking of seafood product concepts. The innovative cod and salmon portions with wild berries were on the top of the list together with the Nordic cod fillets. As the size and shape of the fish in the seafood product concept decreased, the product concepts were less appreciated. The least appreciated product concepts were the ones based on minced fish.

The knowledge from the four studies led to the development of new seafood product concepts that can decrease the distance between young adults and their final choice for seafood products.

Keywords

Young adults; consumers; liking; attitudes; food choice; seafood; new product development

1 Introduction

Food is a source of necessary nutrients and regular satisfaction. In a day, each individual consumes a significant amount of food and drinks in order to satisfy specific physiological needs. However, since human senses are associated with positive and negative affective reactions, food is also a source of pleasure or aversion. Individuals are naturally attracted to sweet and salty food while they experience an aversion to bitter and sour food (Capaldi and Privitera, 2008; Clark, 1998; Messer, 1989).

Increased availability of convenient food with high energy content combined with the aforementioned in-built or learned preferences make individuals more prone to choose less healthy, energy-dense food such as fast-food (Birch, 1999). The regular consumption of fast-food is known to lead to a decrease in the intake of specific nutrients which are known to be beneficial for a person's health (Paeratakul et al., 2003).

1.1 Food choice

Food that ends up in the daily meals is in most cases chosen by the persons that consume the meal or someone who prepares the meal for them. Food choice behaviour is influenced by many factors (Kamphuis et al., 2006; Köster, 2009; Shepherd and Dennison, 1996). Some of the main factors that influence food choice relevant to the studies described in this thesis will be described below.

1.1.1 Liking and food choice

Whether a food item is liked or not can certainly predict a large part of food choice (Brug et al., 2008; Tuorila and Pangborn, 1988). Liking of food can be aroused and influenced by a combination of affective and/or cognitive processes, but is mainly dominated by the affective ones (Cantin and Dubé, 1999). Liking can be strongly influenced by expectations individuals have based on their past experiences with the same food item or a relevant food category or combination of foods (Deliza and MacFie, 1996; Schifferstein et al., 1999). Furthermore, liking is considered to be a stronger predictor of a choice for a food item than intention to

consume a product (Saba et al., 1998). On the other hand, any type of pressure against one's own liking has been considered to lead individuals away from the pleasure of eating and to generate over-occupation with the subject of food (Mela, 2001). Eventually, disliking a food, without doubt, creates aversion to the consumption of that food (Rozin and Zellner, 1985). One could conclude that independent of the origin of the feelings of affection and/or aversion towards a specific food, the resulting choice and pleasant consumption of the specific food can only take place when affection is at least higher than aversion.

1.1.2 Habits and food choice

Another important predictor of food choice is habit. Habit essentially originates in repetitive past consumption and satisfaction through repetitive confirmation or positive disconfirmation of expectations. Past behaviour has been proposed as a better predictor of actual behaviour than attitudes towards the behaviour or intentions to realise the action in many circumstances (Bem, 1972; Köster, 2009; Wilson, 2002). Furthermore, intention to consume seafood is found to be predicted partly by habit and the associated past consumption behaviour (Honkanen et al., 2005). In particular, Honkanen et al. (2005) showed that the effect of habit on intended behaviour was stronger than the effect of attitudes due to the strong association between past behaviour and reported intentions. There is evidence that most individuals are subjects to this habitual behaviour, which is associated with specific environments and consequences. This habitual behaviour is strongly related to the availability of specific food items and the type of food that these individuals were exposed to in their childhood (Birch, 1999). In practice, past food consumption behaviour and frequency have been considered as one of the appropriate variables which can be used to measure food habits.

1.1.3 Parents and food choice

Since habits are associated with past behaviour, the types of food that an individual is exposed to during upbringing can play an important role in future food consumption. Consequently, parental promotion, prohibition or avoidance of specific foods can influence food choice behaviour (Sondergaard and Edelenbos, 2007). In particular, parents have an influence on shaping the tendencies for specific food preferences in children (Benton, 2004). Furthermore, it has been demonstrated that obesity in young adults can be highly associated

with parental obesity due to behavioural and genetic factors (Whitaker et al., 1997). Additionally, resemblance in fat and food consumption behaviour is found between parents and their adolescent children as well as between spouses (Feunekes et al., 1998). Furthermore, parental healthy food habits and concerns about children's weight have been found to be an environmental factor with a negative influence on child overweight (Birch and Fisher, 2000; Birch et al., 2003). Finally, parental behaviour as role models and as providers of healthy food has been shown to increase adolescents' consumption of fruit, vegetables and dairy products (Hanson et al., 2005). Parental control of food preferences is associated with food practices in late adolescence in specific cultural settings (Unusan, 2006). However, young consumers also seem to react negatively to parental advice about healthy food such as fish and choose less healthy meals (Honkanen et al., 2004). Suggesting and not imposing food choices may be a promising method to achieve long term food choice changes (Mela, 2001; Tuorila, 2000). Summarising, one could argue that children's and young adults' food choices are influenced by their parents in many ways.

1.1.4 Health and food choice

There is evidence that consumers report positive attitudes towards healthier products and report high scores on intentions to consume those (Kozup et al., 2003). However, the possibility that healthier products are not the final choice is also described (Köster et al., 1987; Weijzen et al., 2008). This may be due to the implicit tendency to report behavioural intentions based on past behaviour and not based on deliberate descriptions of plans (Bem, 1972). Young consumers in particular are less influenced by information about health related attributes of food (Roininen et al., 1999). However, environmental changes such as increased availability could increase convenience and access to healthier choices (Wiegersma et al., 2000).

Information about the healthiness of food does not always have a positive effect on food choice behaviour. Negative effects of health information on the choice of a snack in a canteen have been reported in the past (Köster et al., 1987). Additionally, Raghunathan, Naylor and Hoyer (2006) discussed that there is an implicit positive association between unhealthy and tasty food products. In the case of snacks such as chips, healthier versions of the product could not win consumers' preferences due to the strong effect that taste had on food choice

(Tepper and Trail, 1998). Furthermore, Jansen et al. (2008) demonstrated that restriction of a food can lead to changes in children's behaviour. When a food item was described as forbidden, the total intake of this item was increased, irrespective of its attraction or health qualities. Even though a part of the young consumer population could be approached by additional health information, this approach would not reach out to those that are not interested in or are negative about healthy food choices. A way to attract the attention of the latter group might be by using appropriate images of relevant and entertaining role models (Bruhn, 2008).

1.1.5 Young adults and food choice

There are differences between food choices among different age groups due to variations in the relevance of health concerns (Wandel and Fagerli, 1999). These differences go along with changes in identity development (Hill, 2002). Young adulthood represents the transition from the complete development of the singular self and identity to the social out-reach (Erikson, 1968). It has been suggested that this stage of life is the point where all cognitive development starts being expressed in behaviours which determine each person's character (Piaget, 2008). Furthermore, it is apparent that moving into adulthood is accompanied by changes in reasoning and the perception of ethics. Young adults have a better understanding of the consequences of their choices and the obligations and responsibilities that come along with commitments than do adolescents (Gilligan and Murphy, 1979). This interaction between structured rules and emotions leads to the ability to exercise more subtle judgment of situations. This is a fertile ground for food choices which correspond more to young adults' hedonistic preferences than healthy ones due, to their clear understanding of the differences between what is socially acceptable and what they personally prefer.

One of the changes in life that define an actual and not only historical or numerical change in age and maturation is a change in the household situation. Some of these changes may be moving out of home to live alone, living together with a partner, having the first or following child and of course losing household members due to their relocation or passing away. Research shows the most common relocation time (change in residence) for Western societies occurs at about 20 years of age (Arnett, 2000). Moving out of the parental home, for example, to study at a university, has been shown to influence food habits of young adults towards the

development of personal consumption patterns which fit the situation in which they are living (Papadaki et al., 2007). Young adults tend to obtain more energy at fast-food restaurants than at home when compared to older adults or children under the influence of parents (Nielsen et al., 2002). As a result, young adult university students tend to decrease their consumption of fresh fruit, cooked and raw vegetables, fatty fish, seafood and olive oil and increase their sugar, alcohol and fast-food intake (Papadaki et al., 2007). These changes in food habits deriving from their household change indicate that young adults could benefit from a positive shift in their food choice behaviour, such as an increase in fruit, vegetable and seafood consumption.

1.1.6 Barriers and food choice

Two of the most common barriers for young adults in preparing their own healthy meals are the lack of time and cooking skills (Shepherd et al., 2006). Young adults who prepare their own meals tend to consume less fast-food and their food intake is closer to the common dietary recommendations for fat, calcium, fruit, vegetables and dietary fibre (Larson et al., 2006). These practices could be more stimulated if young consumers were advised on how to prepare healthy meals in an easy way. Additionally, advice on how to identify healthier readymade snacks and meals would increase the overall healthiness of their diet (Larson et al., 2008).

1.2 Seafood

The term seafood is used in this thesis to encompass wild and farmed, fish, crustaceans and shellfish, both of marine and freshwater origin in fresh, frozen and processed product forms (Jaffry et al., 2004).

1.2.1 Health and seafood

Seafood and particularly, fish has been repeatedly described as a health promoting food category (Mozaffarian and Rimm, 2006; Sidhu, 2003). The health benefits of seafood consumption have recently been reviewed (Undeland et al., 2009) showing regular seafood

consumption lowers the risk for coronary heart disease. For many other diseases (diabetes II, cancer, cognitive decline or development) more research is needed to demonstrate the health beneficial effects of eating seafood.

Public health organisations in various countries recommend that fish should be consumed at least two times per week ("Advice on fish consumption: Benefits and Risks," 2004). However, the average fish consumption in Europe is considerably less frequent than recommended by the public health organisations daily intake and estimated to be around once per week (Brunsø, 2003; Myrland et al., 2000; Scientific Advisory Committee on Nutrition and Committee on the toxicity of chemicals in food, 2004; Similä et al., 2003; Welch et al., 2002). Based on the fish supplies, the average fish consumption in Europe was reported as 20.8 kg (live weight equivalent per capita) in 2005 (FAO, 2009), which indicated that fish consumption frequency was on average around one time per week, estimated from average fish serving sizes (Einarsdottir et al., 2007).

These findings are further supported by self reported questionnaires about seafood consumption among European consumers. Fish consumption frequencies reported by the consumers confirmed the estimated mean consumption of once per week and in countries like the Netherlands, Belgium and Poland were even lower (Honkanen et al., 2005). In particular, it has been documented that fish consumption is even lower for young adults, when compared to older consumers. It is estimated that young adults consume almost half or the amount of fish when compared to older consumers (Li et al., 2001; Nayga and Capps, 1995; Steingrimsdóttir et al., 2002). This low seafood consumption frequency of young adults is partly caused by the barriers described in a previous paragraph.

However, one of the ways to improve this situation is consumer oriented new seafood product development. The development of seafood products that are tailor made based on the preferences of the specific consumer group will increase the probability that these products are chosen by these consumers. This increase of available products that are liked by the consumers will decrease the possibility of disappointment due to disconfirmed expectations for an attractive seafood product. Eventually, the latter change will lead to a realisation of their willingness for a change in food habits towards eating more seafood.

1.2.2 Consumers and seafood

Various factors that can influence consumers' seafood eating behaviour have been identified. One of these factors is product quality, a label of which is found to determine the products that various types of consumers choose in the market place (Verbeke et al., 2007c). Furthermore, attitudes towards choosing fish for a meal have been found to lead to the actual choice for fish in many cases (Brunsø, 2003). Additionally, a high involvement with seafood is shown to lead to a higher seafood consumption frequency (Olsen, 2001). Food choice habits and past behaviour have been presented as strong determinants of seafood choices as well (Honkanen et al., 2005). Furthermore, beliefs about benefits and risks related to health that originate from the frequent consumption of fish have been shown to influence fish consumption positively or negatively (Verbeke et al., 2005). An important factor that is shown to act as a barrier to the consumption of fish is convenience. Consumers that believed fish is not convenient to prepare also reported a low fish consumption frequency (Olsen, 2003; Rortveit and Olsen, 2007). An important factor which determines seafood consumption frequency is age. Older consumers consume fish more frequently (Olsen, 2003), mainly due to their higher involvement with health (Olsen, 2003; Pieniak et al., 2008). Additionally, some particular groups of consumers are highly interested in animal welfare practices and are positively influenced if they are made aware of animal friendly practices during the growth, catch and handling of fish (Vanhonacker et al., 2006a; Vanhonacker et al., 2006b). Finally traditions with specific types of products such as frozen fish have a positive effect on the re-use of the same type of products (Sveinsdóttir et al., 2009).

Some consumer research has been performed on the overall image of seafood products, the image of seafood production methods and their impact on fish consumption behaviour. Consumers perceive farmed fish as being of lower quality when compared to fish captured in the wild (Kole, 2003; Verbeke et al., 2007a; Verbeke et al., 2007c). It was recently shown that the less positive image of fish from aquaculture does not correspond with actual taste preferences. It was shown that despite its possibly preferable sensory properties, the image of fish from aquaculture can influence the perception of fish products negatively (Kole et al., 2009; Luten et al., 2002). The image of farmed fish has usually been suggested to be less positive than the image of wild fish. However, consumers do not generally consider nor are they aware and knowledgeable of the farmed origin of fish (Vanhonacker et al., in press).

1.2.3 New seafood product development

The development of new seafood products for young consumers is a challenge and may contribute to their behavioural change towards choices of healthier meals. The combination of the diversity of seafood raw material, expertise in the production of traditional seafood products, new emerging seafood technologies and consumer science is a strong basis for the development of new seafood products to meet young consumer's demands. However, new product development (NPD) is a high risk activity. This is demonstrated by the high probability of failure (70%) in the NPD process (Cooper, 1999; Cooper and Edgett, 2005). However, examples of the successful use of consumer oriented seafood product development have been reported (Morrissey, 2006; Sirois, 2006). A number of studies have focused on advice for successful NPD. Some factors that influence new product performance suggest a number of variables that can distinguish new product success from failure mainly depending on processes, resources and strategies. Some of the key requirements for success in NPD are speed to market, quality management, multifunctional teamwork, sense of commitment and a systems approach (Cooper and Edgett, 2005; March-Chordà et al., 2002; Xueli et al., 2002). Van Trijp and Steenkamp (2005) reviewed determinants for success and failure of new products, which were analysed in different studies. They distinguished determinants related to consumers, such as the proper definition of product concepts and adding value to products for specific target consumers. Additionally, they reported important organisational aspects, such as proper structuring of the design process, appropriate embedding in the organisation and commitment from top management. Furthermore, they distinguished competition-related factors which include competitive activity and turbulence, size and attractiveness of the market. Finally, they referred to the accurate measurement of market size and desired positioning as typical marketing-related determinants of new product success.

Recently, four main factors for the failures in new seafood product development were identified by Ottesen and Grønhaug (2006; 2007). The first factor was that products were mainly invented within the firm and not based on inputs from consumers. Second, several products did not gain sufficient distribution through retail chains, who also were rather impatient and removed products that did not perform well within a few months. Third, several products were priced higher than consumers' willingness to pay. This was related to production costs which were much higher than the companies had planned. A final failure factor was that products that had been successful in a specific market where presumed to be

as successful in another market. However, success was not repeated due to different consumer preferences in different cultures as well as lack of ‘understanding’ of the actual products.

Taking all the risks during NPD, one must be well prepared and take all necessary precautions before a new product is launched in the market. One model which incorporates all the necessary precautions while leaving space for innovation is Cooper’s Stage-Gate[®] model for NPD (2008). Based on the principle behind the Stage-Gate[®] model, the development of new products follows a sequence of actions which can secure market success by using the voice-of-the-consumers. First ideas are created in the discovery stage. Then, consumers’ opinions and values are used to develop and fine tune product concepts. These product concepts are then tested by means of virtual tests (web-based concept-tests). When the virtual testing is conclusive the product development can begin. A short scale development of the product concept can be performed in order to survey consumers’ opinions on the final product test. When all these steps lead to a specific product, it can be launched and the post-launch increased success rate can then be evaluated (figure 1).

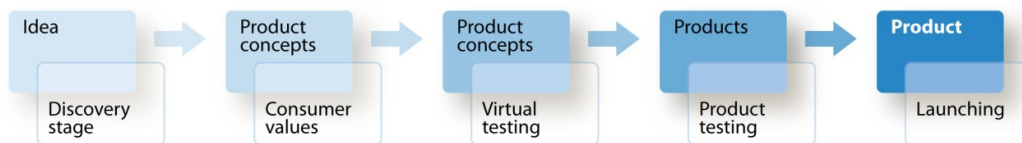


Figure 1. An overview of a new product development system inspired by the Stage-Gate[®] model (Cooper, 2008)

1.3 Aims

The aims of this PhD thesis were:

- a. To contribute to the understanding of young adults’ preference or avoidance of seafood.

- b. To define and pre-test the relationship of health involvement and attitudes towards eating fish with fish consumption behaviour.
- c. To provide input for seafood product development by exploring barriers and opportunities for increasing seafood consumption.
- d. To advise how existing seafood products can be improved through the NPD process in order to increase their acceptability and attractiveness.
- e. To test young adults' seafood acceptance and potential choices, as well as confidence in seafood preparation and consumption when exposed to specific new seafood product concepts.

The results will be used for a next step towards a consumer led development of seafood product prototypes.

2 Summaries of papers

2.1 Paper I

Association of health involvement and attitudes towards eating fish on farmed and wild fish consumption in Belgium, Norway and Spain.

Consumers in European countries often do not meet the recommended daily intake levels for fish consumption. Various factors that can influence fish consumption behaviour have been identified, but limited research has been performed on fish consumption behaviour, discriminating between farmed and wild fish.

The present survey study confirmed differences in total fish consumption, farmed fish and wild fish consumption behaviour in Belgium, Norway and Spain. Spanish consumers more frequently consumed fish in each category than Norwegian consumers. Belgian consumers reported the lowest fish consumption frequency. Accordingly, health involvement and attitudes towards fish consumption decreased from Spain over Norway to Belgium, suggesting a positive association of health involvement and attitudes towards fish consumption with total fish consumption. Similar effects were found for farmed and wild fish consumption. In general consumers in all countries were poorly aware of the origin of the fish they consume, despite the mandatory indication of origin on fish labels. Across countries, an increased awareness about fish origin was found with increased fish consumption.

The findings of the study indicate that farmed and wild fish consumption should be further stimulated among Belgian, Norwegian and Spanish consumers in association with a healthy and positive meal. Additionally, given the limited awareness of the origin of fish, transparency on the issue of farmed origin will be important in order to anticipate potential adverse communication.

2.2 Paper II

Translating barriers into potential improvements: The case of new healthy seafood product development

The aim of this study is to explore potential barriers to seafood consumption among young adults and the parents of young children. Knowledge of these barriers will be used to assist in the development of new seafood product concepts that fulfil the needs of consumers.

To gather this information, twenty-eight infrequent consumers of seafood participated in three semi-structured, two-hour focus group discussions in Denmark, Norway and Iceland. The results were then linked to the Stage-Gate model for consumer-based new product development (NPD).

The participants thought of seafood as either healthy or convenient, although there were concerns about the amount of effort required to prepare it. These concerns resulted in an expression of their need for products that are attractive, healthy, palatable, and convenient. In particular, the newly developed products should be accompanied by clear advice on preparation methods and materials. An increase in seafood availability coupled with lower prices would encourage these consumers to add seafood to their diet. Purchase-point-marketing and habitual behaviour were found to implicitly skew planned behaviour. Inputs for NPD related to convenience, attractiveness, quality, trustworthiness, knowledge and requirements about seafood preparation are discussed.

The present study combines qualitative methods to lead to practical input for NPD focusing on overcoming the barriers that keep consumers from choosing existing healthy seafood products. The importance of the consumers' confidence in their ability to successfully prepare a seafood meal was revealed and can be used in Stage-Gate based NPD.

2.3 Paper III

A voice-of-consumer approach in development of new seafood product concepts

This paper describes a consumer based approach for development of new seafood product concepts among young adults in Norway and Iceland. The aim of the study was to gain insight into how young adults determine their acceptance of seafood and make potential product choices. Additional insights measured were confidence in seafood preparation and consumption choices when exposed to specific new seafood concepts.

Based on consumer-reported values, three seafood product concepts were evaluated by 354 consumers in a web-based, conjoint experiment in Norway and Iceland.

Consumers' evaluations showed a number of consumer preferences for specific seafood product concepts partly associated with and partly conflicting with their original values. Understanding consumer attitudes can help to explain these results.

The results of this study will be used as a guide for the next step in developing seafood product concepts.

2.4 Paper IV

Evaluation of seafood product concepts by young adults and families with young children from Denmark, Norway and Iceland.

This paper describes the results of a study that tested fourteen seafood concepts among young adults and families with young children in Denmark, Norway and Iceland. This study aimed at gaining insight into the acceptance of new seafood product concepts by individuals with low seafood consumption. Based on consumer-reported values and previous concept-testing, fourteen seafood product concepts were tested by 296 consumers in a web-based experiment.

Consumers' preferences depended on the size of fish offered, the presence of information and fish species offered. Young adult consumers evaluated the product concepts differently than parents of young children. Three consumer clusters, based on attitudinal variables, were identified explaining the differences in the evaluation of the product concepts. The outcome of this study will be used to develop product for realistic in-home testing.

3 Discussion

As previously described, the first aim of this PhD thesis was to contribute to the understanding of young adults' preference for or avoidance of seafood. Additionally, to define and pre-test the relationship of health involvement and attitudes towards eating fish with fish consumption behaviour. Furthermore this thesis provides input for future NPD by exploring barriers to and opportunities for increasing seafood consumption. Moreover, advice will be given on how the existing seafood products can be improved through the NPD process in order to increase their acceptability and attractiveness. Finally, insight into young adults' seafood acceptance and potential choices, as well as confidence in seafood preparation and consumption when exposed to specific new seafood product concepts will be given. The results will be used for a next step towards a consumer led development of seafood product prototypes.

3.1 Methodological considerations

In order to work towards the aims of this thesis, the most appropriate research methods had to be chosen. The typical scientific approach would be to directly design questionnaires and experiments based on existing literature. However, being aware of the differences between reported planned behaviour (Ajzen, 1991, 2001, 2002; Ajzen and Driver, 1991, 1992) and actual behaviour (Fiates et al., 2008; Fox and Ward, 2008; Roos et al., 2005; Weijzen et al., 2008) led to a more detailed investigation of the most appropriate methods for the studies in this thesis. First, the fact that food choice is sometimes a cognitive, but mainly an implicit process (Köster, 2003) was considered. Additionally, the fact that researchers that design and interpret the results are directed to expected results was taken into account (James, 1890). The decrease in implicit bias from both participants and researchers was targeted by the use of qualitative methods to define the variables to be used in the product evaluation. Additionally, the design of each step was based on the results of the previous step in order to decrease researchers' bias and follow a consumer oriented approach.

Furthermore, the matter of individualism and generalisation of the results was considered. It is commonly accepted that results found in a certain group, country or time in history cannot

be extrapolated to a bigger group or to population level without caution. Additionally, each model has been designed to reach a specific aim and led to encoding and decoding of the behaviour of interest in the best way for each study (figure 2). However, each behavioural system is different. In order to secure accuracy and decrease bias in the studies presented in this thesis, relevant variables were not only based on the literature but were mainly defined based on pretesting and in-depth exploration. This way of securing the study design can prevent misleading influences on a study of a specific group, in a specific time and place (Köster, 2009).

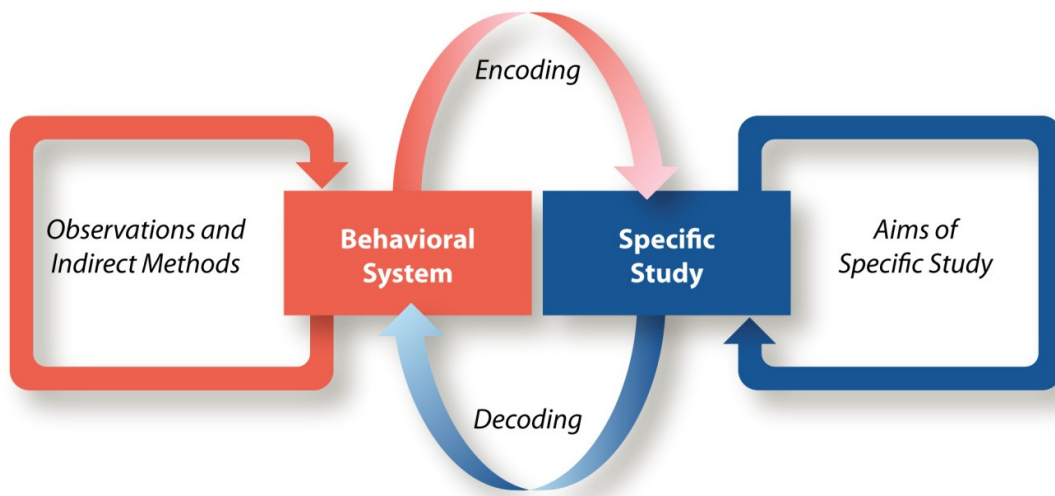


Figure 2. General structure of research

The methods that were chosen were: 1) survey based definition and verification of variables and target groups 2) in-depth qualitative exploration by means of focus groups and in depth interviews and 3) web-based product concept testing and re-testing (figure 3). Starting with a clear definition of target groups and the problem on various versions of the target product (i.e. farmed or wild fish in paper I), followed by an in-depth exploration of consumers' barriers and values related to seafood consumption (paper II) and closing this study with consumer oriented, experimental test verification (paper III & IV) was considered as an appropriate approach for our subject of interest.

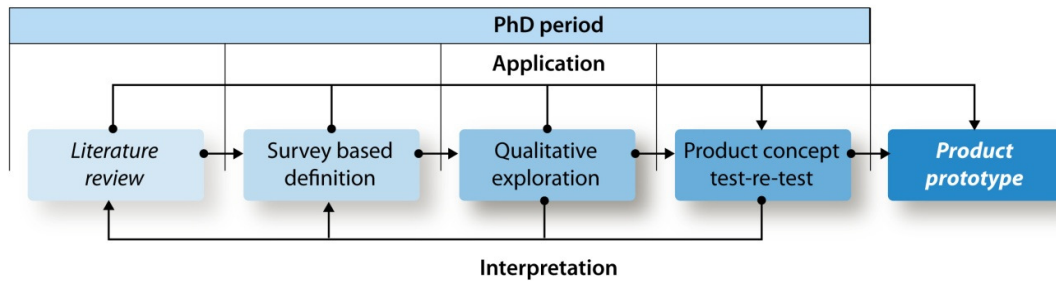


Figure 3. Time sequence of the methods that were used in the four studies

Our first method was the use of questionnaires about attitudes and personality traits and their associations with food consumption behaviour and socio-demographic characteristics. This is a method which has been commonly used in consumer research and the development of products for many years (Cox et al., 2008; Grunert and Scholderer, 2000; Saba et al., 1998; Scholderer and Grunert, 2001; Verbeke et al., 2007b). This method is considered convenient and fruitful, since a carefully chosen list of questions can generate extensive, quantifiable insights. Due to its broad acceptance and convenience, this method was used to direct our understanding of the relationship between young adults and seafood and clearly define and pre-test the relevance of attitudes and health involvement across three European countries (Belgium, Norway and Spain) two product categories (i.e. farmed or wild fish) and all adult age groups. By following this pre-testing procedure, the relevance of studying attitudes towards fish of any origin and health involvement of young adults in the Nordic countries was secured.

Focus group discussions and in-depth interviews including participants that have experienced a specific phenomenon (i.e. barriers to seafood consumption) were considered the appropriate method to use as a second step in the process of understanding consumers and their views of seafood (Endacott, 2008; Mays and Pope, 2000). This method provides invaluable insight into realistic and complex perceptual matrices that can later be used to explain behavioural patterns and lead to fruitful conclusions (Draper, 2004; Meyrick, 2006). Using qualitative consumer data as input for NPD is not as common as in other fields of research (van Kleef et al., 2005a, b). However, a careful exploration of the consumers' discussions on the subject of our interest provides valuable input. Analysing the information that is provided by the

consumers can lead to a better understanding of the current market situation (Søndergaard, 2005; Søndergaard and Harmsen, 2007). In addition, consumer perspectives are captured without being directed by pre-selected items in a questionnaire. This information can then be used as the voice of the consumer when ideas for new products are generated.

Our choice for a final method was a web-based product concept test and re-test with a questionnaire on evaluations of the concepts and a questionnaire about attitudes and personality traits. This type of test does not expose the participants to the actual products. Nevertheless, the high value of this method is in its convenience with testing various products in order to identify which is the most successful one to be used in further testing (Dahan and Srinivasan, 2000). The design of such a method is usually a cross-over between case-control and conjoint designs (modified Greco-Latin square design), due to the number of varying factors that are present in complete product concepts. Usually, participants answer questions on seven or nine point Likert scales. Some examples of commonly used questionnaire evaluation scales are: a) general liking, b) overall appreciation, c) perceived trustworthiness of the product, and so on. Some examples of commonly used attitudinal questionnaire scales are: a) the health orientation scale (Ophuis, 1989) which can be used to measure health interest, b) the personal health scale (Schifferstein and Oude Ophuis, 1998) which can be used to measure the perceived need to take action in improving personal health, c) the food neophobia scale (Pliner and Hobden, 1992) which can be used to measure food curiosity, d) the attitudes towards naturalness (Grunert et al., 1993) which can be used to measure interest in the naturalness of food and e) other items from the literature which can measure convenience orientation, perceived convenience of seafood, etc. (Olsen et al., 2007). Finally, questions about socio-demographic characteristics and consumption frequency are presented to the participants in order to capture a detailed description of the specific study group and assist in groupings and comparisons during the analyses. The questionnaire used in the latest study in this thesis (paper IV) is presented in the appendix as an example.

Once one broad concept test is successfully completed, it indicates directions for a more specific follow-up concept test. The follow-up concept test can then be directed precisely at the point on which further development of a product concept should focus. Following this procedure, the selection of product concepts and variables to be included in further experimental designs are purely based on the consumers' evaluations. The use of consumers' evaluations in the design and definition of each step of product concept development is what

defines it as a pure consumer oriented new product concept development. Consumer oriented product concept development has a minimised amount of researcher bias and secures market success for the developed product. Additionally, consumer oriented product concept development aims at removing the bias that originates from industry oriented new product development. Focusing solely on the needs of the industry without paying close attention to the needs of the consumers could lead to products that may not be appreciated by the consumers.

After the completion of the two concept tests of the third and experimental part of the study, the previous exploratory steps can be recited. At that final stage, the interpretation of the results could be performed based on the input from the participants, the existing literature and to some extent personal interpretation (figure 4). Following this strategy, the design of the detailed method to extract information from the participants' input and the final interpretation can be considered moderately closer to real life settings. Additionally, the interpretations of the researchers that perform the study and the authors of the existing literature can be considered indirectly filtered by the data produced by the participants in the studies.

Considering the importance of the confirmation of the results in different countries and the potential conclusions on an international level led to the decision to study various countries within the European continent.

3.2 Discussion of main findings

In paper I involvement in health was found to be a matter that varies with age which is in agreement with Olsen (2003). It was indicated that single, young males were the least involved in health and the consumption of healthy food, as opposed to the less young, non single females. Additionally, it was shown that attitudes towards the consumption of fish were significantly associated with the consumption of fish from wild or farmed origin. In the present study it was found that health involvement was a predictor of consumers' attitudes towards fish consumption in Belgium, Norway and Spain, which is in agreement with the study by Olsen (2003) in Norway. Pieniak et al (2008) showed that involvement in health affects interest in healthy eating, which influences total fish consumption. The latter was clearly exemplified before, when younger subjects were found to be weakly influenced by

health related attributes of food (Roininen et al., 1999) or by environmental changes that could increase convenience and access to healthier choices (Wiegersma et al., 2000). Combining the present findings and those from Olsen (2003) and Pieniak et al (2008), we conclude that health involvement is associated with age. Furthermore, there is a direct positive relationship of health involvement with fish consumption. Additionally, attitudes towards fish consumption were positively associated with the actual consumption of fish and as has been previously discussed, this relationship could be amplified by a high involvement in health. The results from this study indicated that a further exploration of health involvement and attitudes towards fish consumption of young adults in the Nordic countries (Norway, Iceland and Denmark) was relevant within the frame of new seafood product development.

As expected, the use of focus group discussions as a starting point for in-depth exploration led to new insights regarding seafood perception by the participants. The overall value of this method was the understanding of some consumers' values regarding seafood products. These values were: healthiness, satiation, convenience, visibility & trust, freedom of choice, successful preparation, image improvement, availability and price. These nine consumer values were used in order to understand barriers to and opportunities towards the increase in seafood consumption by young adults and to design product concepts that would increase their final choice for seafood.

One of the findings of the focus groups study (paper II) was that participants linked food with their health and discussed the trade-off between health and convenience. They reported feelings of guilt that accompanied their choices for a meal focused more on convenience than on healthiness. This type of guilt is not a new notion (Soetens et al., 2008; Wardle and Solomons, 1994), but the participants talked about it as leading them to some minor interest in being involved in the preparation of the meal in order to feel closer to having a healthy diet (Larson et al., 2006). They also indicated that when a product was convenient, they were suspicious about its quality and healthiness. Information about the quality and the healthiness of a convenient product would improve its image and increase their willingness to choose the product. Most participants were aware of the positive health benefits of seafood. The general idea that "seafood is good for you" was present and led to willingness to consume more seafood (Roosen et al., 2007). However, the final choice for seafood was not necessarily made due to inconsistency between planned and actual behaviour (Köster, 2009). The latter

resulted in a feeling of guilt about not being cautious with regards to personal health, together with the feeling of their actions being inconsistent with their knowledge (Paisley et al., 2001). Feelings of a lack of time to prepare a meal are probably an indication of food being a lower priority than work, education and hobbies (Jabs et al., 2007). A factor that could influence the choice for a seafood meal was the presence of children in the household. It was believed that “good habits” should be taught to and performed when they start having children, which involved healthy eating (Fiates et al., 2008).

When seafood product concepts were tested for the first time (paper III), they were rated at the midpoint of the scales for convenience. This medium convenience of the seafood product concepts could be an indication that consumers are unsure about the convenience because they could not use the product in reality but only evaluate images of and information about the product concepts. Moreover, since the consumers considered seafood as not convenient, a rating around the scale’s mid-point could be an indication that the product concepts were perceived to be relatively more convenient than the participants expected. This was clearly illustrated in Iceland, where consumers reported the lowest scores in overall convenience of seafood and the highest perceived convenience of the experimental seafood product concepts. This outcome is of significant value due to the fact that the participants of this study were selected for having a low seafood consumption frequency due to barriers related to convenience.

In paper II, the outcome of the focus groups showed that seafood was strongly associated with healthiness, but also led to negative associations. Across the three countries the participants mentioned poor access to seafood of high quality, the high price of seafood and insecurity related to their own cooking skills and in judging what good quality seafood is. This finding is in agreement with a previous study in Norway (Myrland et al., 2000). It was shown that convenience and availability alone could not persuade the participants into purchasing a product even though they were willing to do so. Trust in the quality and their cooking skills would increase the market potential of healthy seafood products. When product concepts with various preparation guidelines were presented to the participants of the study described in paper III, it was shown that there was low appreciation of additional information. Combining this outcome with the results of paper II, it could be concluded that although information availability is appreciated, it may lead to some aversion and decrease trust in the product, when an overload of information is presented directly with the product.

In paper II, it was shown that past exposure and habits influenced participants' present food choice behaviour positively and negatively. Regular past consumption increased their liking of and trust in, seafood products. However, very frequent exposure to seafood resulted in product boredom which is known to affect food choice negatively (Köster and Mojet, 2007). Hence, it can be concluded that both high and low consumption of seafood during childhood had a negative influence on the consumption in later life (Fox and Ward, 2008). Finding a good balance in the frequency of having or serving seafood to others is a challenge. Furthermore, in this paper, the concept of a "consumption circle" was used by participants to describe the consumption and eating habits of participants. The participants described the common practice of having 10-15 dishes that are randomly prepared during the year. It appeared that seafood does not play a major role in the consumption circle. In order to increase seafood consumption the challenge is to break into this habitual circle. This concept provided practical insight on the previously presented issue of the strength of habit in food choice behaviour (Honkanen et al., 2005).

One of the main messages extracted from the focus groups (paper II) was that an improvement of the image and an increase in the availability of seafood could increase intake. Sources of promotional information were explicitly mentioned as a reason for remembering to purchase more seafood. There was a general agreement that more promotional strategies would lead to an increase in the consumption of seafood and seafood products. As participants primarily select their main meal during shopping, the results indicated that more seafood promotion at the purchase points could be a way to influence consumer choices. Additionally, based on the discussions, seafood was considered to be a product that is too expensive to risk preparing inappropriately. Hence, information about the preparation method and the choice of additional ingredients or accompaniments would improve the image of new healthy seafood products. The participants were willing to add more seafood to their consumption circle and they would act accordingly if they would be informed about the availability of healthy and convenient seafood products of guaranteed high quality (Pieniak et al., 2007). The participants also showed an overall preference for being reminded at the purchase points of new recipes and guidance on how to prepare them to break out of their long trusted habits. Demand for new products that would describe on the packaging in simple terms the necessary steps to a successful meal was reported.

One of the main results of the first concept test (paper III) was that visible products were considered to be more attractive and increased consumers' trust in them compared to products that were not visible at all. It was also shown that the visible products were perceived as more convenient and generated higher willingness to buy. This confirms the results of paper II where consumers reported the need for visibility in order to make them feel more confident about the quality of the product while buying. Another focus groups study has reported this result (Dantas et al., 2005), showing that consumers clearly describe products that are visible in their packaging as preferable. The results presented in this paper empirically support the positive effect of visibility of the seafood product for young consumers, which is important for further seafood product development.

Participants in the study described in paper III also reported a preference for the "natural Nordic" and "French herbs" themes in contrast to the "hot & spicy" and "fish & fruit" themes. Similarly, the concept of a mixture of fish species seemed to be perceived more positively than the concept of a mixture of seafood species. The less appreciated product concepts (i.e. "hot & spicy"," fish & fruit" and "mixed seafood") were suggested as being more innovative. Perhaps consumers considered these seafood product concepts less trustworthy due to the fact that they were not familiar with comparable concepts. This result of less appreciation of the unfamiliar products conflicted with the relatively high food curiosity consumers reported in the attitudinal part of this study. However, this conflict between reported preference and reported attitude may be present due to the tendency of young adults to report an interest in new product concepts but still reject them at the moment of choice as shown in paper II. In the focus group study, participants described this phenomenon as a balance between an attractive new image and the feeling of trust and security about the successful preparation of the meal.

A general observation throughout the first seafood product concept evaluations (paper III) was that the scores were around the scales' mid-point. This result can be an indication of low acceptance of existing seafood product concepts by the specific target group (young adults) and a possible explanation of their low consumption which is repeatedly reported in the literature (Myrland et al., 2000; Similä et al., 2003; Steingrimsdóttir et al., 2002). Keeping in mind that the participants of this study were young adults and thus infrequent consumers of seafood, it could be suggested that the concepts were relatively well accepted. However, further development and improvement of the seafood product concepts in the second concept

test (paper IV) would increase the probability of accepting the products and eventually increase seafood consumption. Additionally, raw seafood products might appear less appetising when not shown as part of a prepared meal. Product concepts could benefit from a visualisation of the prepared meal on the product's packaging. This was included in the second seafood concept test.

In the first concept test (paper III), Icelanders evaluated all seafood product concepts as more convenient, but were less sure of how to prepare a meal based on them (concepts, themes, species, shape and size, guide, visibility). Regarding willingness to buy, Icelanders reported higher scores except for one product concept, "mixed bites", which Norwegians were more willing to buy. Additionally, Norwegians were less trustful towards the different seafood product types (concepts, visibility, guide, species, shape and size). From the results regarding consumers' attitudes (paper III) it can be seen that Norwegians find seafood in general as quick and convenient to prepare as well as being more interested in naturalness than Icelanders. This may be an indication of increased familiarity with and exposure to seafood of the participants from Norway, as shown by the higher frequency of consumption of seafood. Increased familiarity with and knowledge about a product are reported to influence product evaluation and attention to some product characteristics (Cordel, 1997). Therefore, it is reasonable to speculate that an increased familiarity may be associated with the appreciation of fresh raw seafood. However, this association was not tested. These differences between Iceland and Norway can be used to provide input for further targeted seafood product development and confirm the importance of cross-cultural research.

Based upon the outcome of the first three studies, new seafood product concepts were designed and retested in the second concept test study (paper IV). In this test it was shown that there are differences in the evaluations of the product concepts on all variables evaluated by the participants (figure 4). Significant and corresponding differences were found between the various product concepts with and without information about the product. These differences showed that the Nordic cod fillet concept was the most preferred, followed by the fish portions concept. The innovative fish portions (cod or cod and salmon) and wild berries product concept scored about as high as the very familiar traditional cod fillets product concept. Further development of the of the cod and salmon fish portions with wild berries product concept could lead to a successful product in the market which will eventually lead to an increase of fish consumption by young adults.

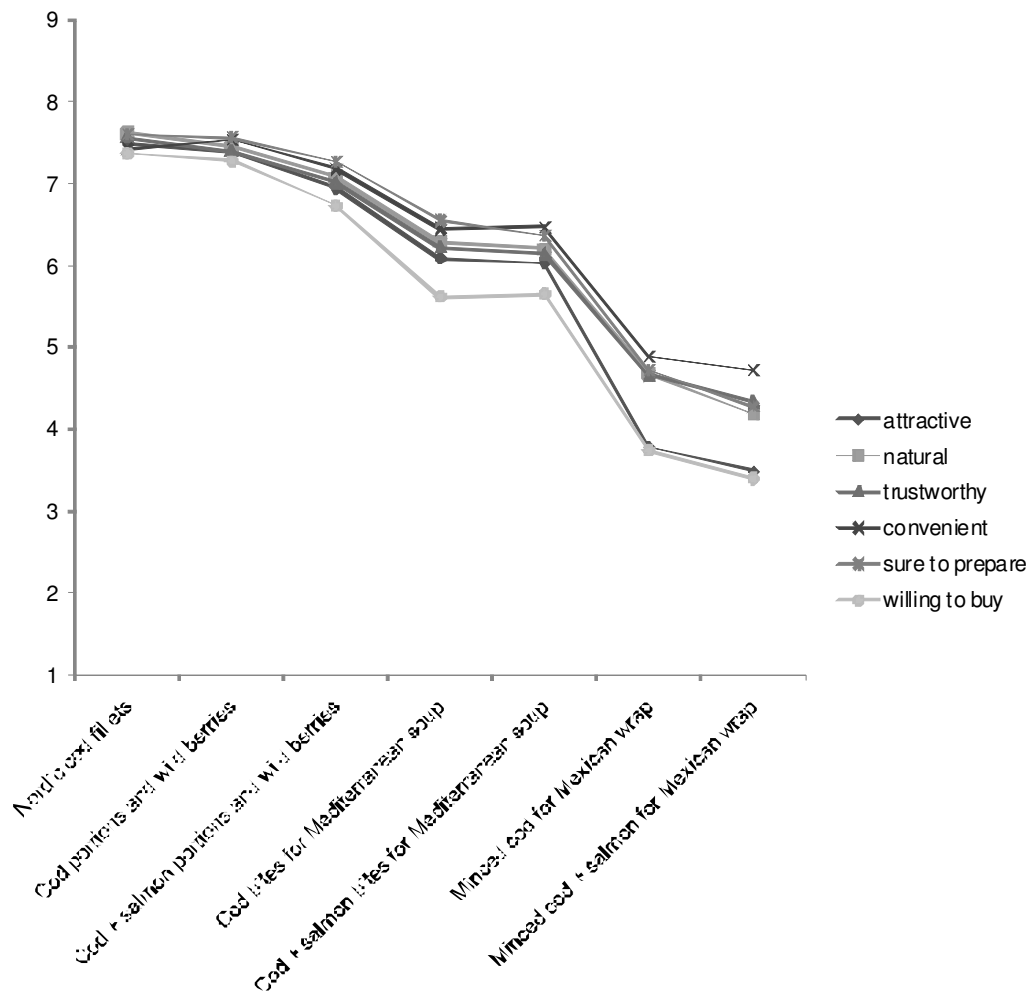


Figure 4. Product concepts evaluated by the consumers on six variables on nine-point Likert scales with one (1) denoting a low evaluation of the specific product characteristic and nine (9) a high one.

Lower in the evaluations were the fish bites and finally the minced fish. The consumers involved found seafood product concepts less attractive, natural, trustworthy or convenient when they were offered in small pieces or minced. Small portions of fish, not deviating too much from fillet size were evaluated as almost as good as the fillet concept.

The participants in the last study (paper IV) showed higher preference for the product concepts with additional textual information about the product including a recipe as well as a

photo illustration emphasising the naturalness and attractiveness of the final prepared dish. This effect was significant for the variables: perceived attractiveness, trustworthiness and willingness to buy the product concept. However, the positive effect on the preference for products with information was not as high as expected. The limited information effect in the case of naturalness was probably due to the fact that the fresh product was so visible in the packaging that the participants perceived both versions of the product concept to be very natural. Convenience and sureness about the successful preparation of a meal using this product may not have been significantly affected by the packaging label because the information about the preparation of the meal was only described on the back of the package, without actually being presented to the consumers in the test.

Looking at the differences between fish species (cod and salmon), we can conclude that the combination of cod and salmon was well accepted. It was shown that the evaluations between the cod and cod & salmon product concepts were either equal or sometimes in favour of either one. The cod product concepts were slightly more appreciated in the case of fish portions. However, when the evaluations for the product concept “Fish bites for Mediterranean soup” were analysed, it was shown that cod & salmon bites were preferred. Finally, the use of cod or salmon for the minced fish product did not lead to any significantly positive change in consumers’ preference for this product. Minced fish was not appreciated regardless of the species or the accompanying information and the expected added value as a healthy replacement for popular minced meat in convenient dishes.

An interesting outcome of the second concept test study (paper IV) was the definition of three consumer clusters, based on attitudinal variables. The analysis of these attitudinal variables revealed the existence of the groups “totally positive health oriented consumers”, “non health-action fish consumers” and “fast-convenient non-fish consumers”. There was a non significant tendency for young adults to belong to the “fast-convenient non-fish consumers” cluster. The results suggested that there was an overall trend that “totally positive health oriented consumers” rated the seafood product concepts higher than “non health-action fish consumers”. The lowest product concept evaluations were reported by the “fast-convenient non-fish consumers”. These differences were comparable to the differences between the two target groups (young adults and families with young children) in this study. Again, the low evaluations were not significantly different but the highly rated seafood product concepts were different between groups on willingness to buy and sureness about preparation.

4 Conclusions

The results of paper I verified the relevance some of the variables which were explored and described in paper II. The consumers' values extracted from the study described in paper II were used as an input for testing new seafood product concepts in paper III. The results of the third study (paper III) directed towards the design of new healthy seafood product concepts such as fish portions from one or a mix of species, in improved packaging with appropriately targeted package information which were tested in the study described in paper IV.

The main outcome of paper I was that involvement in health issues and attitudes towards fish consumption are associated with fish consumption in a positive manner. This influence is present for farmed and wild fish consumption equally across Belgium, Norway and Spain. It was also shown that younger consumers are less involved in health and thus consume less fish. In summary, this study demonstrated that different types of consumers in Belgium, Norway and Spain may chose farmed and wild fish based on their involvement in health issues and their attitudes towards fish consumption.

Healthy eating requires some complex choices, especially when it comes to seafood. However, the participants discussed the need for a balance between health, pleasure and convenience (paper II). Individuals with a low consumption of seafood from countries with traditionally high seafood consumption face barriers related to the price and quality of their traditional seafood products. It was suggested that promotional material would assist consumers in staying consistent with their intended food choice behaviours. The promotional material at the point of purchase should offer information on preparation methods. Eventually, this additional information will redirect consumers' attention to food choices which are based on their knowledge on health. Considering the increasing necessity for innovative seafood products that focus on healthiness, convenience, palatability and food preparation knowledge, an overall improvement in the image of seafood is required. In summary, the nine consumer values regarding seafood were: a) healthiness, b) satiation, c) convenience, d) visibility & trust, e) freedom of choice, f) successful preparation, g) image improvement, h) availability and i) price.

The knowledge on attitudes across age groups from paper I and nine consumer values from paper II were used to develop seafood product concepts for young adults that were then tested

(paper III). The results indicated that “thematic fillets” and “mixed bites” were liked more than “minced fish”. Further development and improvement of the seafood product concepts would increase the probability of success in the market. Although information availability was appreciated, it may lead to some aversion and decrease trust in the product, when this information is presented directly with the product as shown in paper III.

The results from the first three studies led to the second concept test which indicated the potential market success of an innovative seafood product concept (figure 5). This product concept was portions of cod and salmon with wild berries. The product concept was presented in a package with information about the Nordic origin, a recipe guide and a visual representation of the dish that can be prepared by using the ingredients. This innovative seafood product concept scored about as high as the very familiar traditional cod fillets product concept. This close evaluation indicated that the cod and salmon fillet portions with wild berries concept can be further developed into a successful product in the market which will eventually lead to an increase in fish consumption by young adults.



Figure 5. The product type and concept “Cod and salmon portions and wild berries” with information.

This product seems to fit perfectly to the consumer target groups and their values by means of variation of species, freedom of choice between species and its attractive, innovative image which is created by pure, fresh and traditional ingredients. This product with a recipe to assist

in preparation is expected to be rated high on trustworthiness, convenience and successful preparation.

The results discussed in this thesis (figure 6) and the accompanying papers show various new insights towards the understanding of young adults' preference for or avoidance of seafood. Additionally, these insights can further be used in the final development of new seafood products in order to fulfil the needs of young adult consumers. This knowledge can also be used to redirect existing products more precisely to the specific consumer group. When the needs of young adults are further understood and used into the development of new products, directed balanced communication about seafood can also be developed, taking into account the specific attitudes of young adults towards the consumption of fish and their low involvement in health. Once all these variables and insights are taken into account, final testing of the resulting concepts, including communication strategies, should be performed in order to increase the probability of an increase in seafood consumption by young adults.

Young Adults

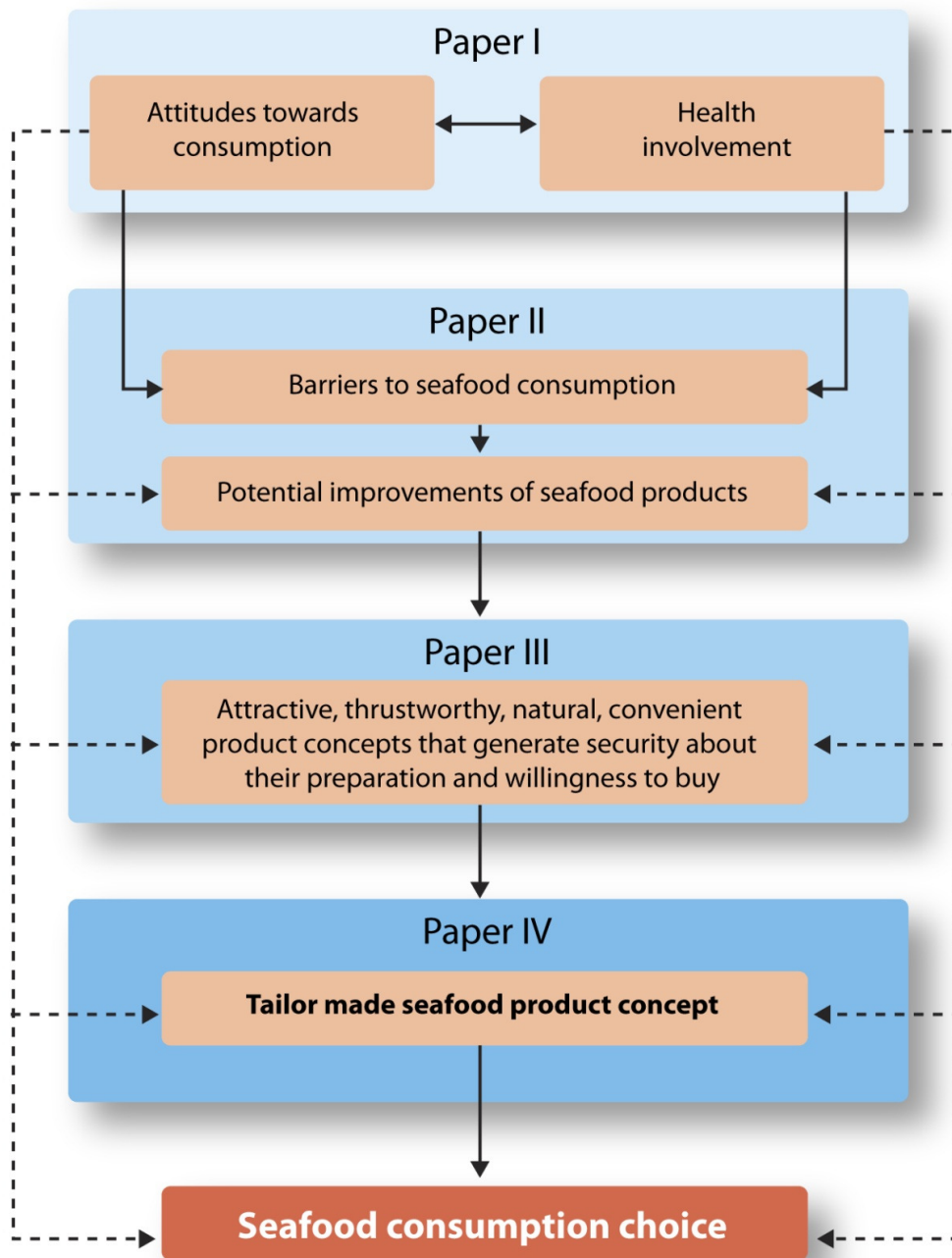


Figure 6. Summarised outcome of the thesis

5 Future prospects and suggestions

On an applied level, this research led to some suggestions for future seafood product development in order to approach young adults and increase the probability that they choose a healthy seafood meal. All of the information extracted from this research can be applied in order to retest seafood products (concepts) that will reflect what young consumers really need. Finally, cross cultural research would direct targeted seafood product development and increase the scope of the applicable results.

On a theoretical level, various new issues can be extracted from these results for use in further exploration and possible quantification. Promising areas for further research might be: a) past and habitual behaviour, b) the interaction between time perception and convenience, c) perception of safety and trust with respect to risk factors and transparent communication, d) the image of healthy products that are influencing health behaviour and finally e) the interaction between age and household size. Furthermore, the gap that is left from past psychological attitudinal models (e.g. Ajzen, 1991) could be the main focus of further research. In all three countries implicit factors like past experiences and situations where choices were made quickly appeared to have an impact on the present liking and consumption level of seafood. These behaviours might have been overlooked if the intention to behave in a socially desirable manner has not been explored. Further qualitative and quantitative exploration of the steps in food choice that are made between the intention to behave in one way and the actual behaviour studied in longitudinal intervention and observation based case-studies in real life settings is needed.

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Appendix

The questionnaire used in the study presented in paper IV

Please fill out the information below

Name	
Year of birth	
e-mail	

Gender	Female	Male
	<input type="checkbox"/>	<input type="checkbox"/>

Education level (last completed)	High school	Technical high school	Further technical education	Higher education	BSc	MSc or higher
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Education type (subject)	
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Household situation	Single living with parents	Single living alone	Couple without children	Couple with children at home	Single parent
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you consider/think about your consumption during the past months, how frequently did you eat...

	Never	1-6 times a year	Once a month	2-3 times a month	Every week	2 times a week	>2 times a week
...fish in general	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...fish as a main meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...fish as cold lunch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...fish as warm lunch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...fish as a snack	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

This page repeated 14 times in order to expose the participants to each of the 14 product concepts.

Here an image of the product concept was presented on the top of the screen and the 6 questions which are presented bellow were asked each time.

Please answer the following questions about the product

How appealing do you find this product?	Totally not appealing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Totally appealing
How natural do you find this product?	Totally not natural	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Totally natural
How trustworthy do you find this product?	Totally not trustworthy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Totally trustworthy
How convenient do you find this product?	Totally not convenient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Totally convenient
How sure do you feel with respect to preparing a meal using this product in a successful way?	Totally not sure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Totally sure
Would you buy this product, for yourself or for others?	Totally not	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Totally yes

Please rate your agreement or disagreement to the statements below

	totally disagree		Neither agree nor disagree			totally agree	
If I don't know what is in a food, I won't try it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that I need to improve my health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have the impression that I sacrifice a lot for my health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I try to avoid food products with additives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am constantly sampling new and different foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am not very occupied with my health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To me the naturalness of the food that I buy is not an important quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I consider myself very health conscious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I prefer meals that are quick to plan, buy (provide), prepare and cook	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I really don't think often about whether everything I do is healthy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is difficult to plan, provide, prepare and cook seafood for a meal (dinner)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't trust new foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that my health status is extremely good	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank you for your participation!

PAPER I

Altintzoglou T., Vanhonacker, F., Verbeke, W. & Luten J. (2010). Association of health involvement and attitudes towards eating fish on farmed and wild fish consumption in Belgium, Norway and Spain. *Aquaculture International*. Accepted with revisions.

PAPER II

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PAPER III

Altintzoglou T., Einarsdóttir G., Valsdóttir T., Schelvis R., Skåra T. & Luten J. (in press). A voice-of-consumer approach in development of new seafood product concepts. *Journal of Aquatic Food Product Technology*, in press.

PAPER IV

Altintzoglou T., Sveinsdottir K., Einarsdottir G., Schelvis R. & Luten J. (under review).
Evaluation of seafood product concepts by young adults and families with young children
from Denmark, Norway and Iceland. *Journal of Aquatic Food Product Technology*,
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