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Using a Choice Experiment with Insights from Laddering Technique
to Reveal Consumer Preferences
towards the Acceptance of Functional Foods

Michail BITZIOS

A thesis submitted for the degree of Ph.D. in
Agri-Environmental Economics at the University of Kent

January 2011

UE 5



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Declaration

I hereby certify that this thesis has been realised under normal supervision and all sources used have been acknowledged.

I declare that this work has not already been accepted in substance, nor is it currently being submitted in candidature for any other degree.

Michail Bitzios

December 2010

ABSTRACT

This research brings together, into one powerful analytical tool, two methodologies, Laddering Technique (L.T.) and Choice Experiment (C.E.), which complement each other nicely, in an attempt to examine consumers buying motives in relation to bread.

The incentive to explore consumers' "black box" was given by the fact that changes in relation to nutritional issues have become apparent. The case of bread, particularly, attracts the attention of research as a product widely consumed that, however, has not been given much attention by researchers.

L.T. approaches the subject from the psychological point of view and explores how people relate products with their personal values. L.T. was implemented so as to gain richer understanding as to how people translate product's characteristics into indicative connotation with respect to themselves. It has also created the basis for the second part of research by informing the attributes used in the C.E. The data was generated with the use of questionnaire that was completed by a small sample of individuals. The results revealed that bread type and the perceived bread healthiness are among the most important aspects consumers consider when buying bread.

C.E. was used to examine how the inclusion of a functional ingredient affects consumer attitudes towards bread. An important feature of the C.E. design was the inclusion of the Dutch Eating Behavioural Questionnaire (D.E.B.Q.) to collect information on participants underlying eating behaviours. The survey instrument employed a single postal mail shot. The results showed – again - that bread type is a major factor in determining choice and that the inclusion of a functional ingredient returned relatively small measures of value. The estimation of a Latent Class Model (L.C.M.) revealed differences in W.T.P. between segments. Also, segment membership can be partly explained by the D.E.B.Q. Finally, an important finding is that respondents hold a stronger preference for a simple health statement compared or in addition to the benefits resulting from consuming a product that includes functional ingredients.

ACKNOWLEDGEMENTS

Ph.D., apart from a voyage of acquiring knowledge, is an internal process of discovering yourself. You work on your own but also as part of a team, you learn to act and react during various circumstances, you understand mistakes, improve your efforts as well as characteristics of your personality.

Throughout my Ph.D. journey, I got help and support by various people. Without the intention of forgetting someone outside this important for me circle, I will pay my appreciation to those I am the most indebted.

I could not start with anyone else other than my two co-supervisors, to whom I want I wish to express my sincere appreciation. Dr. Janet Haddock-Fraser has advised and directed me, especially in the early stages of my research during which I was trying to build my conceptual framework. She has greatly helped me in developing further my ideas. Dr. Iain Fraser generously offered me his experience and expertise to help me design my Choice Experiment survey and guided me in estimating the various models during my analysis. I am grateful to him for one more reason as he granted me a two-year scholarship to support the continuation of my studies. I want to thank both of them for their patience and kindness all these years and for putting up with me while writing this thesis. Their incisiveness and meticulousness has made a big difference and spared me many errors. Needless to say that any faults that remain are entirely my own.

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Special thanks to a great group of friends (Adel, Nikos, Pavlos, Luca, Lazaros and many others) I made in Canterbury that helped me adapt easier to the change in the environment between Wye and Canterbury and made my hard time there more fun. Our dinners/breakfasts and hilarious conversations will forever be remembered! I am also grateful to my friend Paraskevi for her advices on various issues. To all of you, guys, a big thank you. Your friendship and support will never be forgotten and the great times we had will always be precious memories.

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Dedication...

To my parents Panagiotis and Paraskevi and to my sister Despina, for their unconditional love, for being supportive in all stages of my life and for always being there for me...

To all of my teachers and professors by whom I got educated and gained a lot all these years, but particularly to my first teacher Konstantinos Kladas

Σα βγεις στον πηγαιμό για την Ιθάκη,
να εύχεται νά 'ναι μακρύς ο δρόμος,
γεμάτος περιπέτειες, γεμάτος γνώσεις...

Πάντα στον νου σου νά 'χεις την Ιθάκη.
Το φθάσιμον εκεί είν' ο προορισμός σου.
Αλλά μη βιάζεις το ταξίδι διόλου.
Καλύτερα χρόνια πολλά να διαρκέσει·
και γέρος πια ν' αράξεις στο νησί,
πλούσιος με όσα κέρδισες στον δρόμο,
μη προσδοκώντας πλούτη να σε δώσει η Ιθάκη...

Η Ιθάκη σ' έδωσε τ' ωραίο ταξίδι.
Χωρίς αυτήν δεν θα 'βγαινες στον δρόμο...

Κωνσταντίνος Καβάφης
(Στίχοι από την «Ιθάκη»)

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LIST OF ABBREVIATIONS

A.I.C.	Akaike Information Criterion
A.P.T.	Association Pattern Technique
A.S.C.	Alternative Specific Constant
B.I.C.	Bayesian Information Criterion
B.S.E.	Bovine Spongiform Encephalopathy
C.A.G.R.	Compound Annual Growth Rate
C.E.	Choice Experiment
C.L.	Conditional Logit
C.L.A.	Conjugated Linoleic Acid
C.M.	Choice Modelling
C.R.	Contingent Ranking
C.V.	Contingent Valuation
D.C.M.	Discrete Choice Modelling
D.E.B.Q.	Dutch Eating Behaviour Questionnaire
E.F.S.A.	European Foods Safety Authority
E.P.I.	Ethical Purchasing Index
E.U.	European Union
F.A.O.	Food and Agriculture Organisation
F.D.A.	Food and Drug Administration
FO.S.H.U.	Foods for Specified Health Use
FU.FO.S.E.	Functional Food Science in Europe
G.M.O.	Genetically Modified Organisms
H.V.M.	Hierarchical Value Map
I.F.I.C.	International Food Information Council
I.I.A.	Independence from Irrelevant Alternatives
I.L.S.I.	International Life Sciences Institute
iid	Independently and Identically Distributed
J.H.C.I.	Joint Health Claim Initiative

L.C.M.	Latent Class Model
L.F.R.A.	Leatherhead Food Research Association
L.O.V.	List of Values
LCM	Latent Class Model
M.E.C.	Means-End Chain
M.N.L.	Multinomial Logit
M.R.S.	Marginal Rate of Substitution
M.L.	Mixed Logit
N.C.C.	National Consumer Council
N.L.E.A.	Nutrition Labelling and Education Act
R&D	Research and Development
R.P.L.	Random Parameter Logit
R.U.T.	Random Utility Theory
S.C.	Stated Choice
S.C.M.	Stated Choice Methods
S.I.M.	Summary Implication Matrix
S.P.	Stated Preference
S.P.M.	Stated Preference Methods
S.P.S.S.	Statistical Package for Social Sciences
T.P.B.	Theory of Planned Behaviour
T.R.A.	Theory of Reasoned Action
U.K.	United Kingdom
U.S.	United States (of America)
U.S.A.	United States of America
W.H.O.	World Health Organisation
W.T.A.	Willingness-To-Accept
W.T.P.	Willingness-To-Pay

CHAPTER 1

INTRODUCTION

This thesis will examine consumers' attitudes and perceptions towards the acceptance of functional foods. The key question being addressed in this thesis is how U.K. consumers perceive bread with functional properties. The motivation for the research can be traced to the fact that there is an escalating need and willingness for multiple segments of the society to modify their diets so as to avoid some of the increasingly undesirable health issues that result from poor eating. The food product, which this research will focus on, is bread. The selection of bread as the vehicle product of this study has been made simply because it is a staple food product which almost all members of the general public consume on a regular or semi-regular basis. It is also a food product which the food industry has been making significant efforts to include various healthy ingredients to, in an attempt to provide an ever expanding range of healthy options.

This first chapter of the thesis will identify the rationale and motivation for conducting this research as well as the objectives of the study. Also, the contribution of this research is clearly set forth. At the end of this chapter the structure and outline of this thesis will be presented.

1.1 Introduction and justification of research

During the last decades, a change has been noticed with reference to nutritional issues. The period that followed the shortage of food and the resulting poor nutrition, a few years after the end of World War II, was displaced by the abundance of goods. Consequently, one would expect better nutritional habits. However, not all choices made by consumers were healthy. In recent years, more and more people have become interested in the state of their health as well as the reflection of their image in the society. This statement is supported

by research undertaken by International Food Information Council (I.F.I.C.) in 2005. Many consumers have sought ways to improve their eating habits and make rational as well as wholesome food choices. This suggests that they have better understood the magnitude of the relationship between health and dietary choices.

Over the past few years food and health issues have been the centre of attention in the developed as well as in the developing world. Research activity has focused on diet-related diseases (Charalampopoulos et al., 2002, Hill & Peters, 2002, Roberfroid, M. B., 1999), such as heart disease, obesity and certain types of cancer and diabetes, resulting in a big debate with contradicting opinions. The amount of fat, sugars, salt and various other nutrients contained in every product as well as their role in the cause or prevention of diseases have been the centre of public discussions (Heasman & Mellentin, 2001). The food industry, nevertheless, has not adopted a uniform response. The part of it that was affected by public health advice claimed that there is no good or bad food and that everything depends on the diet followed. It was clear that this statement placed the responsibility on the shoulders of individuals. A different approach chosen by others in the industry was to comply with the changes and create a new market for those products that could potentially deliver health benefits (Heasman & Mellentin, 2001).

Despite the insignificant initial response of industry to functional foods, in late 1990s, the sector accepted the concept of foods with health properties, since a lot of benefits were accompanying this category of products.

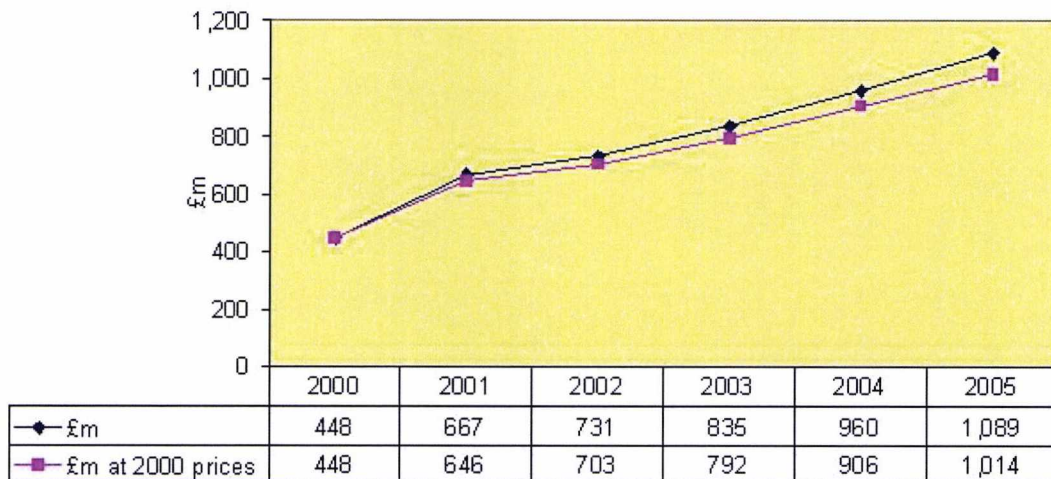
Due to advances in food technology and nutritional sciences, many new food products have been developed and have entered the market implying to be healthier and more helpful, that is providing health benefits and the potential to reduce the risk of diseases compared to conventional products. These new food product developments have been introduced as *functional foods* or *nutraceuticals* (Childs & Poryzees, 1998). As Unnevehr and Hasler (2000)

report, results from epidemiological studies have proved that people whose diet is rich in grains, legumes, fruits, and vegetables have reduced numbers of cancer. The naturally occurring lycopene in tomatoes is a component (phytochemical), which act as an antioxidant and has been shown to have increased effectiveness in reducing the risk of prostate cancer (Giovannucci, 1999). Research has also identified foods with health promoting properties that lessen the risk of cardiovascular disease. Renaud and De Lorgeril (1992) observed a structure by which a component in red wine reduces hardening of the arteries. Another example of a food product that delivers health benefits is the cranberry juice, which reduces the incidence of urinary tract infections (Avorn et al., 1994). Additionally, several studies have identified the role of soy protein in reducing blood cholesterol (Anderson, Johnstone & Cook-Newell, 1995). However, consumers have not accepted them to the degree that was expected. There is evidence that consumers are likely to differ in the extent to which they would buy food products with functional properties (Frewer, Lynn, Scholderer & Lambert, 2003). It is assumed that the public will be more accepting to novel foods – and therefore to functional foods too – if there is a concrete and tangible benefit for the consumer (Frewer, L. et al., 1998). Thus, the perception of potential advantages could countervail the perception of risks affiliated with new technologies as well as the perception of the unknown, since the benefit from the consumption cannot be experienced immediately (Deliza, Rosenthal & Silva, 2003). Thereupon, this information could prove more effective if conveyed by means of communication other than the product per se (Frewer, L. et al., 1998). Furthermore, Verbeke (2005) reported that knowledge and belief in the health benefit delivered by functional foods offsets the role of socio-demographics and are likely to determine their acceptance.

The idea of functional foods emerged in 1980s, when the Japanese invented the term “functional food” and promoted research on this area. In 1990, the concept of functional foods is introduced in Europe and during the early stages of the decade it spread in the food industry. Nowadays, the concept of functional foods

is growing rapidly, widely and globally and many products can be found on supermarkets' shelves alleging to offer health benefits. Weststrate (2002) argues that the functional food market is very large, that is estimated at around €95 billion for the year 2000. The growth rate of products such as those claiming to be "good for you" is unprecedented. Sales of functional food and drinks continue to grow strongly. Since 2000, as can be seen in Figure 1.1, sales have increased by 143% to reach almost £1.1 billion in 2005, with an average annual growth rate of around 13%.

Figure 1.1. Estimated UK retail sales of functional food and drink products, 2000-2005



Source: Mintel, (2006)

Another source, Euromonitor (2003) reports that despite the steady or decreasing percentage of annual growth for functional foods, the per capita expenditure for such product is continuously increasing, as it appears in table 1.1, indicating the growing consumer awareness of the link between diet and health and high disposable income.

The future of the food will increasingly be about how it affects our health and well-being and the sorts of products and ingredients that will deliver such health benefits. Functional foods science aims at sustaining or enhancing health and generating the conditions for shrinking the risk of disease. It offers the chance to

people to improve their vigour and potentially gain health benefits by consuming functional foods, as part of a balanced diet.

Table 1.1. Total market value sales 1998 – 2008

Year	Market size	% annual growth	£ per capita
1998	733.6		12.4
1999	899.2	22.6	15.2
2000	1,069.80	19	18
2001	1,305.60	22	21.9
2002	1,474.30	12.9	24.7
2003	1,628.30	10.4	27.3
2004	1,743.60	7.1	29.1
2005	1,879.80	7.8	31.4
2006	2,008.30	6.8	33.4
2007	2,123.10	5.7	35.3
2008	2,245.60	5.8	37.2

Source: Euromonitor, (2003)

Functional foods, however, comprise a very controversial area of research. This is because it is claimed by food producers that this category of foods has the ability to prevent or even treat a disease. However, some authors argue that the role of functional food products is to reduce rather than prevent/treat a disease and therefore products with therapeutic properties should not be included in the list (Roberfroid, M., 2000). The difference between disease prevention and reduction is not clear and one can allege that this is due to regulatory issues rather than the functional ingredients or the resulting health benefits themselves (Frewer, Lynn, Scholderer & Lambert, 2003). Thereby functional foods step on two different fields: that of food manufacturing and that of drug development (Heasman & Mellentin, 2001).

In the literature, it has been found that individuals are willing to pay for health benefits delivered by food products in general (Maynard & Franklin, 2003, Poulsen, J. B., 1999). However, de Jong et al. (2003) stress that the acceptance of functional foods in relation to people's demographic and attitude characteristics depends on the product that conveys the benefit. This means

that a certain product with a specific health benefit could be accepted by consumers, while an alternative product with the same health benefit may not enjoy similar success. Moreover, it is not explicit whether single or multiple health benefits affect the choice of consumers and whether sensory attributes have any contribution on affecting buying behaviour (Teratanavat & Hooker, 2006). In other words, it is not clear whether quality characteristics of the product in question as well as the conveyance of more than one health benefits affect the purchase intentions of the public.

1.2 Vehicle product of the research

Bread was used as the vehicle–product for this research. Bread is a product that has not been explored in depth by applied social scientists. There are only few attempts to study bread (Hu, Adamowicz & Veeman, 2006, Hu et al., 2004) in relation to the attitudes and perceptions held by consumers and its acceptability by the public, based on a number of attributes it conveys.

It is selected to be the research product for the experiment on the grounds that it is consumed in most of the U.K.'s households (according to the Flour Advisory Bureau, bread is bought by 99% of British households, and nearly 12 million loaves are sold each day, based on 2004 data (<http://www.fabflour.co.uk>). Therefore, it is anticipated that the level of preconceived notion due to unfamiliarity of the product will not be high. What is more, Hu et al. (2004) mention that bread is a product consumed on an everyday basis. This means that there exists a degree of familiarity with the product and, therefore, could be assumed that consumers will be more thoughtful before they provide their responses than in the case of another product.

It is important to note that this thesis has been produced as a result of a research, which was part of the SLOWCARB project under the Home Grown

Cereals Authority (H.G.C.A.). The project was collaboration between the academic community and leading companies from the food sector. SLOWCARB project's aim was to develop and investigate the health benefits, consumer acceptability and market potential of a range of cereal based products rich in slowly absorbed carbohydrate. More specifically, a) to look at customer understanding and communication of health messages related to slowly absorbed carbohydrates acceptability and b) to investigate models of estimating market potential of newly developed cereal products.

Various partners participated in the project and contributed in different ways. They provided highly valuable suggestions during the construction of the questionnaires as well as very useful feedback when the latter were tested.

1.3 Aims and objectives of the research

The main goal of this research is to examine consumers' preferences and discover the factors that influence the buying of bread with health promoting properties. Thus, the major objectives of the research are:

- (i) to explore U.K. consumers' perceptions of bread with functional properties;
- (ii) to investigate the values consumers place on different functional foods' attributes;
- (iii) how these product attributes are related to individual's values; and
- (iv) how these values can be utilized to elucidate the willingness to pay for functional foods. In addition, the research assesses the impact of consumers' attitudes toward the purchase of bread with functional properties.

The methodological framework for this research uses an economic choice model powered by insights from behavioural research. A qualitative, in essence, approach called the Means-End Chain (M.E.C.) model is employed in the first

part of the research to provide us with understanding on how people make bread choices. In the second part of the research, a large-scale choice experiment was conducted at a national level. This allowed a comparison between the bread characteristics taken into account by individuals and evaluation of the importance assigned to each of them.

The methodologies employed in this research constitute two distinct but interrelated methodologies. As a result the objectives of this thesis are divided into sub-objectives of these methodologies. As Grunert and Grunert (1995) claim, M.E.C. can potentially serve two types of methodological objectives: a) the motivational-type objective is to obtain insight into consumer buying motives, namely the way basic motives are linked to bread shopping behaviour, b) the cognitive-type objective is to identify the consumers' cognitive structures of bread purchasing behaviour, namely the way any information and bread consumption knowledge is stored in consumers' mind. A hierarchical model will be unfolded, in which perceptual orientations that belong in different levels of abstraction are interconnected in networks. It is presumed that behavioural motivation is acquired connecting cognitive nodes associated with concrete products with cognitive nodes of higher more abstract level, such as personal values. M.E.C. analysis has been widely employed to examine how food quality affects consumer food choice (Barrena & Sánchez, 2009, Boecker, Hartl & Nocella, 2008, Lind, 2007, Chema et al., 2006, Costa, Dekker & Jongen, 2004).

The application of Choice Modelling (C.M.) is used for the prediction of consumer choice and the identification of preferences. It is a technique that has gained increasing popularity across a range of disciplines. For example, James and Burton (2003) used the method to examine under which conditions Australian consumers would be willing to pay for food produced from genetically modified organisms. Similarly, Burton and Pearse (2002) applied a Choice Experiment (C.E.) to identify consumer preferences for various types of genetic modification in beer. Teratanavat and Hooker (2006) examined consumer valuations of a number of attributes of an example of functional food. In the

same line, Balcombe et al.(2010) investigated consumers' response to the U.K. nutritional food label traffic light system.

In this context, it is employed to achieve the following objectives: a) examine (i) consumer valuation of various product attributes, and (ii) the effect of individual characteristics on people's purchase decisions by placing monetary values on the attribute and b) the calculation of the Marginal Rate of Substitution (M.R.S.) between attributes, providing information on the relative importance/value placed on specific attributes of the product examined.

The research presented in this thesis brings together these two distinct methodologies into one powerful analytical tool, which can provide the researcher with valuable information on consumer issues by trying to decode people's profound ways of making choices. Consequently, in this research we will try to answer the following key questions:

- What are the bread attributes that potential consumers value the most? Alternatively, which of the various attributes of bread are perceived to provide healthiness and as a result are valued by consumers?
- Do health promoting attributes yield positive willingness-to-pay (W.T.P.) estimates?
- Do we expect to find that preference heterogeneity exists in the population and does this reflect different preferences among consumers to pay a premium for health benefits from the consumption of bread with functional properties?
- It is expected that there will be a number of consumer types in the population with different preferences toward bread and health claims. Is this heterogeneity caused by different prioritizations of concerns resulting from the different attribute levels?

1.4 Contribution and novelty of the research

In order to examine consumer attitudes towards functional ingredients, a new mixed approach is proposed. It is important to stress the process which will be followed to get there.

A new two-stage, dual-mode, process is employed. First we use Laddering interviews and M.E.C. analysis to reveal key attributes consumers attach to bread. The use of M.E.C. analysis in understanding consumer choice in relation to food is well established in the literature (eg, (Barrena & Sánchez, 2009, Boecker, Hartl & Nocella, 2008, Chema et al., 2006, Grunert, K. G., 1995). M.E.C. is a research method used to reveal how consumers value product characteristics with regard to the motivation to buy a specific product, based on personal construct theory. This is done by linking product characteristics with the consequences they deliver and the latter with personal values that motivate a purchase decision. Second, many of the attributes revealed by the M.E.C. analysis are employed in a C.E. to examine how consumers trade-off attributes of bread when making a purchase. Our CE adds to the literature examining consumer choice in relation to food, nutrition, health labels and product selection, by the mixture of attributes employed (eg, (Balcombe, Fraser & di Falco, 2010, Teratanavat & Hooker, 2006, Hu et al., 2004).

The dual-mode approach presented in this thesis has enabled a C.E. to be developed which is informed by insights from behavioural research. Usually, focus groups would be used to develop a set attributes for C.E. However, the use of the M.E.C. analysis and specifically the use of Laddering interviews enabled us to develop a better understanding of motivations underlying attribute selection. Laddering interviews provide a robust research method to link actual product attributes with perceived consequences that result from the consumption of the product. This approach allows us understand whether or not it is simply the attributes of a product or deeper consumer motives and values that drive choice. Thus, the adoption of M.E.C. analysis provides a more

structured approach than focus groups to the identification of attributes to be employed in the C.E. As a result of this dual-mode approach, this research provides an extension to the typical CE approach of employing focus groups to reveal key attributes.

An additional contribution of this thesis is the inclusion in our CE survey instrument of the Dutch Eating Behaviour Questionnaire (D.E.B.Q.). The D.E.B.Q. allows us to collect information on all participants underlying eating behaviours. Given the focus of the C.E. is food consumption, the D.E.B.Q. is considered to be an important design feature to understand underlying respondent eating habits.

Finally, in terms of the C.E. we examine how health messages in combination with the inclusion of a functional ingredient influence consumer preferences. The reason for adopting this approach is so that we can better understand the relationship between the health benefits of a product generally defined, as opposed to the implied benefits that are derived from the inclusion of functional ingredients. This enables the researcher to understand the importance consumers attach to particular messages about the product.

1.5 Thesis Outline

This section summarizes the structure of the present research. The thesis is set out in six chapters.

Chapter 2 presents the concept of functional foods, providing definitions and explaining in more detail the reasons which contributed to the expansion of functional foods development. It presents the current situation in the functional food market and gives information for the functional bakery sector. It also examines the issue of health claims and the regulatory framework upon which

these are based and support functional foods. Furthermore, this chapter discusses theories of consumer behaviour and provides an overview of concepts related to bread and the determining factors that could potentially affect its acceptance by consumers, as they were identified in the literature. Also, issues related to risks and ethical concerns associated with functional foods will be considered.

In Chapter 3 the author presents the conceptual framework of the research and highlights how the two methodologies will be linked. This will be informed by the existing literature and how this relates to the issue of functional food and bread.

Chapter 4 presents the M.E.C. model and the supporting theory as well as previous applications of the model on food-related topics and on different areas of research. This chapter will explain the purpose of M.E.C. in addition to describing the key features of the research method. Then the way the M.E.C. approach was applied in the current study through its operational technique, Laddering, is explained. The author describes in detail the design of the method and finally the findings from the implementation of the technique are presented.

Chapter 5 will present the C.E. that has been used in the second part of the research. Previous applications of this method on several different subjects will be expounded and their important remarks will be noted.

The C.E. conducted in this thesis is described in detail. The author begins by describing the development of the survey instrument and how it was designed. Later, how the survey instrument was distributed is explained. Before the econometric analysis of the data is carried out, an overview of the sample data is provided. Then the results are presented. The main focus of the results will be on how consumers have reacted to the various health claims and the inclusion of a functional food attribute in the C.E.

Finally, Chapter 6 will draw all our findings together and summarise how they provide important insights into the role of bread in the delivery of healthy functional food. In addition, the limitations of the research are indicated and issues that need further examination in the future are suggested.

CHAPTER 2

DEFINITION AND EXPLORATION OF ISSUES RELATED TO FUNCTIONAL FOODS

The health-promoting or risk-disease-reduction effects delivered by foods represent the “top trend” of the food industry and suggest that nutritional issues is one of the major concerns in today’s societies.

Functional foods constitute a relatively new category of food products, which claim to be able to deliver remarkable health benefits, such as lowering cholesterol levels, reducing the risk of heart disease, reducing the risk of certain types of cancer etc. There are many classes of functional foods and people have difficulties in understanding what exactly the term means. To this end, supportive is the fact that there is no internationally agreed definition for functional foods.

In this chapter, the author documents what functional food is and explains why the subject has gained immense importance internationally in a relatively short period of time. Legal issues related to health claims made by such products are discussed. We provide examples of functional foods and present the situation in the market. At the later part of the chapter issues related to public’s attitudes and perceptions to functional foods are reviewed.

2.1 The concept of functional foods - Definitions

The concept of functional foods emerged in Japan in the 1980s (Hilliam, 1998). However, they have a long history. In the eastern world, in countries like China, Japan and other Asian countries, many types of foods have traditionally been associated with health benefits. Such an example is tea. Tea may protect against cancer and cardiovascular disease, as well as against decay (Wu & Wei, 2002). Also, it has been found that there is a link between high intakes of green

tea and decreased recurrence of stage I and II breast cancer in Japanese women (Schafer & Nelson, 2000). Even in western societies, a brand which is globally recognisable, Coca-Cola, was introduced as a functional food at the beginning of the twentieth century (Weststrate, van Poppel & Verschuren, 2002). Tim Harford (2007) states that *“it was first taxed as a medicine”*.

Functional foods can be described as a new class of foods offering a wide range of defined health benefits. In figure 2.1, a view of food product categories and where each of them lies relative to each other in terms of wholesomeness. Functional foods sit in the gap between healthy food and medicine. The distinction made between healthy and functional foods is that producers of the former class promote their products as being beneficial to the general state of health, while manufacturers of the latter class market their products as having an influence on a specific function of the human body (Jonas & Beckmann, 1998). Consequently, they can be helpful for the cure or prevention of particular diseases.

There is no universally accepted definition for functional foods, with definitions varying from country to country or even from company to company (Arvanitoyannis & Van Houwelingen-Koukaliaroglou, 2005). This is probably because functional foods are regarded as more of a concept rather than a distinct food product category. Several definitions have emerged ranging from simple to rather more complicated ones that have been associated with these food products and these are explored below.

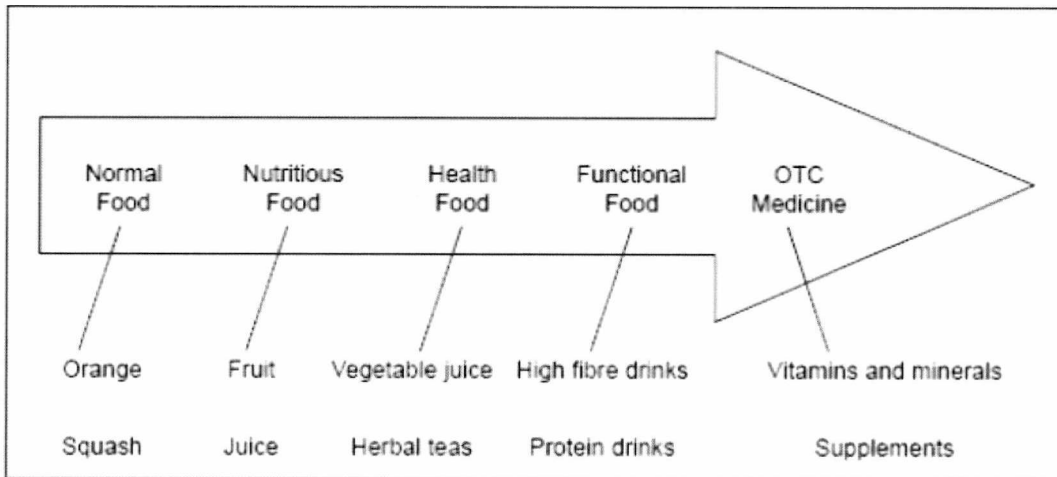
Lake (1990) and Potter (1991) provided early, broad definitions for functional foods. According to these sources, described as follows by Jonas and Beckmann (1998) functional foods can be regarded as:

- “foods in solid form (i.e. neither tablets nor powder) generated from “naturally occurring” ingredients,

- foods with “naturally occurring” substances from plants or animals – possibly in an “unnatural” concentration (e.g., reduced-fat dairy products) or in foods that do not naturally contain these substances (e.g., butter fortified with fish oil or yoghurt fortified with live cultures),
- non-health hazardous foods that are to be eaten as part of the daily diet,
- foods that stimulate body functions (e.g., strengthening the immune system, preventing particular diseases)”.

On the contrary to the above mentioned definition for functional foods, in Japan since 2001, functional foods can also take the form of capsules and tablets. However, the great majority of products remain in the conventional form (Ohama, Ikeda & Moriyama, 2006).

Figure 2.1. What are functional foods?



Source: (Jonas & Beckmann, 1998)

A definition provided by Diplock et al. (2000) describes functional foods as

“food products that are satisfactorily demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either an improved state of health and

well-being and/or reduction of risk of disease” (Diplock et al., 2000)(p. S6).

Researchers in Japan, where functional foods first emerged as a concept, attempted to define functional food as a product that has three functions. Specifically,

“functional food is the food product that has physiological functions (tertiary function), such as regulation of biorhythms, the immune system, the nervous system and body defence, beyond the nutrient and sensory functions (primary and secondary)” (Shimizu, 2003) (p.242).

Several other definitions are provided by Roberfroid (2000). One that is simple and descriptive, which is also in line with Clydesdale (1997) is the following:

“Functional food is food similar in appearance to conventional food that is intended to be consumed as part of a normal diet, but has been modified to subserve physiological roles beyond the provision of simple nutrient requirements”.

Having presented some of the typical types of definitions used for functional foods, we need to clarify that the definitions for functional foods embrace any food product which has been enriched with minerals, antioxidants and vitamins or any other biologically active component. They do not include, however, any dietary supplements in the form of tablets and powders (Jonas & Beckmann, 1998). These are typically classified as medicine. Moreover, functional foods should offer the potential of enhanced health or reduced risk of disease.

A new term named “nutraceuticals” was originally launched by DeFelice (1991) and was defined as

“any substance that may be considered a food or part of a food, which provides medical or health benefits, including the prevention and treatment of disease” (Childs & Poryzees, 1998) (p. 419).

Nutraceuticals is a term derived from the combination of the words “nutrient” and “pharmaceuticals”. The intended meaning of the word is self-evident, although different categories are in each of the separate words. According to Brown (2009) that clarifies the difference between nutraceuticals and functional foods, the term “nutraceuticals” is broader than functional foods (Castellini, Canavari & Pirazzoli, 2002) and it encompasses food products that cannot be included in the latter category, such as dietary supplements. The scope of nutraceuticals is notably different to that of functional foods. While nutraceuticals are associated with the prevention and treatment of disease – which implies medical claims – functional foods are only linked with the prevention of disease (Arvanitoyannis & Van Houwelingen-Koukaliaroglou, 2005). In addition to the last statement, functional foods are in the form of common food (as indicated by the definitions provided earlier) as opposed to nutraceuticals, which come in different forms, such as tablets.

In an attempt to bridge all these definitions, so as to have a better understanding of what functional food is, the following observations can be put together:

- a) Functional food is in the form of conventional food, neither tablet nor powder.
- b) Functional food is consumed as part of a normal, balanced diet.
- c) Functional food stimulates body functions, promotes health and reduces the risk of diseases, beyond just simply supplying food nutrients.
- d) Functional foods need to present evidence of the actual benefits, which they claim they provide.
- e) Functional foods differ from nutraceuticals.

It is obvious that defining the functional food concept could be endless. The number of definitions presented in this document, prove exactly the fact that the scientific community has not come to an international agreement as to what are the decisive factors for a food to be characterised functional. However, it has to

be pointed out that, in principle, there exist accordance in various issues. That is, functional foods are products similar to the conventional ones that can offer health benefits if they are consumed as part of a normal diet. Therefore, these products have more functions that just serving as product that satisfies the basic nutritional need. However, functional foods have to demonstrate their positive health effects in amounts that can be consumed during a normal diet. Therefore and for the purposes of this research the definition proposed by Diplock et al. (2000) will be adopted.

Despite the different definitions for functional foods, those that have been mentioned in this thesis and those that have been used elsewhere, it is still difficult to conclude what constitutes functional food and what products fall under this category. However, there is a question that still remains: are functional foods healthy foods?

The answer to such a question is neither easy to be given nor can it be answered simply with “yes” or “no”. Functional foods comprise a special case of food products, as they have introduced themselves to the public, as products that could potentially deliver health benefits but that nevertheless carry with them uncertainties and risks. In general, one can say that healthy food is any product that is good for the general state of one’s health. Functional food, on the other hand, can be any product, that as part of balanced diet, promote health and help reduce the risk of certain diseases.

Consumers nowadays are more aware of the relation between health and diet, compared to the past decades and cognisant of the risks associated with the use of modern technologies in the food sector, such as biotechnology. These technologies are also used for the production of functional foods and this could explain the scepticism of the public towards functional foods healthiness and safety. Consequently, the public still holds concerns regarding the wholesomeness of functional foods, as they constitute a relatively new area of

research, which might have adverse effects that are still to be discovered. In a research conducted in Finland, Niva (2007) maintained that there was a unanimous view of the participants that by sustaining a good diet does not imply a guaranteed good state of health. Other things, such as tradition, cultural and social conditions were identified as playing an important role in one's health.

2.2 Types of functional foods

The number of functional foods that can be found in the marketplace is large and it includes natural foods, foods with added functional components extracted from natural foods, packaged dietary supplements containing these extracted components and foods that contain functional components produced with the use of biotechnology. We report below some examples of the types of functional food products that consumers can buy in the market. Yoghurt and other dairy products, cereals, energy drinks and margarines are among those products most frequently bought.

In an attempt to categorise the foods of this relatively new class of products, one can employ three different ways of categorisation. Based on work published by I.F.I.C. (2006), this can be done as follows: The first way is based on the type of product. The example stated earlier represents how these products are classified. A second way of categorising functional foods is according to the ingredient responsible for making the product functional. Finally, the third way of categorising functional foods is according to the potential health benefit claimed to be delivered by the product. In table 2.1, examples of the different categories of foods, indicating the functional component, the source it can be found as well as the potential health benefit can be viewed.

Table 2.1. Categories of functional foods

Category	Source	Functional component	Potential benefit/target function
Natural foods	Carrot	β-carotene	neutralizes free radicals which may damage cells; bolsters cellular antioxidant defenses
	Fish oil, walnuts	Omega-3	Maintain heart health and may reduce risk of heart disease
Processed foods	Yoghurt	Probiotics and prebiotics	May improve gastrointestinal function
	Table spreads	Added stanols and sterols	May reduce cholesterol levels and so reduce risk of heart disease
Food enhanced to have more of the functional component	Tomatoes	Lycopene	may contribute to maintenance of prostate health

Source: Adopted from I.F.I.C. (2006)

2.3 Why functional foods are becoming a trend?

Functional foods have been identified as major growth area for the food industry during the last years (Verbeke, 2005). Childs and Poryzees (1998), Sunley (2000) and Lennie (2001) have reported corresponding examples of strategic and operational efforts by food and biotechnology companies. More specifically, it was found that the vast majority of those companies were conducting research on functional foods. Additionally, a great number of companies were forming alliances so as to further develop the products and better place them in the market.

Korthals (2002) noted that this relatively new food product category appeals not only to manufacturers, since it promises market benefits, but also to consumers since it implies health benefits and to researchers because it enables the application of research for social good.

Although there is no standard or official definition for the concept of functional foods, the interest in this relatively new category of products is high. The

reasons explaining functional foods' expansion, according to Heasman and Mellentin (2001), Benkouider (2004) and Sandler (2005) can be summarised below:

- 1) They provide a large-scale health vision for the developed and developing world (Heasman & Mellentin, 2001).
- 2) They accommodate busy lifestyles with poor choices of convenience foods and insufficient exercise which has led to deterioration of personal health (Benkouider, 2004).
- 3) Changes in regulatory environment. In the case of Japan and the U.S.A., food companies, which provide a fair amount of evidence that their products provide specific health benefits, will be permitted to put such claims on the products. However, it is contemplated that the performance of functional foods in Europe will be dependent on the regulatory bodies, as they become stricter on the claims permitted for food products (Sandler, 2005).
- 4) There is a noted increased incidence of self-medication, because of the reduced level of healthcare expenditure. This has resulted in increased personal responsibility for healthcare (Benkouider, 2004).
- 5) In addition there is an increased level of information about nutrition from health authorities and media. This has created a more educated consumer that understands the importance of the problem (Benkouider, 2004). This, however, at the same time has created a great deal of confusion to the consumer, who sometimes is not able to recognize the concept of functional foods, due to the complexity of messages.
- 6) Due to the growing understanding of the link between dietary constituents & physiological processes (health), consumers' attitudes and expectations changed. The result of this was that buyers started looking for healthier versions of their favourite products.
- 7) There have been many scientific developments in nutrition research, leading to a number of discoveries of ingredients with health improving

properties, which could be incorporated into foods (Benkouider, 2004). It is clear, therefore that the key for the success of functional foods, namely their acceptance by the target population, is the continuation of research for the identification of certain components that have an impact on health biomarkers in combination with research that evaluates consumers' willingness to accept these products that provide health benefits.

- 8) Shareholder imperatives drive corporate ambition in functional foods. In highly competitive food markets with tight margins and slow-growing food sales – but shareholder demands for profit growth – functional foods are seen as a way to achieve added-value growth and profitability. Food manufacturers have been focusing on added-value products so as to improve profit margins and as a means of differentiation. They have emphasized on products with superior quality and taste, premium flavours, portability and convenience. (Heasman & Mellentin, 2001).
- 9) Joint ventures for branding purposes. This means that branding of ingredients is very important – particularly for small scale producers that lack expertise in research and development (R&D). It could act as product differentiator and help manufacturers to gain credibility easier, as confused or sceptical consumers will seek to trust a convincing health claim on a product. This will not be easily accomplished, unless the brand is well-recognised (Sandler, 2005).

In terms of the driving force of consumer health, there are two factors of relevance – that relating to illness prevention, and that relating to health improvement. Obesity has been identified as a widespread phenomenon and is considered to be one of the most important factors playing a key role in the emergence, internationally, of type-2 diabetes and cardiovascular heart disease (Riccardi, Capaldo & Vaccaro, 2005, Baranowski et al., 2003, Must et al., 1999). Palou (2004) noted that the selection of particular types of foods, that can contribute to the general health state and enhance body functions, offers great opportunities for functional food developments. In this sense, the emphasis is

placed on the potential of foods to promote and reduce the risk of illnesses. Consequently, the trend is to move from the idea of “adequate nutrition” to the idea of “optimal nutrition”.

However, Teratanavat and Hooker (2006) stated that, although functional foods have gained popularity the last years consumers, nevertheless, remain uncertain about their ‘wholesomeness’. Therefore, because of the emerging character of these products, which often require extensive research and development, food producers have to make sure that there will be adequate demand that will make the investment safer.

2.4 Functional foods consumers’ characteristics

To date various distinct functional food products have been launched onto the market. However, not all by any means have met with success, despite the use of strong brand names and advertising. It is not always clear which consumer segments these products are for, the frequency of consumption and what are the defining characteristics of consumer behaviour for functional foods (such as motivation to purchase, price sensitivity, product awareness, socio-demographic differences etc). Some examples of functional food product launches are discussed below, with evidence from the literature of contributory factors affecting their success or otherwise.

De Jong et al. (2003) investigated the opinions of Dutch consumers regarding different functional foods and the association between their consumption and the socio-demographic traits and lifestyle characteristics. They concluded that the correlation of particular socio-demographic variables with functional food consumption depended upon the actual product. However, they indicated gender, age, education, vegetable consumption, increased alcohol intake, smoking and deterioration of personal health as predictors of functional food consumption.

Several types of bread, such as wholemeal and rye, can be considered as forms of functional food. This is because research on the area of clinical nutrition has provided evidence that a diet based on low glycemic index foods may contribute to diabetes prevention. However, what is even more interesting is that not only the consumption of fruits and vegetables is related to a potential reduction of risk for type-2 diabetes, but also that of wholegrain products (Riccardi, Capaldo & Vaccaro, 2005). Hupkens et al. (1997), mentioned by Prattala et al. (2001), observed that in many European countries higher social classes have a preference towards the consumption of whole-grain and brown bread than white. Additionally, bread consumption in general is often correlated with lower socio-economic status levels. In terms of way of life such as smoking or exercising, higher social classes seem to be able to more easily become accustomed to healthy and modern lifestyles. A difference has been detected with reference to alcohol as people with higher status level tend to consume alcoholic drinks more habitually. Worsley (2003) claimed that white bread is negatively associated with the implementation of vegetarian, low fat and other special diets. In line with the study by the Finnish researchers (Prattala, Helasoja & Mykkanen, 2001), white bread consumers were more likely to be smokers, belonged to the younger groups of respondents and less likely to have completed higher education. Unlike other studies, Worsley (2003) noted that no relationship was reported between white bread and health conditions, such as diabetes and heart disease. Overall, two consumer segments were identified: those who do not consume white bread (older, high educated and have adopted a healthy diet) and those who consume white bread (younger, unwilling to accept health promotions).

2.5 Regulatory framework and potential health claims of functional foods

In order to ensure that the consumption of functional foods does not involve risks for consumers, regulations must be re-examined and updated. This is essential in the case of this category of food products that claim to offer health

benefits, which however cannot be experienced immediately by purchasers. This is because functional foods have been considered by the public with some degree of uncertainty and scepticism as the benefits to be delivered are not tangible. Additionally, because some of them have been produced with the use of genetic engineering, for which consumers have rather negative or not clear attitudes (Poortinga & Pidgeon, 2007, Pardo, Midden & Miller, 2002, Gaskell et al., 2000), the products themselves are faced with hesitation.

An effective regulatory and labelling system will not only help consumers understand the particular characteristics and ingredients that accompany these products and consequently make more informed choices, they will also support producers of functional foods place emphasis on these special product's attributes and promote the products using correct labelling and appropriate health claims (Shimizu, 2003).

2.5.1 Japanese legislation of functional foods

Japan comprises the 'avant-garde' of functional foods regulatory system, as the legislation defines clearly and in detail this particular category of products. Japan was the country where functional foods were firstly introduced, and the government has created a legal system (FO.S.H.U.: Foods for Specified Health Use) for the approval of statements on functional food labels, regarding the possible results of food on human body. Effectiveness, safety and analytical determination of the functional ingredients of foods applying for approval by FO.S.H.U. are scientifically evaluated (Shimizu, 2003). However, it is not clear from the literature if this had an impact on the willingness to consume, either positively or negatively. After a formal process of approval is complete, during which the authorities inspect thoroughly all related aspects of the issue, then the logo of the Ministry of Health is placed on the packaging of the product – if the application is successful - and the company is allowed to include any effects of the product on its packaging.

Regarding the health claims that can be used, as reported by Shimizu (2003), the Japanese Ministry of Health, Labour and Welfare defines the following:

- A claim to maintain or improve a functional marker which can be easily evaluated by, for example, self-diagnosis or a health check-up. Two examples of permitted and non-permitted health claims are respectively: “This product helps to maintain normal sugar levels” and “This product improves hypertension”.
- A claim to maintain or improve physiological function and organ function of the human body. Two examples of permitted and non-permitted health claims are respectively: “This product enhances the absorption of calcium” and “This product is an effective food for enhancing fat metabolism”.
- A claim to improve physical condition subjectively and temporally, but not persistently or chronically. Two examples of permitted and non-permitted health claims are respectively: “This product is good for or helps those who feel physical fatigue” and “This product has anti-ageing effects”.

2.5.2. The Codex Alimentarius and the case of United States of America (U.S.A.)

The Codex Alimentarius was created in 1963 by the Food and Agriculture Organisation (F.A.O.) and the World Health Organisation (W.H.O.), in order to develop food standards, guidelines and codes of practice under the Joint F.A.O./W.H.O. Food Standards Programme.

In 1997 and 2000, it defined three types of claims:

- “Nutrient Function Claim”: is the claim that describes the physiological role of the nutrient in growth, development, and the normal function of the body
- “Enhanced Function Claim”: concerns specific beneficial effects of the consumption of foods and their constituents in the context of the total diet on physical or psychological functions or biological activities but does not include nutrient function claim. Such claims relate to a positive contribution

to health or to improvement of a function or to modifying or preserving health.

- “Disease Risk Reduction Claim”: relates to the consumption of a food or food constituent, in the content of the total diet, to the reduced risk of developing a disease or a health-related condition.

In the case of U.S.A., the Food and Drug Administration (F.D.A.) has founded the way health claims should be expressed and also specified which of them need to be liable to controls or not (Castellini, Canavari & Pirazzoli, 2002). Specifically, F.D.A. describes the relationship between a food component and health-related condition. This is similar, as Shimizu (2003) states, to the reduction of risk of disease described in Codex Alimentarius.

Specifically, as Hasler (2008) states, there three categories of claims that can be used on labels of food products and supplements in the United States. These include health claims, nutrient content claims and structure/function claims. To explain further these claims, starting with the latter one, structure/function claims are declarations illustrating the effect of the food product or supplement on the structure or function of the body. A statement such as *“helps promote bone health”* constitutes a typical example of this category of claims. Structure/function claims can be used on the labels of food products and supplements without the preapproval by F.D.A. being necessary. However, they must be followed by the following disclaimer: *“This statement has not been evaluated by the F.D.A. This product is not intended to diagnose, treat, cure or prevent any disease”*. Structure/function claims were authorized under the Dietary Supplement Health and Education Act in 1994.

Nutrient content claims comprise the second category of claims allowed to be use on food and supplement labels in the U.S. Such claims are used to express the percentage of a nutrient in a product relative to the daily value. The daily value specifies the amount of a nutrient that can be ingested by a single serving

of a food product. The following statements are examples of a nutrient content claim “*good source of calcium*” or “*excellent source of calcium*”. The distinction between the two claims is related to the percentage of the daily value of the nutrient. A product is a “good source” of calcium when this nutrient provides the ten percent of the daily value, whereas the product can be considered an “excellent source” of calcium when the twenty percent of the daily value of the nutrient is provided.

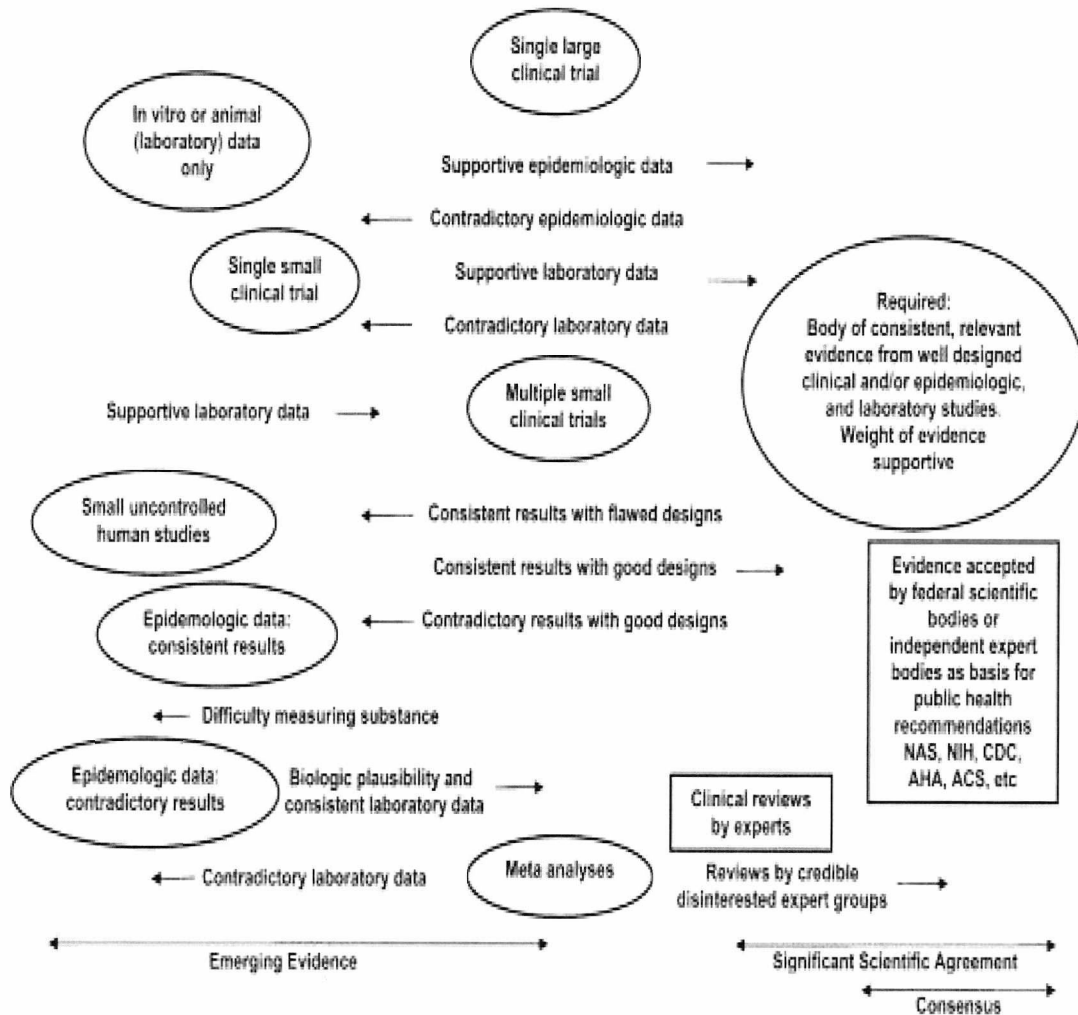
Finally, the last category is health claims. They define the relation between a food, food component, or dietary supplement ingredient and the potential reduction of risk of a disease or health-related condition. The following statement represents an example of a health claim: “*Food containing 0.7g or more of plant stanol esters per serving, eaten two to three times a day with meals, may reduce the risk of heart disease as part of a diet low in saturated fat and cholesterol. A serving of this product contains 1.7g of plant stanol esters*”. Health claims were authorized under the Nutrition Labelling and Education Act in 1990 and must be based on very high standards of scientific evidence. This means that all the publicly available evidence must support the diet-disease relation that is the subject of the claim and also there must be significant scientific agreement among qualified professionals/specialists that the relation is valid and legitimate.

However, the question what significant scientific agreement actually implies has been in the centre of debate in the U.S. The F.D.A. has outlined a scheme for assessment of the strength and consistency of scientific evidence leading to significant scientific agreement as shown in Figure 2.2 below.

Without any doubt, randomized, controlled clinical intervention trials are the only way to go for a health claim to be approved.

The F.D.A. decides for the authorisation or not of these types of health claims taking into account a comprehensive review of the scientific literature, generally as a result of the submission of an appeal for a certain health claim.

Figure 2.2: F.D.A.’s schema for assessing strength and consistency of scientific evidence leading to significant scientific agreement



Source: (Hasler, Clare M., 2008)

2.5.3 The case of European Union (E.U.) and the United Kingdom (U.K.)

European legislation does not consider functional foods as specific food categories, but rather a concept. In the E.U., instead of regulating the product group per se, regulatory efforts currently have focused on restricting the use of health claims on packaging and in marketing (Niva, 2007).

In E.U., until recently, there was no specific body of legislation to regulate the functional foods category and the health claims of these products. Consequently, the E.U. member states were depended on their national regulations, wherever this possible as sometimes even in the national level, these laws were absent (Shimizu, 2003). This resulted in great confusion and created problems in marketing functional foods and trading (Castellini, Canavari & Pirazzoli, 2002). This was because a product that belonged to a certain category, when exported, it may come under a different category, based on the law of the imported country. For that reason, functional foods producers were not willing to invest on research and development, since their efforts are subjected to uncertainty (Jonas & Beckmann, 1998).

The European Commission Concerted Action on Functional Food Science in Europe (FU.FO.S.E.), which is coordinated by the International Life Sciences Institute (I.L.S.I.), defined the nutrient function claims in a similar way as that of the Codex Alimentarius and also proposed enhanced function claims as well as disease risk reduction claim (Diplock et al., 2000).

In 2006 the E.U. launched a regulation (1924/2006) in an attempt to harmonise the nutrition and health claims across all European member states. This Regulation establishes the authorisation procedures required to ensure that claims on food labelling, presentation and advertising are clear, concise and based on evidence accepted by the whole scientific community. It identifies two categories of claims: nutritional claims and health claims.

Both types of claims should meet a number of criteria in order to qualify as such. Specifically, the regulation makes a distinction between the general and specific

conditions of use. The general conditions of use can be summarised in the following statements:

- a) the nutrient or substance, in respect of which the claim is made, must be in an immediately consumable form;
- b) the presence, absence or reduced content of a nutrient or other substance in respect of which the claim is made must have a beneficial nutritional or physiological effect, and be scientifically proven;
- c) the nutrient or substance in respect of which the claim is made is present in significant quantities in order to produce the nutritional or physiological effect claimed. Its absence or presence in a reduced quantity should also produce the expected nutritional or physiological effect;
- d) the specific conditions of use must be complied with, for example, the active substance (e.g. vitamins, fibres, etc.) and must be present in sufficient quantity in the food to have beneficial effects. Furthermore, if it is claimed that a food is energy-reduced, the energy value must be reduced by at least 30% of the total energy content of the food (25% in the case of salt).
- e) Nutritional and health claims relating to beverages containing more than 1.2% of alcohol by volume are prohibited, with the exception of those which refer to a reduction in the alcohol or energy content of an alcoholic beverage.

As far as the specific conditions of use are concerned, there is a list of nutritional claims that are authorised. Comparative nutritional claims can be made for foods that fall under the same category and whose composition does not allow a claim. These claims must relate to an identical quantity of food and also indicate the difference in the nutrient content and/or energy value.

With regard to health claims, there are certain requirements that need to be fulfilled. The labelling, presentation and publicity related to these health claims must provide specific mandatory information. This information can be summarised into the following:

- a) a statement indicating the importance of a varied and balanced diet and a healthy lifestyle;
- b) the quantity of the food and pattern of consumption, which will ensure the claimed beneficial effect;
- c) a statement addressed to persons, who should avoid the substance concerned;
- d) a warning of the health risks caused by excessive consumption.

In addition to the above requirements, the 1924/2006 E.U. regulation excludes health claims that refer to the rate or amount of weight loss or suggest it is harmful to health not to consume a certain type of food. Moreover, references to an individual doctor or health professional or to associations other than national medical associations and health-related charities are also prohibited as well as claims, which suggest that health could be affected by not consuming the food. However, despite the Directive 2000/13/EC on labelling (which prohibits any reference to properties for the prevention, treatment or cure of a human disease), the Regulation 1924/2006 can authorise claims related to the reduction of the risk of a disease, provided that an application for authorisation has been approved, as stated in the amending regulation 107/2008 and 109/2008.

Finally, the regulation 1924/2006 permits an individual or company wishing to obtain authorisation for a new claim or amend the existing list to submit, to the member state concerned, an application, which will then be forwarded to the European Food Safety Authority (E.F.S.A.). The Commission then decides on the use of the claim based on the authority's opinion.

In the case of the U.K. and in the absence of common E.U. legislation, the Joint Health Claims Initiative (J.H.C.I.) was formed in 1997 – voluntarily – in response to the increasing urgency for clarity regarding the use of health claims. It consisted of representatives from the food industry, consumer and enforcement groups (Ruffell, 2003). Its role is to provide advice to the food industry in a pre-

market launch and product-specific basis and in any case it does not attempt to substitute current regulatory controls. J.H.C.I. aims at supporting and improving the regulatory system as well as reinforcing the requirements for food products to carry on the packaging overstated health claims.

Its efforts yielded fruits and a voluntary Code of Practice was launched in December 2000. The J.H.C.I. Code defines a health claim as “*a direct or implied claim in food labelling, advertising and promotion that consumption of a food carries a specific health benefit or avoids a specific health detriment*”. This includes images and logos that may indeed imply exaggerated health benefits for consumers.

In the UK’s legislation, as in most developed food legislations, firms cannot claim on a label or advertisement that a food is capable of preventing, treating or curing human disease (i.e. a medicinal claim). However, they are allowed to make claims which do not fall within that prohibition. Shimizu (2003) says that J.H.C.I. suggested two types of health-related claims: a) generic health claims and b) innovative health claims. The former ones are based on well-established and generally accepted knowledge with evidence from the scientific literature and/or recommendations from national and international institutions. No substantiation is required. The latter form of claims is based on evidence applied to existing or new products and substantiated in compliance with the Code.

As far as the reduction disease risk health claim is concerned, the Code states that if the product is satisfactorily demonstrated to affect beneficially a certain health-related condition, then the claim may contain the part of the body advantaged from the consumption of the product, under the condition that the health-related condition is not mentioned.

Similarly, Jonas and Beckmann(1998), state that there are three levels of claims in the U.K.:

- a) nutritional claim, such as “high fibre”
- b) health claims, such as “may reduce cholesterol as part of a low fat diet”

- c) medicinal claims, such as “may prevent coronary heart disease”. It has to be noted that under British legislation medicinal claims are not permitted, unless the product is categorised as medicinal.

Additionally, Kalaitzandonakes (2000) stated that it is important for governments to come to a decision

“on the degree of intellectual property protection that will be allowed to such new product concepts and underlying discoveries. Socially optimally schemes must provide incentives for increased discovery and allow for equitable distribution of benefits among producers and consumers” (p. 2).

To summarise, labelling and general provision of information to the public will help not only consumers, but producers as well. The former will be able to make more rational choices by examining the attributes, ingredients and consumption patterns of the product in question, while the latter will be able to highlight product’s characteristics and therefore market it in a better way, using health claims (Shimizu, 2003).

It is clear that regulating information to support consumers’ decision making is vital, especially in a world where advances in food science and technology are incessant (Unnevehr & Hasler, 2000).

2.6 Functional food market background

2.6.1 Overall market

The market for functional foods has increased significantly during the 1990s, when the idea behind this category of food products managed to acquire global recognition (Heasman & Mellentin, 2001). Most early developments were foods fortified with vitamins and/or minerals such as vitamin C, vitamin E, folic acid, zinc, iron, and calcium (Sloan, 2002). Subsequently, the focus shifted to foods

fortified with various micronutrients such as an omega-3 fatty acid, phytosterol, and soluble fibre with these micronutrients helping to promote good health or preventing diseases such as cancers (Sloan, 2002, Unnevehr & Hasler, 2000, Hasler, C.M., 1998).

Table 2.2. Global market size estimates for functional foods

Market size (in million US\$/year)	Year	Definition	Reference
15,000	1992	Functional, enriched and dietetic foods	Menrad (2000)
6,600	1994	Functional foods	Hilliam (1998)
10,000	1995	Functional foods	Arthus (1999)
11,300	1995	Functional foods	Heller (2001)
21,700	1996	Functional, enriched and dietetic foods	Menrad (2000)
10,000	1997	Foods with specific health benefits	Byrne (1997)
22,000	1998	Foods with specific health benefits	Gilmore (1998)
16,200	1999	Functional foods	Heller (2001)
17,000	2000	Functional foods (forecast from 1998)	Hilliam (1998)
17,000	2000	Functional foods (forecast from 1997)	Hickling (1997)
33,000	2000	Functional foods	Hilliam (2000)
7,000	2000	Foods that make specific health claims	Weststrate et al. (2002)
50,000	2004	Functional foods (forecast from 2000)	Euromonitor (2000)
49,000	2010	Functional foods (forecast from 2000)	Heller (2001)

Source: (Verbeke, 2005)

Previous research has identified the functional food concept as top trend in the food industry (Sloan, 2002, Childs & Poryzees, 1998). In table 2.2 one can see the global market size estimates adopted by a number of studies conducted since 1997. A variation among the estimates is clear, which can be credited to the use of different sources as well as the non-existence of a clear definition for the product category.

Charalampopoulos et al. (2002) argue that the development of non-dairy functional products is a challenge for the food industry in its efforts to utilise the abundant resources by producing high quality functional products and cereals constitute a potential good market, as it has not been explored in depth.

This section continues by providing a number of statistical estimates related to the size of functional food market. The figures presented are from a selection of different sources and consequently differ from one another, in terms of market share expressed either in percentages or monetary values as well as in terms of growth rates. According to Milner (2002), the market value of functional foods is also largely “ill” defined. The author cites Frost & Sullivan (<http://www.food.frost.com>), who suggest the total market for functional ingredients, functional foods, functional beverages, dietary supplements and foods for special dietary use is worth approximately \$50 billion.

Based on Maynard and Franklin (2003), who studied the U.S. market in an attempt to evaluate the commercial viability of Conjugated Linoleic Acid (C.L.A.)-milk production, the functional food industry accounts for 3.5% of the U.S. food market. They state that functional dairy foods accounted for \$1.1 billion in U.S. sales in 2000. They justify the demand for dairy products based on the following reason: rising average age, increasing health care costs, availability of information over health-related issues that permits consumers to take care of their own health.

Sandler (2005), indicated that the biggest functional food market in Europe is Germany. Interestingly, Spain shows the highest growth at 7.7% per year, although it is a relatively smaller market. All the other countries show an estimated growth at a rate between 6% and 7% per year to 2008. Italy and Spain are also low, possibly because in these countries quantities of natural foods, such as olive oil and fresh vegetables are consumed. These can be viewed in table 2.3.

Table 2.3. Functional food and drink sales by value (\$m), 2004 – 2008

Country	Year					CAGR 2004-2008
	2004	2005	2006	2007	2008	
France	390	417	446	479	512	7.0%
Germany	1,021	1,083	1,148	1,219	1,292	6.0%
Italy	213	227	242	258	275	6.6%
Netherlands	60	64	68	73	78	7.0%
Spain	189	203	219	236	254	7.7%
Sweden	23	24	26	27	29	6.6%
U.K.	633	676	721	771	823	6.7%
Europe	3,038	3,238	3,452	3,678	4	6.6%
U.S.A.	29,990	31,969	34,079	36,328	38,726	6.6%
Total	33,027	35,207	37,531	40,006	45,910	7.0%

Source: (Sandler, 2005)

Also, from table 2.3 it is clear that the functional foods sector of the U.K. food industry was anticipated to maintain fairly good growth rate over the next five years, with a Compound Annual Growth Rate (C.A.G.R.) of 6.7% between 2004 and 2008.

2.6.2 U.K. market overview and performance by sector

The functional food sector in the U.K. although it has made steps forward, has not developed to a great extent, as the British consumers are reluctant to adopt these novel products (Jonas & Beckmann, 1998). It also seems that consumers are very much in favour of the concept of natural and organic food. Possibly this could be explained by the fact that the UK has experienced a number of high profile food scares, such as the foot-and-mouth and Bovine Spongiform Encephalopathy (B.S.E.) crises. Armstrong et al. (2005) highlight the potentiality of the U.K. market to grow by 40% by 2007.

Growth in 2003 stood at 10.4% in value terms. While growth in functional foods has been steady over the review period, it has not been exceptional. Functional food sector should benefit from the fact that consumers have a growing awareness and understanding regarding health related issues and are able to understand the link between nutrition, health and disposable income.

According to a Euromonitor report (2003), functional beverages were the best developed of all three sectors (beverages, dairy and bakery) in 2003, with sales of just over £1 billion. Functional juice with added nutrients pushed the value of sales up. Specifically, functional juice sales accounted for £356 million and energy drinks and sports drinks for £630 million.

The dairy products sector is set to expand by a compound annual growth rate (C.A.G.R.) of 5% over the 2003-2008 period. Plant sterols that promise lowering cholesterol levels drive the race (Euromonitor, 2003). Additionally, dairy functional products have had the advantage to include the pioneers and some of the most innovative and fastest growing brands, such as Yakult and Danone (Armstrong et al., 2005), which have created strategic agreements to continue hold their leading position around the globe. Dairy was the smallest of the three sectors in functional food, with sales of £253 million in 2003. Dairy products showed the strongest growth in functional food over the year examined. Fortified foods in dairy products are common with skimmed milk powders, for example, required by legislation to be fortified with vitamins A and D. Within dairy products, the strongest gainer was functional liquid milk and powder milk due to the success of companies selling these fermented drinks. This particular segment experienced growth of nearly 11% in current value terms for the year 2003 (Euromonitor, 2003).

Bakery products and snacks on the other hand despite being larger than dairy in value terms, in 2003 demonstrated considerably less innovation. Because of that, it is predicted that dairy products will catch up on bakery products and snacks and by 2008 the two will be comparable in terms of value size. Bakery products and snacks are dominated by confectionery which in turn consists mainly by medicated confectionery brands and functional chewing gum. Medicated confectionery and functional chewing gum raised the sales of functional bakery products and snacks to £315 million for the year in review.

Functional chewing gum sales accounted for £149 million, while medicated confectionery at £143 million (Euromonitor, 2003).

Functional oils and fats (such spreads) showed a good growth rate (in current value terms) of more than 9% in 2003. Within functional oils and fats the dominant players were brands that promise lowering cholesterol levels (Euromonitor, 2003).

Finally, in a number of earlier studies conducted by Leatherhead Food Research Association (L.F.R.A.) during mid '90s with regard to the market potential of functional foods in the U.K., France and Germany, the top health concerns were those shown in table 2.4. It is clear that the three countries share almost the same anxieties. Heart disease appeared in all three countries (in two of which scored the top place) and obesity was mentioned as a health concern in two of them.

Table 2.4. Top health concerns in the U.K., France and Germany

U.K.	France	Germany
Heart disease	Stress	Heart disease
Stress	Migraine	Stomach/Colon cancer
High blood pressure	Heart disease	Stress
Obesity	Obesity	Osteoporosis
Stomach/Colon cancer	Memory decline	Raised cholesterol level

Source: (Young, J., 2000, Hilliam, 1998)

In the same research, when respondents were asked to state the factors motivating their desire for being healthy, the top answers were: “to feel good”, “to live longer”, to maintain an active lifestyle”, “to prevent disease”, “to improve/maintain appearance” and “to lose/maintain weight”. This is stated here as it will appear to be an interesting finding later in the thesis.

Finally, a report by Mintel (Mintel, 2006) summarises the functional food categories in the U.K. market and provides details for the retail sales of the

functional food and drink products by sector and value for the period between 2001 – 2005. This can be seen in table 2.5.

Table 2.5: UK retail sales of functional food & drink products by sector & value, 2001-2005

	2001 £m	%	2003 £m	%	2005 £m	%	% change 2001-05	% change 2003-05
Yogurts and drinks	97	15	143	17	275	25	+183.5	+92.3
Breakfast cereals	175	26	215	26	250	23	+42.9	+16.3
Spreads	131	20	166	20	190	17	+45.0	+14.5
Stimulation drinks	124	19	152	18	168	15	+35.5	+10.5
Juice, juice drinks and dilutables	82	12	93	11	121	11	+47.6	+30.1
Soya dairy-alternative products	4	1	26	3	32	3	+700.0	+23.1
Eggs	12	2	14	2	18	2	+50.0	+28.6
Bottled water	10	2	13	2	14	1	+40.0	+7.7
Beverages	4	1	5	1	4	-	-	-20.0
Others*	28	4	8	1	17	2	-39.3	+112.5
Total	667	100	835	100	1,089	100	+63.3	+30.4

*Others include bread cereal bars and cheese

What is clear from the table 2.5 is the expansion of the yoghurts and drinks sector sales from 97 million pounds to 275 million pounds, recording an increase of 183.5%. At the other extreme, functional bread sales declined during the same period by 39.3%. However,

2.6.3 Functional foods bakery sector

Bakery products and snacks constitute the smallest of the three “functional” food sectors (beverages, dairy and bakery). Its share of the total functional products sales was 18% in 2003 and decreasing continuously. Siro et al. (2008) in their review of the functional food market state that while functional foods are rapidly gain popularity in sectors such as dairy products or confectionery, in bakery they are still relatively underdeveloped. In Spain in 2006, 45% of the launched functional food products were dairy food while only 13% of the products

accounted for the functional bakery sector. Within the sector there are three different categories of products: medicated confectionery, functional chewing gums and fortified bread and cereals (Benkouider, 2004). The functional confectionery was the largest product category within bakery and snacks in western Europe, accounting for almost 90% of the total sector sales. The last category, namely fortified bread and cereals, was by far the smallest within the sector in terms of value sales, showing a niche positioning and accounting for an amount under 3%. This, according to Euromonitor International, is not expected to change during the coming years. By 2008, although functional bakery products will have grown by 35%, they will account for 23% of the total market value of functional products. In particular, by 2008, it is estimated that functional bread will account approximately 2% of the total functional bakery products sales (Benkouider, 2004).

A possible explanation for the current situation of bakery products that could be given is the fact that there has not been much innovation within the sector. Additionally, marketing attempts to communicate the product's benefits to consumers yielded very poor results. This is probably because it is difficult for consumers to accept that products such as biscuits, cakes and pastries can provide the human body with extra benefits. Consumers do not find it easy to associate such products with a wholesome image. Therefore, they hesitate to consider these products as functional and relate them to healthy food (Benkouider, 2004).

Conversely, bread is regarded as healthy product and bakery companies could use this as leverage to build on. Euromonitor's analysts estimate, functional bread has demonstrated the most dynamic volume growth over the last few years and is expected to provide evidence of the most dynamic value growth over the coming years. This can be explained by the fact that bakery companies, wanting to increase their low profits, seek ways to differentiate their products and gain extra share in the market (Benkouider, 2004).

Bakery companies should grasp the chance they have to increase their profits and invest in the functional bakery food products, especially bread. According to Euromonitor's report, bread has the highest potential, among the whole bakery sector, to grow.

To date there have been some successful attempts of marketing functional bread. Specifically, in the U.S.A., an American company launched bread that contained soya isoflavones and omega-3 and omega-6 fatty acids, targeted to men's population. In Germany and Australia bread contained prebiotic inulin was sold in the market. In Japan and Germany, which constitute key markets for functional foods, there are bread products enriched with functional nutrients, claiming to improve skin's health or boost energy (Unknown, 2004). What is more, there is evidence from the existing literature that functional bread can reduce the risk of cardiovascular disease, type-2 diabetes and obesity (Ludwig, 2002, Bessesen, 2001, Frost & Dornhorst, 2000, Thorburn, 1987). This provides the incentives to manufacturers to build upon the "healthy image" of bread.

Looking more in depth into the U.K. market, one can understand that the functional bakery sector is still not widely developed. Whilst total bakery products and snacks' sales in 2003 accounted for £ 315 million, however, more than £ 300 million were gained from medicated confectionery (Benkouider, 2004). Functional bread products have not performed well and it seems consumers are not prepared to fully adopt healthy eating habits. Instead they are willing to partly accept and add to their diets, bread products like "Hovis Best of both", which contains more fibre, but looks and tastes as white bread. These are characteristics that definitely attract both adults and children (Benkouider, 2004).

2.7 Attitudes, perceptions and beliefs

Jonas and Beckmann (1998) noted that the whole of society could benefit in three different ways by consuming functional foods. First, consumers could sustain or improve a condition of good health. Second, producers could gain by increasing the production of high value-added food products. Third, national expenses related to health treatment could be significantly reduced and therefore money could be utilised for other purposes.

Despite the fact that there is scientific documentation of advantageous physiological and psychological impacts of functional foods' ingredients beyond the original nutritional value, the market performance of health-enhancing foods has proven rather unsatisfactory (van Kleef, van Trijp & Luning, 2005). However, it has been reported that nutraceuticals constitute a top trend for the food sector (Verbeke, 2005). Further to the last statement, Europe's health-promoting dairy sector is estimated to be one of the most dynamic food sectors (Armstrong et al., 2005). This is probably because dairy sector includes pioneers of the industry as well as some of the most innovative and fastest growing brands (Euromonitor, 2003). What is more, Sorenson and Bogue (2005), having used a report of Leatherhead Food Research Association, pointed that sales of food products beneficial for health in a global scale have risen by 50% between 2001 to 2004. The inference that can be extracted is that functional food market is steadily getting bigger.

The major difficulties that potential functional foods consumers and manufacturers face in buying and selling, respectively, these products are: legislation, scientific documentation, consumers' knowledge of functional foods and consumers' attitudes towards biotechnology. Foods manufacturers employ biotechnology for several reasons, among which is to produce food with increased nutritional value and health benefits. Additionally, strong correlation was observed between biotechnology and perceived naturalness, signifying that purchase might be dependent upon natural characteristics (Frewer, L. J.,

Howard & Shepherd, 1995). However, it is anticipated that this attitude held by people might have change with the passing of years as consumers get more educated and more information is available to them. Focus-group interviews among Danish consumers proved that one of the main beliefs that consumers hold towards functional foods is their perceived unnaturalness (Poulsen, J. B., 1999), reinforcing the finding mentioned above.

The regulatory framework is an area characterised by complexity and confusion, since there is no specification as to what kind of modification or which substances are considered as functional ingredients (Jonas & Beckmann, 1998).

Research that has been carried out up to now in the field of marketing functional foods and consumer behaviour has approached this issue from different perspectives. Most of the studies, which have focused on consumer acceptance of functional foods, have implemented a variety of methodologies and have investigated various concepts. Some of these studies are those of Poulsen (1999), Bech-Larsen et al. (2001), van Kleef et al. (2005). These and other studies are outlined below.

2.7.1 Consumer acceptance

Verbeke (2005) investigated the impact of socio-demographic characteristics, cognitive and attitudinal factors on functional foods acceptance. The concluding remark of this research was that the main positive determinant of acceptance of functional foods is the belief in the health benefits claimed to be offered. Purchase likelihood can also be amplified by the presence of an ill member in the family. However, the percentage of acceptance tends to decrease when knowledge about functional foods is higher. This finding is contrary to what someone could expect. However, there was an association between knowledge and age, indicating that acceptance may increase as age increases. Finally, the potential consumer of functional foods was described as “a health benefit

believer, who faced illness among relatives and whose eventual criticism towards functional foods fades away with ageing”.

The International Food Institute Council (I.F.I.C.) Foundation (2005) reported that consumers are highly motivated by knowledge and beliefs for purchasing or rejecting health-enhancing foods. The I.F.I.C., however, indicated that consumers are unaware of what functional foods are, explaining the reason why these products face difficulties in being adopted by the society. Additionally, Verbeke (2005) mentioned that high prices underlie a substantial drawback towards the acceptance of functional foods and Childs and Poryzees (1998) arrived at the conclusion that price sensitivity together with taste, also mentioned by Gilbert (2000) could be used as future determinants of functional foods performance.

A pan-European study marked out healthiness, quality and family preferences as well as price and taste to be important factors, which affect consumers' attitudes with regard to functional foods acceptance and purchase intention (Urala & Lahteenmaki, 2003).

It is true that in Europe the role of healthiness in the food choice is gaining more and more attention by consumers. It should be noted, however, that Europeans in general are far more critical with new products and technologies compared to the U.S. population. Consequently, Europeans' acceptance of functional foods is less unconditional, better thought-out, and comes with more concerns and reservations in comparison to consumers in the U.S.

Siro et al. (2008), based on a number of studies, concluded that consumer acceptance of functional foods depends on various elements. Taste, product quality, price, convenience and trustworthiness of health claims are important factors for the acceptance of functional foods. As a rule, consumers seem to evaluate functional foods first and foremost as foods. Functional benefits may

provide added value to consumers but cannot outweigh the sensory properties of foods.

2.7.2 Ethical concerns

Since functional foods are innovative products, developed with the assistance of genetic engineering technology (Urala & Lahteenmaki, 2003, Jonas & Beckmann, 1998), ethical concerns have generated a social debate that focuses on two ethical issues: i) reliability of the claims pertinent in functional foods and ii) socio-cultural dimension of these food products. This argument is approached by two different theories: Rawls's liberal theory (Rawls, 1993, 1972) and Habermas's deliberative theory (Habermas, 1995), as they are described by Korthals (2002).

According to the liberal theory, food – just like health – could be considered a public good and if so, governments could intervene in the private life of individuals and even prescribe specific diets under the pretext of sustaining the public health. This could turn into reality, especially if the claims of functional foods are proven to be valid.

On the other hand, deliberative theory supports the assertion that food is an impartial good and that different food styles should be recognised and respected. Therefore, functional foods should be esteemed just like any other consumption habit, especially in the case that this food consumption pattern is followed by lots of supporters and in no occasion they should be prescribed by governments, sustaining their different character from drugs.

Shaw and Shiu (2003), based on the Theory of Reasoned Action (T.R.A.), applied reliability analysis and structural equation modelling techniques and tried to discover the factors that are relevant to and influence ethical consumer choice. They concluded that consumers do make ethical choices, to the extent that ethical purchasing in the UK has surpassed the “non-ethical” equivalent one by more than six times. There is no better proof for that from the recent initiation,

in 2001, of the Ethical Purchasing Index (E.P.I.) in the U.K., which certifies that enterprises that operate ethically are rewarded by the consumers in contrast to those which do not adopt ethical practices.

In the past, many studies have engaged in different theories so as to explain consumer buying behaviour, consumer attitudes and consumer attitudes change. Bredahl et al. (1998) used the Theory of Planned Behaviour (T.P.B.) and tried to capture the consumers' coherent intention to purchase or avoid purchasing food, which was produced with the assistance of technology. This model concluded that consumers' ethical obligations constitute a non-trivial indicator of persons' buying intention for food engineered products. In the same study scientists drew on the Fishbein's multi-attribute attitude model and they highlighted that attitudes towards the innovative technology for food production depend upon the implications its use might have, not only on oneself, but also on other parts of society, which are pertinent in each individual (e.g. family), as well as on the environment. Strength of beliefs affects attitudes. Therefore, beliefs should be addressed to the influenced groups in order for attitudes to be weighted.

2.7.3 Associated risks

One more thing that has to be taken into consideration and worth being examined is the assessment of potential risks and how they are associated with the consumption of health-enhancing engineered food products.

Consumers' awareness of functional foods might exist but the knowledge they have about benefits gained when consuming these products is limited (Jonas & Beckmann, 1998). Additionally, there are a number of substances, meaning functional food ingredient, which have been tested by scientists and which appear to have a positive effect on human's health. However, the strange names of these substances (e.g. isoflavones, phenolic acids and glycosides), described on the food labels, discourage consumers from buying products that

contain these ingredients (Jonas & Beckmann, 1998), since they perceive them to be unnatural,.

Based on a sample of 1500 respondents from Denmark, Finland and U.S.A., Bech-Larsen Grunert et al. (2001) concluded that enriched food products, as opposed to their conventionally produced counterparts, were considered to be less natural by Danish and Americans, while Finnish consumers related the aspect of naturalness with processing method rather than with enrichments.

Frewer, Howard et al. (1995) found that high risks rather than low risks are attached to biotechnology (i.e. genetic engineering). The public believes that it is less rather than more healthful and therefore more risks are associated with consuming functional foods. Despite the fact that consumers recognize they will only gain substantial benefits by adopting a healthy eating diet, they admit that they have not heard enough about functional foods and they hardly identify these products in the market (Gilbert, 2000).

2.7.4 Quality dimension, information and communication

Consumer purchase is the major criterion for successful launch of food products in the market. The high acceptance or rejection rates, which a novel product brought to the market experiences, may indicate that consumer attitudes and perceptions are strongly related to them. People take into account many things when they are about to make a choice. One of the concepts examined by consumers is quality (Grunert, K., Bech-Larsen & Bredahl, 2000).

As a parallel to consumer acceptance of functional food, Frewer et al. (1995) considered genetically engineered food. They noted that there has been much discussion about the way and methods used to provide information to the public for the qualitative characteristics of genetic engineered food compared to conventional alternatives (Frewer, L. J., Howard & Shepherd, 1995). For genetically-engineered food some of the most important quality dimensions were: health/convenience/process-related quality (Grunert, K., Bech-Larsen &

Bredahl, 2000). Since marketing food products that are produced with the use of biotechnology is rather difficult, credibility and trust in information sources is a cardinal determinant of consumers' acceptance of innovative commodities (Frewer, L. J., Howard & Shepherd, 1995). This is justified by the fact that a number of functional food products can be produced with the assistance of biotechnology (Poulsen, J. B., 1999, Jonas & Beckmann, 1998). This is because the active component of the product has to be extracted from the natural product or produced in the laboratory using genetic engineering.

Functional foods' messages implying health claims are becoming more and more complicated. Because of that consumers struggle to thoroughly understand the meaning behind each allegation and therefore trust those claims (Verbeke, 2006). What is more, they are bombarded with an excess of information, something that makes the situation even worse. Individuals have their own ideas about things, therefore they are not willing to accept and adopt new concepts easily. The scientific language sometimes used on products' labels and/or advertisements is not easily understood due to unfamiliarity with terms (Shortt, 2000). As a result, consumers need to make a great effort to get the complete picture of the process and benefit related to health claim and finally recognise functional foods' virtue.

As cited by Shortt (2000), consumers' education stands at the top of list of factors, which can contribute to the acceptance of functional foods by the public. Other significant aspects that aided the case of genetically engineered food products performance in the market were taste, proof of usefulness and effectiveness, reconciliation of EC regulation on health claims and support by everyone associated with medical profession. Learning from the case of genetically-engineered food, it could be concluded that communication strategies require long-term commitment and investment, and without holistic approaches (with education as the guiding principle), functional foods are unlikely to succeed. Additionally, the social context as well as the source of the

message being communicated is of particular importance, something which is supported by the literature.

2.7.5 Healthiness, health claims and functional food quality perception

Hailu et al. (2009), using conjoint analysis, investigated consumer preferences over attributes of functional foods and nutraceuticals using probiotics as the functional compound of interest. This research differentiated on the basis of health claims, health claim sources and mode of delivery. The researchers concluded that the functional compound of interest is important for the successful marketing of functional foods. Their finding was in line with results from similar studies (Cox, Evans & Lease, 2008) where the carriers of functional ingredients had the largest relative importance in consumers' valuation of functional foods. With regard to health claims, the authors reported that whether made directly on products or through secondary sources, they play an important role for the acceptance of functional foods. The importance of this statement is even greater when the ingredient is novel and the effects are not well established.

In a similar research, Saba et al. (2010) employing a conjoint task in four different European countries, examined the impact of health related messages on the perceived healthiness and consumers' willingness to buy cereal-based products or non-cereal products that contain beneficial ingredients from grains. The authors reported that bread, along with yoghurt, is considered as the healthiest and the most likely product to be bought. Consequently, bread could be more likely accepted as credible mode of delivery for functional ingredients and/or health messages. However, Verbeke et al. (2009) demonstrated that the perceived degree of credibility of the carrier-product is influenced by the type of health claim. Also, Saba et al. (2010) concluded that differences across the four European countries exist in the perceived healthiness and likelihood to buy the

product. Therefore, one has to bear in mind culture, tradition and eating habits before marketing cereal products containing functional ingredients.

In a critical review of the research conducted in the area of functional foods, Grunert (2010) highlights some of the most important aspects from the consumer quality perception point of view. The author states that people consider food products of good quality those that satisfy four dimensions: taste (along with other sensory attributes), health, convenience and naturalness, which is associated with the method of production, non-existence of G.M. ingredients, etc. He also stresses the importance of legislation on health claims as a factor, in some cases, for the underperformance of functional foods brought in the market. However, he acknowledges the attitudinal factors related to the concept of naturalness. Although the health benefit is regarded as attractive by the public, the process followed in order to include it in the product is seen as unnatural and therefore is rejected. He concludes that functional foods, as seen by consumers, provide an alliance between healthiness and convenience. However, the lack of the latter comprises an obstacle against healthy eating. Nevertheless, consumers do trade off when making choices. Therefore, potential tradeoffs, between increased functionality and healthiness on the one side and naturalness and taste on the other, need to be taken into consideration when developing novel functional food products.

It seems that taste constitutes one of the most influential, if not the most important, determinant of consumers' choice when buying food with health enhancing properties. This is also supported by an earlier study that investigated socio-demographic and attitudinal determinants of consumer willingness to compromise on taste for health in the specific case of the functional foods category. Verbeke (2006) stated that the perceived health benefit resulting from the consumption of functional foods appears to be the strongest positive determinant of consumers' willingness to compromise on taste. However, its level and its predictive power on willingness to compromise on taste decreased

over time. Consequently, relying on people's willingness to compromise on the taste of functional foods for health might prove not a wise decision when developing novel functional foods.

CHAPTER 3

CONCEPTUAL FRAMEWORK OF THE RESEARCH

A framework is the first step towards understanding and integrating the major variables that influence the consumer decision making processes that are to be investigated. The framework for this research was built drawing on the literature review on the economics and marketing disciplines.

In the next few pages of this chapter the conceptual framework, which the current study is based upon, is developed. We briefly present the two methodologies that have been used during the research and we highlight how these methodologies are linked. We also indicate the differences between them and rationalize the reason why these two methodologies have been chosen.

We shall start our conceptual development by examining the area of “values”, as it has been suggested by Rokeach (1970), which are considered to be significant contributors in regulating the way people behave.

In both economics and marketing areas, the concept of value is examined and we will link this with the rationale based on which the conceptual framework for this research was selected.

3.1 Theory of value: economics point of view

The theory of value deals with the “value” of a good and constitutes one of the most important aspects of the microeconomic theory.

The definition of value has changed meaning throughout the years. Nowadays, when referring to the “value” of good, we often mean its price, the cost someone has to take to obtain the good, although a distinction must be made when externalities occur. In the past, economists and philosophers have been using these two terms separately and by mentioning one did not imply the other. According to (Nicholson, 1998), with the use of the word “value” people actually indicated the “importance” and “usefulness” of the good. Since the two concepts

were used differently, it was therefore common for price and actual value of the good to differ, as prices are set by humans and values are determined by each individual. Adam Smith, in his work "*The wealth of nations*", describes the value of a good as its "*value in use*" and the price of it as its "*value in exchange*" (what we nowadays like to call market value). This perspective is described by the paradox of value, in which the contradiction of very useful things to possess low prices, while unimportant things cost high prices is vividly illustrated. The typical comparison between water and diamond prices and value had puzzled economists and philosophers for many years. It was not clear how such a valuable good for the existence of the human race as water has a low value in exchange, while diamonds being relatively so trivial have a high market value. This paradox had to wait until late stages of the 19th century, when three economists all independently claimed that the source of the market value of a commodity was its marginal utility and not its total utility.

3.2 Theory of value: marketing point of view

According to Rokeach (1970), values are

"abstract ideals, positive or negative, not tied to any specific attitude, object or situation, representing a person's beliefs about ideal modes of conduct and ideal terminal goals". (Rokeach, Milton, 1970:) (p.124)

Therefore, when it is said that someone "holds a value" over something, this means that the person has a persistent belief that a specific mode of conduct or an end-state is personally - perhaps socially too – suitable to alternative ones. As Arnould et al. (2004) state, when people are asked, they can often articulate important values, such as honesty, satisfaction, happiness, respect etc.

Rokeach (1970) argues that once the value is internalized then it converts to a decisive factor for guiding action, for developing and retaining attitudes towards relevant objects or situations and for justifying others actions and attitudes. The author also argues that value represents a more powerful notion compared to attitudes and this is because:

- a) it possesses not only a strong motivational component, but also cognitive, affective and behavioural components
- b) although both concepts are believed to be determinants of social behaviour, value is a cause of attitude and of behaviour too.
- c) Under the assumption that an individual holds fewer values compared to attitudes, then the value concept provide us with a more analytic tool in order to describe and interpret variations or similarities among groups of people.

In a different definition of value, Holbrook (1999) describe the value as “*an interactive relativistic preference experience*”. The author claims that there is some interaction between the object (consumer) and the subject (product). He also explains that the nature of value is relativistic and distinguishes it in three types: a) comparative, as there exists a preference between similar objects, b) personal, as the there are differences in the values different people hold and c) situational, as it relates to the circumstances.

In conclusion, the concept of value because of its importance across a number of disciplines, among which the economics and marketing areas, it gives us the opportunity to bring them together.

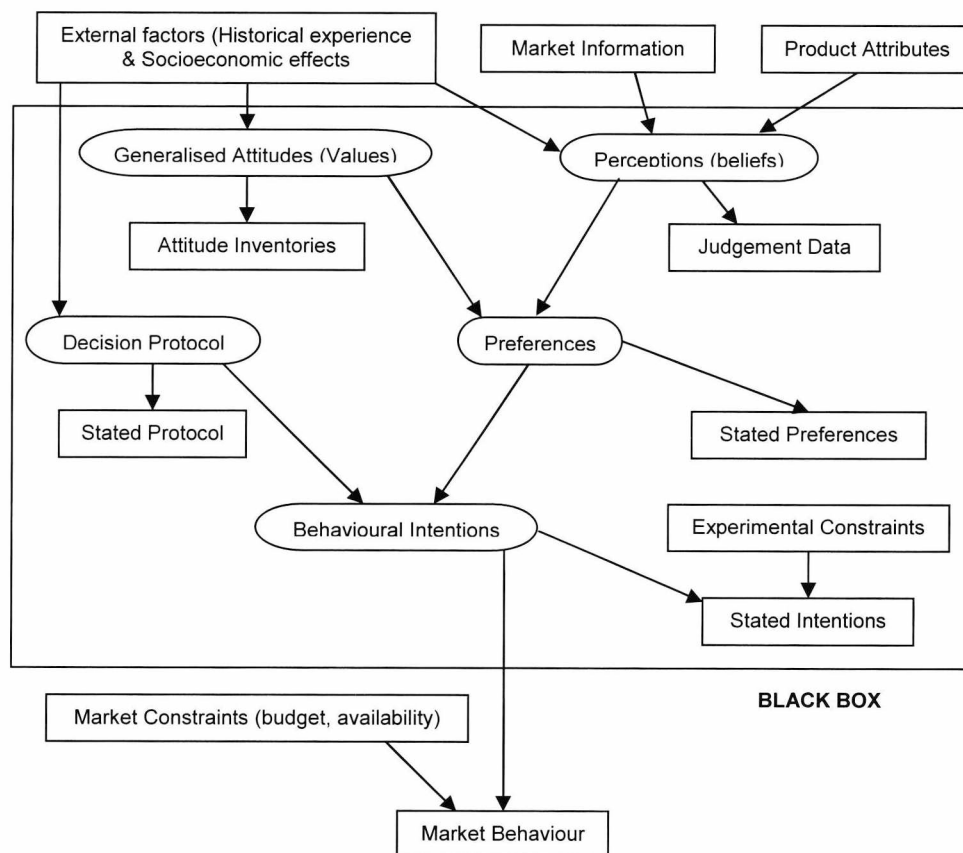
3.3 Choices and values

McFadden (1986) argues that economists often see the individual consumer as an “optimising black box”, whose inputs correspond to product attributes, individual characteristics and market information, while outputs are defined as

purchase decisions and any relevant market behaviour. Economic choice theory represents an advantageous approach that can be used to model and envisage individual behaviour with the assistance of statistical properties.

Often natural experiments do not provide sufficient information on what the researcher wants to reveal. McFadden (1986) proposes to model the cognitive mechanisms in the consumer's black box that are related to his/her behaviour and then use experimental data on attitudes, perceptions and preferences to accommodate the model. He describes his proposal as it is depicted in figure 3.1.

Figure 3.1. Path diagram for the consumer decision process



Source: (McFadden, Daniel, 1986)

On top and out of the box are the measurable inputs, such individual characteristics, product attributes and market information. Under and outside the

box is the actual consumer behaviour, such as a purchase of the product. The essential components for modelling consumer behaviour are those contained in the “black box” of consumer mind. These are related to perceptions or beliefs about the product, attitudes towards the product, personal values and the behavioural intention to make the actual decision. Note that, in figure 3.1, oval constructs represent theoretical variables, while normal rectangular constructs represent the measurable variables. According to the diagram attitudes or values in combination with perceptions or beliefs form consumer preferences, which then are expressed, with the assistance of the decision protocol into behavioural intentions, bearing in mind any constraints related to the decision to be taken.

The theory behind the economics discipline suggests that people make certain decisions, so consequently form a particular behaviour, in the marketplace when their preferences are maximised. Also, the theory of consumer behaviour suggests that consumer preferences can be described by utility (Varian, 2003). According to economists and philosophers of the nineteenth century, utility was a measurement of happiness and satisfaction gained by people when behaviour was initiated. Taussig's words, as cited by McFadden (1986), clearly depict the relationship between utility and preference: “*an object can have no value unless it has utility. No one will give anything for an article unless it yields him satisfaction*” However, in order an individual to make a decision, has to evaluate the various alternatives he has on offer. Therefore, the ability of people to rank all possible alternatives available to them in order of preference, from the most to the least desirable (Nicholson, 1998) and choosing the first is what maximises their utility.

This is briefly, how consumers shape preferences.

In the marketing field of research, it is hypothesized that products encompass a bundle of attributes. Each product has a certain level of performance on each of these attributes. Individuals form perceptions regarding the performance of each of the attributes – and therefore for the product itself – depending on how

important these attributes are to the consumer (Vriens & Hofstede, 2000). As a result researchers quantify these attributes in an attempt to measure: a) the relative importance assigned by individuals to each of the attributes, the relative importance assigned to each of the different levels of the attributes and to understand how the changes on the product's characteristics will affect market share and future sales by estimating the demand for the product. This is an approach called Discrete Choice Modelling (D.C.M.) or Stated Preference Method (S.P.M.), which is widely utilised in the area of marketing, economics, transportation, recreation and many others as it is increasingly popular.

However, according to Vriens and Hofstede (2000) there are cases, where the employment of such a method may not yield the expected returns. The authors provide the following examples to justify the assertion:

- a) positioning a product simply depending on the bundle of attributes the product carries, in a market where the performance of products has become very much alike.
- b) positioning a product for which the amount of information is too big. This creates confusion to consumers and the task of understanding and analysing all the product-relevant information becomes burdensome.

In cases such as those described in points (a) and (b), consumers tend to handle the information in a different way. They analyse and classify the attributes, based on the meaning each of the attributes has for the consumer, into higher order and more abstract levels. These abstract levels correspond to the values held by each individual.

As Winell (1987) explains, "*goals are pleasant consequences or end states to be desired or unpleasant consequences (negative goals) to be avoided*". Pieters et al. (1995) argue that when people make choices, the act of consumption can be seen as a means to attain essential values, being driven by a behaviour which is goal oriented. Gutman (1997) explains that when products are purchased for

their symbolic value, or in other words for what they actually translate in people's mind rather for their genuine use, then it is likely that their consumption is related to a high level goal. The last three statements clearly imply that consumers, in an attempt to achieve certain goals, form their behaviour according to their personal values, which are the actual determinant of the behaviour.

Therefore, as Pieters et al. (1995) explain, the goal and as a result the value (the relationship was explained earlier) accommodates two motivational purposes. Firstly, they affect the direction of behaviour by expressing *what* people are trying to achieve, and in a broader sense how they are planning to achieve the goal/value in question and *why* they are following the chosen course of action. Secondly, they influence the severity of behaviour by demonstrating how enthusiastically a person will act in a certain way, depending upon the attractiveness of the values being pursued. Since many behaviours that are of interest to marketers are value-driven and since values are the important determinants of such behaviours (Carver & Scheier, 1981), it is important to study consumers' values and their relationship to behaviour.

Finally, at the highest order and more abstract levels of self-regulation (values), *system concepts* contain information about such things as one's idealized self-image. Therefore, as Schwartz (1992) stresses, values can be seen as abstract goals or motivational factors, which could in turn provide the researcher with the values that motivate and drive somebody's behaviour.

3.4 Theoretical basis of Discrete Choice Modelling

3.4.1 Theories surrounding Choice Modelling

A number of alternative S.P. techniques have been developed and the literature refers to them as *experimental choice analysis* (Louviere, J. J., 1991) or *Choice Modelling (C.M.)* (Hanley, Mourato & Wright, 2001), with C.E. being one

example, and Contingent Ranking (C.R.) and Contingent Ranking and paired comparison other examples. All of these techniques offer the researcher the opportunity to model multiple as opposed paired choices.¹

Essentially, a C.M. application can be described as follows: A sequence of multiple alternatives of a good or service, which is the focus of the research problem and which differ in at least one attribute (where each attribute is described by various levels) is presented to survey participants. The survey participants are required to rank, rate or choose their most preferred option. It is common practice that a price or cost attribute is included in the list of attributes describing the product's or service's characteristics. The price or cost attribute is required so that people's W.T.P. can be estimated as part of the resulting analysis of the data. Importantly, W.T.P. estimates are recovered for all the attributes employed in the C.M. application.

The theoretical foundation of C.M. can be found in two theories:

- a) *Lancaster's theory of value* (Lancaster, 1966).
- b) *The Random Utility Theory (R.U.T.)* (McFadden, Daniel, 1986, McFadden, D., 1974, Thurstone, 1927).

The essence of Lancaster's theory can be summarised as follows. Consumers form preferences based not on the good or service per se but rather on the characteristics a good or a service possesses. Thus, the consumer then derives utility from each of these traits. It is these characteristics that affect the

¹ The difference between C.E. and the other forms of C.M. is that with the latter ones respondents are asked to rank the alternative options they have been given, rather than choosing the most preferred one. The use of C.M. methods, other than C.E., has been popular in the marketing literature for some time. However, the wider adoption of C.E. and certain aspects of their design can in part be traced to the need of deriving welfare consistent estimates of W.T.P. estimates of this form have been less of a concern for researchers in other disciplines such as marketing.

individual's utility and therefore a consumer will choose a good based on its attributes as opposed to the good or service as a whole entity. This view of how utility is derived can in part explain the difficult decision to be taken by the researcher when designing a C.M. application. That is, what are the appropriate attributes to include and how to find out which attributes actually matter. Lancaster's theory is described in more detail in the next section.

According to R.U.T. people's choices can be explained with the use of utility. R.U.T. assumes that individual consumers select products because they yield the highest level of utility and as such the probability of selecting a product increases as the utility associated with it increases. However, despite the fact that consumers are aware of their preferences, some of their preferential elements cannot be observed by researchers. This is why preferences have to be treated as random by the researcher and hence the individual's utility function has two components: the deterministic and the stochastic (error term). After the selection of the preferred (the one that leads to the highest utility) alternative (observed choice), the researcher can estimate a number of utility functions. Subsequently, the choice probabilities that are related to the hypothetical alternative options presented to the subjects can be calculated.

3.4.2 Lancaster's model of consumer demand

Lancaster has suggested an alternative model of consumer behaviour which may prove a more useful basis for analysis in various areas. According to his model, the consumer is not interested in the products themselves but rather in the attributes they hold. For example, the characteristics of a food product would include the nutrients, such as calories, protein, vitamins etc. The consumer receives satisfaction from the consumption of the product's characteristics. The relationship between consumer satisfaction (in other words **utility**) and the consumption of characteristics is defined by the utility function:

$$U = U(Z_1, Z_2, \dots, Z_m) \quad (3.1)$$

where Z_i denotes the total amount of characteristic i consumed. (Recall that the utility function in the traditional theory is specified in terms of the quantities of goods consumed). It is assumed that each characteristic is quantifiable and can be objectively measured. The total amount of the i_{th} characteristic possessed by a set of market goods is the sum of the amounts of the characteristic possessed by each good separately:

$$Z_i = b_{i1}Q_1 + b_{i2}Q_2 + \dots + b_{in}Q_n = \sum b_{ij}Q_j, \quad i = 1, 2, \dots, r \quad (3.2)$$

where b_{ij} is the quantity of the i_{th} characteristic possessed by a unit amount of the j_{th} good.

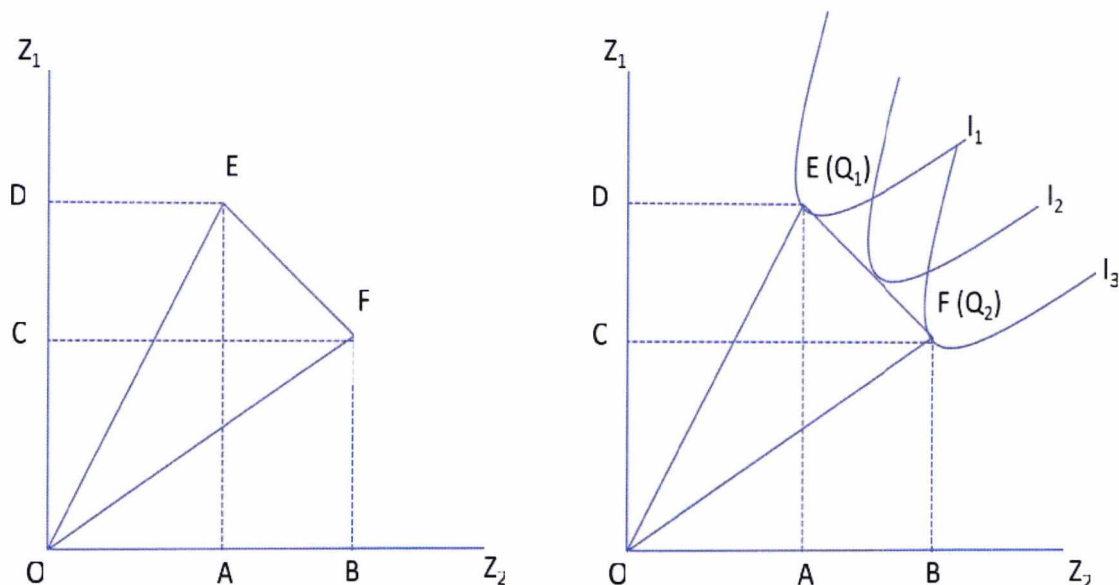
Formally the consumer problem is specified as maximising the utility function (equation 3.1) subject to equation 3.2.

Given prices and the level of income, the maximum amount of each characteristic which a good can provide can be determined and consumers with the same income will face the same range of choices in terms of characteristics. The consumer problem will then be to find the goods or combinations of goods which are efficient in the provision of characteristics and which yield the maximum level of utility. It is assumed that consumers will differ in terms of their tastes and preferences regarding the characteristics, not in their perceptions of the efficient set of choices.

To illustrate the nature of consumer equilibrium in Lancaster's model, let us assume that there are two food products (Q_1, Q_2), each possessing two characteristics, say nutrients $\{Z_1, Z_2\}$. The product Q_1 provides the nutrients in the proportion OE, while Q_2 offers them in the proportion OF in figure 3.2. Note that in this figure the axes are measured in units of the characteristics. Given the prices of the market goods and given a level of consumer income, the maximum amounts of the characteristics which can be obtained from Q_1 are denoted by A and D and from Q_2 by B and C. However, combinations of the two food products

can also be purchased and so the efficient set of consumer choice is indicated by the line EF. Consumers, since they maximise satisfaction, will be in equilibrium somewhere along this line.

Figure 3.2: Consumer equilibrium in Lancaster's model



The precise position of an individual consumer's equilibrium will depend on his or her indifference map. Fig. 3.2(b) presents three possible solutions. Therefore, one consumer may choose to purchase only product Q_1 (indifference curve I_1) or a combination of the two food products (indifference curve I_2) or finally may purchase only product Q_2 (indifference curve I_3).

Lancaster's theory can be useful in a number of areas in which the traditional theory is barren. Firstly, the theory suggests that goods which provide the same characteristics will be closely related in consumption (and in particular will have larger cross-price elasticities). Thus the demands for beef and chicken will be more closely related than the demands for beef and, say, newspapers. Although this may seem intuitively obvious, it is not a conclusion which can be drawn from traditional theory. Traditional theory has nothing to say about which products are close substitutes. Secondly, the theory helps us to understand two pervasive

phenomena of everyday life: product differentiation and advertising. Since consumers will have different tastes regarding the attributes of market goods, it may pay firms, or indeed the same firm, to produce an array of brands of the product, each having slightly different characteristics. Nor is this solely a feature of markets in manufactured goods. The variety of retail food products is also evidence of product differentiation. Even for relatively unprocessed food products such as fruit and vegetables, growers continually search for new varieties, not in order to obtain higher yields (although in some cases this may be a prime concern) but to alter the characteristics of the product in terms of colour, taste, texture etc. Advertising, on the other hand, can be used as a means of persuading consumers to purchase one brand rather than another, thus altering the consumer's preference map.

3.5 Proposed Conceptual Framework for the current research

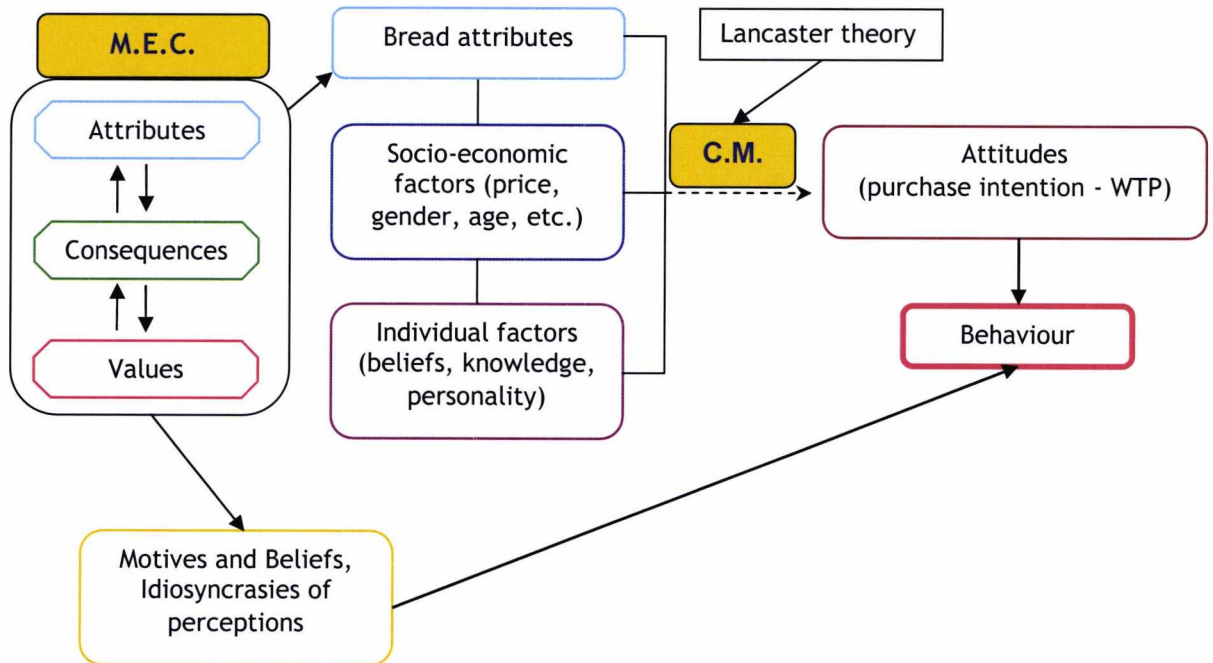
According to what has been described in the previous sections, the problem is to generate an economic choice model powered by insights from behavioural research to acquire further understanding on the decision-making process followed by individuals. For that reason, we propose a model that brings together the D.C.M. and M.E.C. model. The way the model is structured can be seen in figure 3.3.

Figure 3.3 can be imaginably divided in three parts. The first part is the one that refers to the M.E.C. model, which is employed in the first part of the research in an attempt to capture the motivation behind consumers' decisions.

M.E.C. model, which is presented in detail in the following chapter, is applied through its operational vehicle, namely laddering. M.E.C. model seeks to understand human actions (in this case food buying behaviour) through the

perceptions people hold towards various food products. It tries to understand how people behave as a means of satisfying different levels of needs.

Figure 3.3. Conceptual framework of the research



Source: Author

The M.E.C. model suggests that concrete attributes link with self-relevant and more abstract associations, which are represented by consequences and values. It is with the use of laddering that these three concepts are associated with each other. Attributes are the physical properties, the characteristics of the product in question (in this case bread). Consequences, the next level of abstraction, are the outcomes resulting from the attribute. Consumers relate outcomes with the use of the product. In this case, consequences result from the consumption of bread. Finally, at the last level, values are derived from associations of consequences and personal value system (Wansink, 2005). Values, which are accredited to profound emotional needs, are most of the times the central reason why people buy products. As easily one can understand, the

associations between attributes, consequences and values as well as their strength play an important role in affecting a purchasing decision.

Attributes do not reveal many things with regard to why people buy a product. Attributes describe the product precisely, however, they do not constitute the motive behind which a purchase is hidden. The next step in the attempt to understand consumer behaviour is to look at why the product attributes identified by consumers are important to them. This is the beginning of disclosing personal motivations for buying the product. The key question people are being asked after providing the product's attributes is "why". *Why is this attribute important to you?* This generates a sequence of answers that have to do with emotions the individual associates with the product. This process continues up to the point that a value will be revealed. Usually, the number of consequences mentioned by the consumer is large until one value is identified. This is because they show the way each product attribute is related to personal values of the individual. Recently, as a result of the great number of consequences different types of them have been developed and used for the implementation of M.E.C. model by way of laddering. These have been named physical and psychosocial consequences. The former comprise the direct result from the consumption of the product, while the latter correspond to the psychological or social effect the consumption of a product might have. Some remarks that need to be done in relation to the arrows shown in figure 3.2: two direction arrows have been used inside the "box" of M.E.C. The reason is because although an individual follows the path from attributes to consequences and then to values so as to reveal their behaviour, it is actually values that drive the choice of a product. It is the system of values that each one of us has that decides about the attributes, and therefore preferences. This is why an opposite direction arrow has been placed too. The arrow that connects the M.E.C. model with the "beliefs and motives" clearly implies that by means of that one can gain insight into the personal motives of a consumer. This in turn means that when one knows the personal reasons why people act the way they do is in a position to predict their actual behaviour. This is the meaning of the arrow linking "beliefs

and motives” with “behaviour”. Finally, the last arrow originating from the M.E.C. model construct and ending in “bread attributes” construct, specifies the product characteristics that were identified after the analysis of laddering interviews and which were used to inform to subsequent piece of research, namely the C.E.

The imaginable second part of the conceptual framework is related to the research undertaken after the implementation of laddering interviews. This is a C.E., which combines the attributes identified in the earlier part of this research (laddering interviews) with other important information that affect consumer behaviour. This information includes aspects such as individual characteristics (eg. beliefs, personality characteristics) and socio-demographic factors (eg. gender, age, education). Therefore, the three constructs in the central part of the conceptual framework represent the various features of C.E. that will be included in the survey instrument for the collection of data. The C.E. and the stated preference techniques have their foundations on Lancaster’ theory of demand. This is why a separate construct “Lancaster’s theory” is mentioned in the conceptual framework. Lancaster’s theory is also discussed in more detail in the next few pages. By means of the application of C.E. the researcher can identify the most important attributes of the product and taking into account the price attribute to export people’s willingness to pay, in other words the attitude people hold towards a bread purchasing decision, so as to enjoy the benefits from the consumption of a better bread product.

With the use of C.E., the relative importance assigned by individuals to each of the attributes can be calculated as well as the relative importance assigned to each of the different levels of the attributes. Also, estimation of the demand of a product is possible, which will give an indication of the market share and future sales, based on how the changes on the product’s characteristics will affect them.

There is a rapidly growing literature examining consumer attitudes towards food products such as functional food that have enhanced benefits or use ingredients that are the result of scientific modifications or new technologies.

Comprehensive reviews of these literatures are provided by Siro et al. (2008) and Pothoulaki and Chryssochoidis (2009). There is also a related literature that is also rapidly increasing in size that examines how consumers respond to food packaging and the information conveyed about the products they are willing to buy, eg, (Grunert, Klaus & Wills, 2007, Cowburn & Stockley, 2005). Within these literatures we have focused on research that has employed M.E.C. analysis and stated preference surveys relating to functional foods, and bread in particular.

3.6 Advantages of the M.E.C. model

One of the strengths of the M.E.C. model and of laddering in particular is its ability to build bridges between potentially inconsequential choices and important personal values. Although it is true that high-level goals or values may represent the underlying motivations explaining the reasons why consumers make the choices they do (Gutman, 1997).

As Reynolds and Gutman (1988) note, the M.E.C. model can provide several valuable types of information. In particular, as Costa et al. (2004), for the case of a food product, this information can be summarized in the following: the main benefits consumers anticipate to gain from foods (i.e. the consumer needs), the concrete and abstract product characteristics consumers use to infer the delivery of main benefits (or the non-existence of negative consequences) associated with the consumption of the product and finally the values and goals establishing the relevance of the different benefits for consumers. All this information can prove an essential guide for decision makers and for those involved in the research and development of new food products. Specifically, it can provide the basis for: a) segmenting consumers with respect to their values orientations for a product class or brand and positioning the new products in the marketplace, b) the design and development of advertising strategies to communicate the new product, c) evaluating competitive advertising and finally

d) assessing brands or products in a fashion similar to the use of more traditional ratings.

3.7 Advantages of the Discrete C.M. approach

Allenby et al. (2005) argue that from the perspective of collecting market data, choices have a number of attractive properties, particularly when compared with alternative tasks. Firstly, actual choices are those that take place in the marketplace, not ratings or rankings. Secondly, because respondents make choices every day, they appear ready to make hypothetical choices about almost anything. Finally, assuming that the repeated choices in a choice experiment correspond to those in the marketplace, choices can be directly related to market share. This property provides both theoretical and intuitive justification for the use of D.C.M.

Furthermore, Adamowicz et al. (1998) indicate a number of advantages when employing D.C.M.: a) control of the stimuli is in the experimenter's hand, as opposed to the low level of control generally afforded by observing the real market place, b) control of the design matrix yields greater statistical efficiency and eliminates collinearity (unless explicitly built into the design), c) more robust models are obtained because wider attribute ranges can be applied compared to what can be found in real markets and d) introduction and/or removal of products and services is straightforwardly accomplished, as is the introduction of new attributes.

The last point, in fact, is often practically impossible, but certainly always difficult, in actual markets.

The authors conclude that D.C.M. is not a theory of behaviour, but it represents a means, with the assistance of which *behavioural data* from consumers can be generated

In summary, C.M. and M.E.C. are two distinct, nevertheless, complementary methodologies that are combined in this research in order to gain understanding on people's perception of bread with health promoting properties and on the value they place on the product, both in terms of value in use and value in exchange.

In the next two chapters the application of each methodology is explained and the results are discussed. We begin with M.E.C. model, which forms the basis for the application of the C.M., as the former provides the attributes for the implementation of the latter. The C.E. employed is explained in the chapter to follow M.E.C. model and the results of the estimated models are presented, with particular emphasis on the preference heterogeneity discovered.

CHAPTER 4

MEASURING CONSUMER ATTITUDES AND VALUES THROUGH THE M.E.C. MODEL

This chapter will introduce and explain the M.E.C. model. This model is employed in this thesis to conduct the first piece of research. In this chapter it is explained why the M.E.C. is relevant to the general objectives of the thesis in relation to consumer food choice. In addition, the development of the ideas presented in this chapter help to explain why the method of analysis conducted in this part of the thesis is the Laddering Methodology. To this end we introduce and explain the basic principles that underpin the Laddering Technique. This will help the reader to understand the link between M.E.C. and the Laddering methodology which is employed in the subsequent analysis.

4.1 Means-End Chain Theory

Great attention has been given to studies exploring consumer attitude and behaviour using cognitive structure approaches (Peppers & Gengler, 2003, ter Hofstede et al., 1998, Reynolds & Perkins, 1987, Reynolds, 1985, Gutman, 1984, Rosenberg, 1956). One of these methodologies is the M.E.C. model.

M.E.C. has experienced significant popularity among both the academics and practitioners. A considerable number of studies have already been conducted using this approach (Bonne & Verbeke, 2006, Padel & Foster, 2005, Brunso, Scholderer & Grunert, 2004, Urala & Lahteenmaki, 2003, Vriens & Hofstede, 2000, Claeys, Swinnen & Vanden Abeele, 1995, Klenosky, Gengler & Mulvey, 1993). This is because M.E.C. is a very useful and engaging method to reveal the importance hidden behind salient product or service attributes, as well as the meaning people assign to different characteristics (Russell, Busson et al., 2004).

M.E.C. constitutes a research model that focuses on the associations that exist between the product's or service's attributes (the so-called "means"), the relevant consequences that come as a result of those attributes and the values that characterise each individual (Reynolds & Gutman, 1988). The fundamental concept behind M.E.C. model is that consumers' decisions – and therefore behaviour – come as a result of the self-relevant consequences that arise from that decision (Poulsen, C. S., Juhl & Grunert, Unknown). That is to say that the model aims at explaining the people's behaviour by taking into account the satisfaction from the achievement of the certain goals or values.

4.2 Description of the M.E.C. model

The M.E.C. model illustrates the associations between people's knowledge and understanding about product (or service) attributes with the awareness of the relevant consequences that result from choosing that product (or service) and finally with the personal values that direct people's lives. M.E.C. theory, as described, is analogous to research on attitudes introduced by Rosenberg's (1956) Expectancy – Value theory. This theory states that people act in various ways and their behaviour results in consequences that individuals associate with certain product's characteristics. These consequences or benefits arise when the behaviour is initiated. For example, if an individual thinks about buying shoes and associates a pair of shoes with comfort (benefit that he/she is looking for) they offer, it is likely that the person will buy the shoes. M.E.C. model provides the explanation as to why the resulting consequences are influential to consumers. The reason is the personal values (Reynolds & Gutman, 1988).

According to Gutman (1982), the conceptual model for M.E.C. has its grounds in two central assumptions of consumer behaviour:

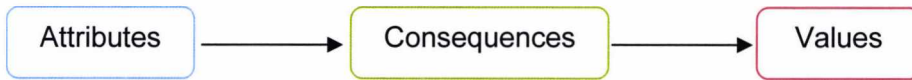
- a) Values, as defined here (consumers' desired end states), constitute the driving force in leading choice behaviour
- b) People categorise the immense variety of different products based on whether they can satisfy their personal values.

This clearly implies that individuals are able to categorise products based, not only on the product-class type of product categories, but also on product functions. Therefore, although categorisation of products depends on a product's attributes, the selection of them is motivated by one's personal values. As Fotopoulos, Krystallis and Ness (2003) explain that although categorising is determined by the product's characteristics, the selection of attributes to be focused on is influenced by personal values. This clearly means that values, representing the more abstract and broad level of the chain in the M.E.C. model or of cognitive structures, are converted to the less abstract and more tangible level, where products are categorized into classes.

In addition to the two assumptions described above, two more can be added to complement them. Firstly, all consumers' actions or behaviour have consequences (not necessarily the same). Secondly, certain behaviours are linked in people's mind with certain consequences (Gutman, 1982). Reynolds and Gutman (1988) argue that consumers learn to choose products which are formed by or contain attributes that are required to reach the desired end state.

As previously has been mentioned, M.E.C. is a popular framework with which to study the latent meanings assigned by consumers. In the most general structure of the M.E.C. model, people have three levels of product related knowledge: the attributes, the consequences resulting from using the product and finally the values that might be fulfilled by making use of the product. The combination of these three levels of consumer knowledge forms the simpler hierarchical chain that is depicted in figure 4.1 below.

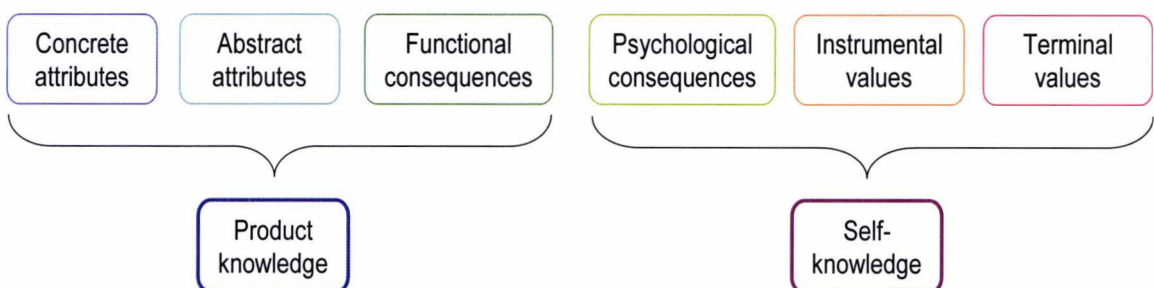
Figure 4.1. Simple form of hierarchical means-end chain



Source: Author

It is this simple form of associations between product characteristics, consequences arising from its consumption and the broad goals or values that may be satisfied from its use that is called M.E.C. because individuals see the product's attributes as the means to the desired end state, represented by values. The chain is the set of connections between attributes, consequences and values. Olson and Reynolds (2001) cite Walker and Olson (1991), who have suggested a more intricate representation of chains. They proposed the six-level type of connection between the elements of a chain. The means-end model suggested divides each piece of the simple hierarchical chain into two separate elements of more thorough description. The new means-end chain builds bonds between each elements starting from the most concrete and tangible attributes of the product or service in question and ending up to the more abstract and intangible personal objectives. This is depicted in figure 4.2 below.

Figure 4.2. Six-level means-end chain connecting product knowledge with self-knowledge



Source: (Walker & Olson, 1991)

However, as Olson and Reynolds (2001) explain, most researchers recognise that the complicated six-level model described above is not necessary to be used in most applications (either theoretical or practical) of the model.

Consequently, a four-level model has been eventually adopted by researchers (Chin-Feng, Hsien-Tang & Chen-Su, 2006, Leppard, Russell & Cox, 2004, Russell, Busson et al., 2004, Russell, Flight et al., 2004, Botschen & Hemetsberger, 1998) when M.E.C. was to be employed. This model represented in figure 4.3.

Figure 4.3. Four-level means-end chain



Source: Author

As can be seen in figure 4.3, the object's properties are translated into functional consequences resulting from the consumption or use of the product in question and to psycho-social consequences explaining individual's psychological characteristic. Finally, these lead to the elicitation of personal values that have an influence on the decision making process.

4.3 Historical overview of M.E.C. – How the model was formed initially

The concept behind M.E.C. is based on a main simple but strong assumption, namely individuals can deal with a priori value orientations and the statements that reflect such highly personal meanings. This, as Valette-Florence and Rapacchi (1991) explain, intimates two implied assumptions:

- a) that respondents are aware and understand the personal motivations; and
- b) that they respond accurately.

Despite the fact that these assumptions are known to practitioners and researchers, they had not been developed and amalgamated to establish a comprehensive framework to be used for the understanding of consumers'

decision making processes. The formation of M.E.C. model, however, constituted an important advancement towards that direction and has helped in recognising and identifying people's motivation behind decision making.

The conceptual framework as well as the operational instrument (the Laddering Technique), through which the model is implemented, evolved during the last two decades as a result of research by Thomas Reynolds and Jonathan Gutman. Nevertheless, the origins of the M.E.C. model go further back, when economists tried to estimate consumers' utility by taking into account the value of the consequences of their actions (Olson & Reynolds, 2001).

In the past, academics in the area of marketing have looked into various features of a Means-End model. Examples are Howard and Sheth (1969), and Howard (1977), who touched upon aspects of M.E.C. Also, Young and Feigen (1975) of the Grey Advertising Inc. developed a similar model to the M.E.C. model, called benefit chain model that was used to dimensionalise people's feelings about products or services qualitatively as well as quantitatively. In line with them, Myers (1976) presented a benefit structure analysis that could help in structuring consumer markets. Geistfeld, Sproles, and Badenhop (1977), Cohen (1979), and Hirschman (1979) added features and contributed to the progress of what today is called Means-End model. All of these advancements have had various common traits, out of which one can recognize the implied M.E.C. model. All authors stressed that consumers' product knowledge is present at diversified levels and that there exists a hierarchy among these levels. Every author describes the proposed model in a different way than the other. All of them, nevertheless, report at least two levels of abstraction: one with the concrete and tangible product attributes and another one broader that contains subtle personal feelings, values and beliefs.

There were a number of additional ideas that offered substantial help in forming the Means-End model. As Veludo-de-Oliveira et al. stated in (2006), Kelly (1955)

developed a general theory to interpret and anticipate individuals' experiences. Kelly's work supported the progress of cognitive interpretation and enriched the belief that a set of internal processes such as thoughts, images and constructs can be used for the interpretation of behaviours. Moreover, Haley (1968) introduced the term of benefit segmentation, according to which the benefits that people base their product buying decisions are the underlying reasons for true market segments. Of course, a contributor to M.E.C. model is Rokeach (Rokeach, M., 1973, Rokeach, Milton, 1970) with his valuable work on values and the list of values he created. At the beginning of 1980, researchers attempted to combine the scholarly concepts and ideas with insights from cognitive psychology to form what is now called the M.E.C. approach (Reynolds & Gutman, 1988, Gutman, 1984, 1982).

The spirit of the M.E.C., in relation to consumer decision-making, according to Reynolds and Gutman (1988), is that individuals form preferences and show behaviour accordingly in order to achieve certain – important for them – goals (values). However, their actions generate consequences and they have “educated” themselves to relate these consequences with the product's attributes. What has just been described is a relationship between the attributes of a product/service, the outcome (consequence) that result from obtaining the product and the salient personal objectives (values) each one wants to achieve. In other words, when consumers are about to make a decision they take into account not the product itself but how they can reach their desired end state by choosing that product, which offers those attributes.

Once a marketing problem has been clearly framed as a distinct consumer decision, the means-end approach (laddering interviews and data analysis) can be used to address two key issues concerning consumer decision-making: What choice criteria do consumers use to evaluate and choose among the choice alternatives? Why are these choice criteria personally relevant to these consumers?

To dig deeper into consumers' decision-making process, it is especially critical to identify the choice alternatives that each consumer considers in the main decision of interest. The specific choice criteria and their particular relevance (meaning) to the consumer are highly constrained by the unique contextual details of the choice situation. The decision context includes the choice set of alternatives that the consumer considers. For example, the researcher might ask: "Over the past year, what brands of soft drinks did you buy?" Thus, a buyer of cola soft drinks might identify three brands that he or she sometimes buys — Coke, Pepsi, and Dr. Pepper. These brands constitute the *consideration set* of choice alternatives the consumer might consider on any given choice occasion. This consideration set of choice alternatives has a critically important contextual influence on the choice criteria.

4.4 Micro and macro approach

The application of value theory and research to understand consumer decision making in relation to consumer products and services has been divided into two fundamentally discrete approaches (Reynolds, 1985). The "macro" approach, with its grounds being in sociology and the "micro" approach, which has its foundations in psychology research.

The "macro" approach is a standard survey research methodology, which endeavours to categorise respondents into different segments, based on their value orientations. However, the "macro" approach only provides part of the picture (the general value orientations of the segments examined). The rest of it (the relation between the product and the personal meaning it has for people's life) is captured by the "micro" approach, which makes use of in-depth qualitative techniques to explain the consumers' motivations.

Built into the "macro" approach is the assumption that subjects can cope with value orientations and the statements that reflect such highly personal meanings. This assumption is supported by two hidden sub-assumptions:

- a) that individuals correspond with these personal motivations; and
- b) that subjects choose to respond accurately.

Clearly, this implies that consumers actions have consequences, positive or negative, associated with every decision taken. However, this does not mean that all consumers will face the same benefit or the same loss by acting similarly in an analogous circumstance. This is because the resulting consequences have their roots to more abstract meanings, which correspond to higher personal values.

4.5 Review of previous research utilised the M.E.C. model

Since the introduction of M.E.C. model and its operational Laddering methodology into the consumer behaviour research field, many academic researchers as well as practitioners have utilised it to reveal the perceptual orientations of individuals. This section discusses previous studies that have utilised M.E.C. model in various field of research and highlights the most important aspects of them.

We begin with the work of Botschen and Hemetsberger (1998) who investigated the degree to which a marketing standardization program could be adopted by companies that operate across different countries and highlighted the defining factors for a marketing standardization program. They made use of M.E.C.

approach and designed a hard-Laddering² based questionnaire, which was sent to three European countries. Out of 10,000 distributed survey instruments, just over a thousand of them were returned and a hundred from each country were selected for the analysis. All in all, the results indicated interesting areas for standardisation and adaptation of marketing programs in different markets. In a similar field, Guenzi and Troilo (2006) attempted to explore the nature of marketing – sales integration and how it contributes to developing marketing capabilities and superior customer value.

In the area of leisure and tourism research literature, Klenosky et al. (1993) employed the M.E.C. model to try to understand the factors influencing ski choice destinations. They employed a sample of ninety (90) individuals, who were recruited while attending a ski show. Only subjects that were at least 22 years of age and had been on at least two ski vacations in the past five years prior the study were selected for the interviews. Participants were given a list of major ski destinations and asked to indicate which of them they had been to. Randomly the interviewer selected one and the asked the participant why he/she preferred that destination over the other two. Some basic distinctions were elicited and for each of them the soft Laddering was employed to identify higher levels of personal relevance.

More specifically, the application of M.E.C. theory in the area of food has been extensive. Several investigators have approached issues related to food by using this model. For example, Reynolds and Gutman (1988), the founders of MEC model, used data from a study related to a wine cooler to demonstrate how

² Hard and soft Laddering are two distinct methods of conducting the Laddering interviews. Hard Laddering is the way to administer Laddering methodology using questionnaires. In other words, with hard Laddering respondents are forced to follow an attribute-consequence-value structure ladder by ladder. On the other hand soft Laddering refer to a face-to-face semi-structured interview, during which the generated means-end structure might not be obvious to the subject, as it is revealed by the analyst in the coding process.

the model operates and how the analysis is performed. They interviewed a sample of sixty seven (67) subjects regarding wine coolers and illustrated how useful the model is in recognising the way consumers translate product attributes into personal meaningful associations with respect to their system of personal values. Using parts of the interviews, they highlighted the difficulties of such interviews (soft laddering) and suggested ways to handle sensitive issues or respondents' unwillingness to articulate an answer. They, also, during the presentation of the way the analysis should be conducted, noted the difference of this methodology from other traditional qualitative techniques. That is, although qualitative methodology in nature, the analysis is carried out in a rather quantitative manner. Additionally, the authors discussed the applications of M.E.C. model, noting that they depend on the ability of the model to elicit from respondents the true basis for any meaningful linkage they have with the relevant product.

Bech-Larsen et al. (1996) employed M.E.C. to measure the means-end chain for a low involvement product, vegetable oil, exhibiting at the same time a promising way of linking means–end data to overall product perceptions. They recruited 90 Danish respondents, all of whom were females with at least one dependent child at home and regular buyers of vegetable oil. The sample was divided in three groups according to three scenarios for oil use (oil for salad dressing, for frying and no application scenario). Initially, subjects were asked to rank different types of oils in terms of preference, with regard to one application scenario and mention the reasons for such a ranking. Then the participants were asked to evaluate each of the attributes mentioned in the first stage. Finally, after the evaluation of the attributes the interviewing technique started for the attributes that carried greater importance for the individual.

Jonas and Beckmann (1998), using two types of the Laddering Technique (hard and soft Laddering) as the operationalisation of M.E.C. model attempted to reveal consumers' perceptions with regard to different products that offer health

benefits beyond the nutritional value. The study took place in two different countries (Denmark and the U.K.) and the products used for the laddering interviews were yoghurt, butter (for both countries), juice (Denmark) and breakfast cereals (U.K.). After the analysis of the data collected from forty (40) respondents (20 from each country), the authors concluded that there are differences between the two types of Laddering technique, as well as differences in the perceptions of functional foods between British and Danish respondents.

Fotopoulos et al. (2003) used the M.E.C. model to obtain information on Greek consumer motives that underlie the wine buying behaviour with emphasis on wine produced from organically grown grapes. A convenience sample of forty nine (49) respondents (which was divided in organic and non-organic buyers), drawn from the City of Athens was employed. The requirements were for the participant to be the person responsible for household shopping and have bought at least one bottle of wine a month prior to the survey. Subjects were shown a list of wine attributes and asked to rank them in terms of importance. The most important of them were used as the starting point for the soft Laddering interviewing technique. The authors concluded that M.E.C. approach can assist researchers in segmenting population based on “true” benefit.

Russell et al. (2004) improved the methodological side of the structured version of Laddering by comparing two types of carrying it out. Chema et al. (2006) exploring possible marketing strategies for biotech functional foods, drew a random sample of 60 households consisted of females with children who are regular buyers of yoghurt. They used Laddering to elicit cognitive structures that relate functional attributes of yoghurt produced by milk and soybean and self-relevant knowledge.

Bread, however, is a product that has not been dealt with in the literature to date. In Chapter 2, it was highlighted that bread is consumed by almost 100% of

the U.K. population. It is interesting and important to gain an understanding into what are the determining factors that play an important role in choosing bread and how these are related to personal values across segments of consumers. Furthermore, the results of this research will be employed in our subsequent choice experiment relating to bread choice and product attributes.

It is common practice focus groups to be used in order to develop a list of attributes for CE. However, the use of M.E.C. analysis gave the investigator the chance to develop a richer understanding of values and motivations underlying attribute selection. Laddering interviews in combination with M.E.C. analysis assisted in identifying associations between product attributes with the resulting consequences from the consumption of the product. This approach allows us understand whether or not it is simply the attributes of a product or deeper consumer motives that steer food choice. It has to be stressed though that, to the best of author's knowledge, up to date there is no scientific evidence that the use of laddering technique generates the finest results supplying the subsequent C.E. with the best set of attributes. Perhaps, this could be a subject of future research.

To sum up, the M.E.C. approach has been used in various occasions by both academic and business researchers. It is particularly valuable in helping investigators understand explicit aspects of consumer decision making process, including purchase choices at the product category level. It is clear that the insights from the M.E.C. approach are of particular importance to academic researchers of consumer behaviour, as they can gain innermost knowledge of the processes, on which consumers base their decisions and therefore draw a clearer picture of the choice mechanisms. Professionals can also use the information obtained from the analysis of laddering data to develop marketing and communication strategies that are intended to impel those decision processes.

4.6 Analysis of data obtained from M.E.C.: The Laddering Technique

After the data is collected, the primary task of the analysis is to content analyze all the elements mentioned. The procedure starts by recording every single ladder stated by each individual. By doing so, the analyst can also develop a general idea of the types of elements included in each ladder. This will prove very useful as the next step is to construct a set of summary codes, which will express all components contained in all ladders. This can be accomplished by categorising all responses into the three basic levels (attributes, consequences and values) or into the four- or six-level model (based on which one has been used for the study) and then assigning each element under a summary code.

Evidently, the researcher wants to capture with the summary codes and as close as possible the meaning of as many elements as possible. This is because it is important to get replications of one ladder mentioned by many different individuals. However, the researcher needs to be careful because if the summary codes are too outspread, then a mine will be present in the foundations of the analysis. For that reason the analyst has to always bear in mind that it is important to concentrate on meanings that are fundamental for the analysis and that it is the relationship between the elements – rather than the elements themselves – that is critical during this process.

Continuing with the analysis, the next step after the creation of summary codes is the production of a matrix, in which each row corresponds to an individual respondent's ladder. It is easily understandable that a consumer might have articulated more than one ladder. Therefore, more than one row in that matrix will belong to the same respondent. This, so-called, summary score matrix will act as the main source for the establishment of the prevailing connections between the elements.

Two more steps until the analysis is over. The last but one stage of analysis is the creation of the Summary Implication Matrix (S.I.M.). This is a square matrix that reveals the number of times each element is linked with each other element.

At this point, a distinction of the types of connections that can be found between two elements in a ladder needs to be made. There are two categories of linkages between the elements: direct and indirect.

As an aside, direct connections are those that exist between adjacent elements, while indirect connections are those that exist between two elements when one or more other elements are interpolated between them. As an example, in figure 4.4, one can point out direct as well as indirect relations among the elements of the ladder. Thus, "leather material" and "makes me feel trendy", "makes me feel trendy" and "have an improved image", "have an improved image" and "self-fulfilment" signify direct connections. In the same ladder, though, the following relations: "leather material" and "have an improved image", "leather material" and "self-fulfilment" and finally "makes me feel trendy" and "self-fulfilment", describe indirect connections between the elements of the ladder.

Returning to the discussion about the S.I.M., it is important to clarify how one can read the matrix. The resulting S.I.M. indicates the number of times each row-element leads to each column-element, either via direct or indirect links. The numbers in the matrix's cells are expressed in fractional form. The number to the left of the decimal denotes the number of direct linkages between the two elements, while the number to the right of the decimal denotes the number of indirect linkages.

When the researcher designs the matrix, he/she needs to decide whether a link stated by an individual will count each time it is mentioned by the same person or will only count once, regardless of how many times it was mentioned by the same respondent. As Reynolds and Gutman (1988) argue, the salience of an

element is partly a function of the number of relations it has with other elements. Therefore, counting all linkages (even if they are repeated) between elements seems sensible, although this might create setbacks for the construction of the map that will follow.

The final step of the analysis of Laddering data is the construction of the Hierarchical Value Map (H.V.M.) and the determination of the dominant perceptual orientations. H.V.M. are built using the data at the aggregate level. For that reason and in order to avoid confusion a clarification is required. Using the terms ladder and chain one may get confused as the two words have a similar meaning. The difference though between the two is that “ladder” refers to the elements elicited by each individual respondent while “chain” refers to the sequence of perceptual orientations at the aggregate level. The most commonly used tactic to build H.V.M. is to plot all relations among the elements above different cut-off levels. This helps the analyst to estimate different results and choose the one that hosts the most stable set of relations and generates the largest amount of information. There is no general rule, though, as to what is the best or most suitable cut-off level. The researcher can take into account only the direct linkages or the total number of them, both direct and indirect. The rule of thumb is to try to minimise the number of crossing lines contained in the H.V.M. As an aside, the number of relations contained in the H.V.M. when compared to the number of relations between the elements included in the S.I.M. can provide the researcher with an index of the ability of the map to communicate the aggregate relations. The best way to construct the H.V.M. is to start from the first row of the S.I.M., where a value above the random cut-off level exists. Finally, when the H.V.M. has been drawn, the investigator can now identify the governing linkages in the map by inspecting and evaluating the strength of the intra-chain relations.

H.V.M. offer considerable knowledge to the researcher, which one can use in order to divide consumers into different segments based on their values

orientation for the product in question. They can also serve as the basis for designing advertising strategies.

4.7 Introducing the Laddering technique

The pages that follow in this chapter present the implementation of the M.E.C. model through its operational vehicle, the Laddering methodology. To implement this method, a survey was conducted with respondents from the University of Kent. The data obtained from this survey are analysed using the methods outlined in Reynolds and Gutman (1988). The main feature, of the results we present, is that they help to explain consumer attitudes and preferences for bread. Specifically, we begin by describing the main characteristics of Laddering interview technique and then explain how the Laddering technique was implemented to measure the U.K.'s public behaviour for bread. At the end the results we present findings which identify motivational and cognitive structures of U.K. bread consumers that offer an explanation as to what drives their purchasing behaviour.

We begin by explaining how the Laddering technique works. We then discuss the design of the survey employed in this study, followed by an examination of the survey data collected. Finally, we present results and offer some concluding thoughts.

Laddering is the qualitative research method through which M.E.C. is implemented. Reynolds and Gutman (1988) define laddering as

“an in-depth, one-on-one interviewing technique used to develop an understanding of how consumers translate the attributes of products into meaningful associations with respect to self, following Means-End Theory”. (p. 12)

In Laddering the researcher engages in a discussion with the respondent using a series of directed probes³ typically expressed by the “Why is that important to you?” question. Clearly, the intention behind it is the construction of connections between the perceptual elements (attributes (A), consequences (C) and values (V)). It is these linkages that help the researcher to identify differences between and among products in a particular product class. Distinctions at the different levels of abstraction, which are represented by the A – C - Vs yield more personally relevant ways in which products are grouped and categorised. In other words, these higher order knowledge structures provide an outlook of how the product information is processed by the consumer from a motivational angle.

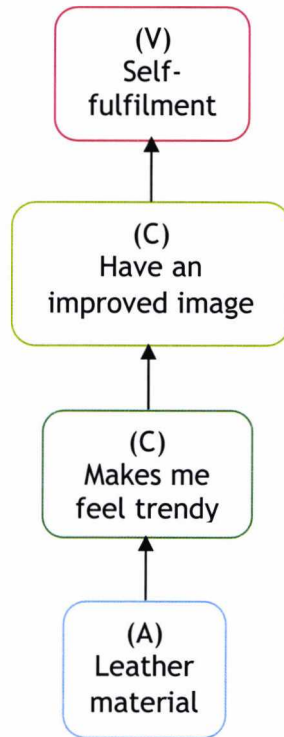
In figure 4.4, a typical example of such a ladder is presented. This figure refers to the example provided in the questionnaire employed in this research in order to provide a visual representation of the model and assist respondents complete the Laddering task of the study.

At the aggregate level, a set of interrelated elements can provide very useful information as to why a product characteristic or a consequence (arising when choosing or consuming the product) are important and identify the personal meaning they have for the consumer, by connecting them to personal values. The fundamental idea when using the Laddering technique is to maintain the focus on the person rather than on the product in question.

Interpretation of this type of qualitative information allows the investigator to gain understanding of consumers’ underlying personal incentives with respect to choosing a certain product. Every single connection between the elements

³ The term is used widely in the laddering literature and it means exploratory (in-depth) questions. The researcher, in his/her attempt to dig deeper and identify consumer motivations, when a response is articulated by the respondent uses the continuous probe “...and that is important for you because...”, aiming to uncover the underlying – hidden reasons for a decision taken by consumers.

Figure 4.4. Motivational perspective of a ladder



Source: Author

(from the attribute to value level) constitutes a potential perceptual orientation of how the product is perceived. Because of that, M.E.C. model represent an appealing way to differentiate a product and therefore create a competitive advantage not by focusing on its attributes but by communicating how one can reach their desired end states. Thus, in effect, we are creating an “image positioning” which can be the basis for advertising strategies.

Laddering, as developed by Reynolds and Gutman (1988) is an in-depth one-on-one interviewing technique with the aim to reveal the associations consumers place on product’s characteristics and their motivation for choosing the product. It can be carried out in a number of different ways. One distinction can be made depending on the way used to collect the data. Consequently, this generates two different types for conducting laddering interviews, soft and hard Laddering. The term “soft Laddering” concerns a dialogue between the interviewer and the

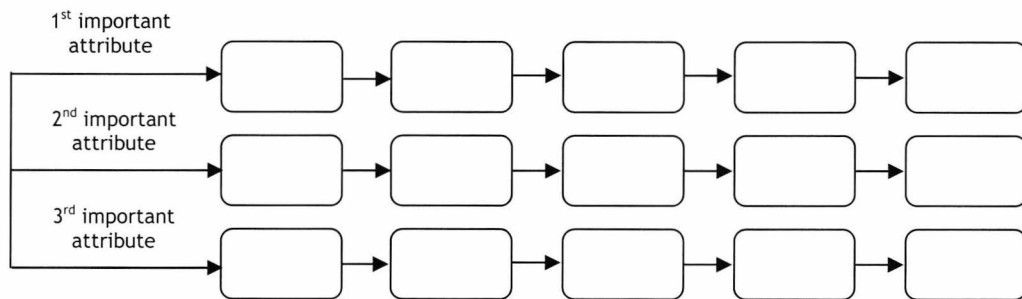
respondent, during which the causal means-end perceptual orientations may not be obvious to the respondent and they are uncovered later by the researcher during the transcription and coding process (Poulsen, C. S., Juhl & Grunert, Unknown). The second type of collecting data, "hard Laddering" refers to the type of Laddering where the respondent, after providing a response to the "why is it important for you?" prompt, is not allowed to reflect on his/her answer, as the interviewer moves on to the next question quickly (Jonas & Beckmann, 1998). Usually, the personal interviewing format is substituted by paper-and-pencil methods (Walker & Olson, 1991).

Laddering is a valuable technique, which because it is complex, can create biases depending on the type of interviewing format chosen. Nevertheless, the technique shows a robust behaviour with regard to respondents' verbal ability as well as the situational determinants in the interview (Bech-Larsen, Tino et al., 1996, Sørensen, Grunert & Nielsen, 1996).

Both soft and hard Laddering types of collecting data have been used (Jonas & Beckmann, 1998, Walker & Olson, 1991, Reynolds & Gutman, 1988) in the past. However, soft Laddering proved extremely time-consuming for regular application, as Flight et al. (2003) state. On the other hand, most of the studies utilized hard laddering took place via a structured questionnaire, in which respondents first provide up to certain number (usually three or four) attributes that are important for their buying decision and then indicate why each specific attribute is important to them. For each attribute, they can state up to a certain number of reasons (usually two or three). A sequence (for the most important attributes) of empty boxes (for means to ends) that are connected by arrows serves as a guide for the respondents in the questionnaire. Botschen and Thelen (1998) carried out a study using the hard Laddering type of the method (figure 4.5) and concluded that the results are analogous to those from the soft Laddering. In a similar study, Botschen and Hemetsberger (1998) used a slightly changed version of the one presented in figure 4.5. In addition, hard Laddering

outweighs soft Laddering in that it is easier and less expensive to administer, interviewer bias is reduced and respondents may feel less social pressure to respond to the questions of the interviewer. What is more, hard Laddering can be carried out to a larger sample which results to more representative samples. Computer-assisted Laddering questionnaires could prove very useful as they would considerably decrease the cost and time of implementation and possibly that of analysis as the data would be saved automatically in a database.

Figure 4.5. Paper-and-pencil version of hard Laddering used by Botchen and Thelen (1998)



Source: (Botschen & Thelen, 1998)

The authors noted that the questionnaire was easily understandable. Their study/questionnaire could be delivered by mail, providing the clarifications necessary for participants to understand. It required individuals to select the three most important attributes and then develop the ladders for each of these attributes.

However, the authors did not allow respondents to “fork” answers. The term “fork” refers to the situation where respondents are permitted to express more than one consequence for a given attribute or more than one value for a given consequence. This is something that usually occurs in soft Laddering.

Inspired by Gutman (1982), who indicated that the means-end chains can be considered as sequence of associated matrices, Ter Hofstede et al. (1998) proposed an alternative approach to eliciting means-end chains of consumers.

Figure 4.6. Example of the A.P.T. matrices: a) A – C matrix and b) C – V matrix, used by ter Hofstede et al. (1998)

(a)

		Attributes												
		Horm one-free beef	Beef without visible fat	Higher priced beef	Red-coloured beef	Tender beef	Frozen beef	Pre-packed beef	Succulent beef	Organically-produced beef	Processed beef (sausage, salami, etc)	Animal-friendly produced beef	Lean beef
Consequences	Meat that is easier to eat, cut, chew													
	Meat being good for your diet													
	Bringing variation to meals													
	A fair treatment of animals													
	Receiving compliments for your cooking													
	Knowing what you buy													
	Paying attention to, making time for cooking													
	Being good for the digestion													
	Paying attention to, making time for eating													
	Saving time													
	Food that is convenient in use													
													
Being environmentally friendly														

(b)

		Consequences												
		Meat that is easier to eat, cut, chew	Meat being good for your diet	Bringing variation to meals	A fair treatment of animals	Receiving compliments for your cooking	Knowing what you buy	Paying attention to, making time for cooking	Being good for the digestion	Paying attention to, making time for eating	Saving time	Food that is convenient in use	Being environmentally friendly
Values	Having a safe future													
	Being able to do many things													
	Feeling acknowledged by others													
	Being relaxed													
	Preserving the environment													
	Accomplishment													
	Giving sense to life													
	Self-control													
	Enjoying life													
	Not feeling guilty, egoistic													
	Being happy													
													
Respecting everything that lives and grows														

Source: (ter Hofstede et al., 1998)

They named this method the Association Pattern Technique (A.P.T.). The A.P.T. hypothesizes that means-end chains can be regarded as a set matrices that can be linked with each other. The two matrices are the attribute – consequence matrix and the consequence – value matrix, as shown in figure 4.6. The two matrices are constructed using predefined lists of attributes, consequences and values. Then, these lists are placed as rows and columns in the two matrices. Next, respondents are asked to indicate which consequence and value, each of the attributes and consequences respectively lead to. As opposed to the paper-and-pencil method employed by Botschen and Thelen (1998), A.P.T. allows respondents to “fork” answers. The authors concluded that despite the difficulty in completing correctly the task, A.P.T. is a very useful method to extract means-end chains.

An issue related to the implementation of M.E.C. model, either through Laddering (hard Laddering) or the A.P.T., is permitting individuals to skip levels of abstraction so as to resemble as close as possible to the original form of Laddering, the in-depth interview. However, it is not clear whether either of these two methods for revealing people’s cognitive structures accommodated this.

Russell et al. (2004), in their attempt to compare the different ways for conducting Laddering interviews, incorporated a number of advancements in to their design of the paper method and computer method. Conclusions from this study showed that, despite the differences, paper-type and computer-type of hard Laddering produced similar results.

4.8 Design of the laddering Interviews

Nasse (2001), as mentioned by Wansink (2005), employed Laddering to understand acceptance of soy products by consumers. Nasse conducted fifty face to face interviews to identify key attributes of soy products, resulting

consequences that might be experienced after the consumption of the product and finally the core reasons for purchasing soy products, the values. The investigator used a set of values which consisted of seven values most of which can be associated with the social and self-actualisation levels of Maslow's hierarchy of needs. Nasse used the soft Laddering to collect the data. Conceptually the implementation of Laddering in this research is the same with Nasse's way of application. However, in this research, the author decided to employ a slightly different version of Laddering, namely hard Laddering. Nevertheless, the author does not claim a novelty in the application of Laddering in this research, as others have previously used the hard type of Laddering.

At this point, it is important to stress the ability of Laddering to more suitably identify attributes valued by consumers compared to other traditional qualitative methods, such as focus groups or in-depth interviews. It is often the case that purchasing decisions are not obvious. It is also the case that consumers are not even aware of the core reasons for buying or not buying a product. However, most of the times Laddering interviews identify, apart from product's attributes, the underlying reasons for the actual purchase. Most of the times, a product is bought not only because of its practical reasons (or in the case of food products to satisfy hunger or to provide people with the appropriate nutrients). It is also because it fulfils some emotional needs. With laddering, it's not only the characteristics of the product that are revealed. Most importantly, laddering provides the researcher with more information. Consequences from the consumption of the product as well the personal values each individual holds are also revealed. This is particularly important as consumers relate, subconsciously, consequences or even higher levels of abstraction (values) to every single product's traits. Consequently, a purchase intention may actually take place if the individual believes in achieving these consequences that will satisfy their personal values. The analysis of data collected with Laddering can be used for the segmentation of consumers based on their value system.

Additionally, the understanding gained from the analysis can assist in designing and communicating educational campaigns on nutritional issues.

In this research, in line with Russell et al. (2004), the paper-and-pencil version of hard Laddering was selected for the collection of data in this study. This was mainly because of reasons of simplicity and limited time. A tree-like chart was designed incorporating the developments discussed earlier. Respondents were asked to select up to three attributes that they usually consider when buying a loaf of bread and develop ladders, with a starting point for each one of the attributes.

The question that initiated the construction of ladders was

“When I buy bread, one of the most important things that I take into account is...”.

After the answer was given, the subsequent levels of abstraction were introduced by the preceding statement *“...and this is important for me because...”*. Four levels of abstraction were chosen and respondents were required to complete a minimum of one chart to a maximum of three. The subjects were permitted to fork answers (one attribute could lead up to one functional consequence, up to three psychological consequences and up to three values) as well as to skip levels of abstraction.

Four lists of attributes, functional and psycho-social consequences and values were developed from the literature (Annett, Spaner & Wismer, 2007, Kihlberg & Risvik, 2007, Kihlberg et al., 2006, Olaoye, Onilude & Idowu, 2006, Carson, L., Setser & Sun, 2000) and were provided to respondents as a means to assist them for the completion of the chart. This tactic was used in the past by Fotopoulos et al. (2003) and by Russell et al. (2004). The most difficult terminology was discarded in order to assist respondents in their evaluation. The

four lists were provided to them in the form of “thinking bubbles” (see Appendix I). The attribute and physical consequences lists were prepared based on a review of the related bread literature. The psycho-social consequences list was developed as lay interpretations of the items identified from the literature, in a manner similar to Russell et al.(2004). The Kahle et al.’s (2000) List of Values (L.O.V.), was adopted as it consists a validated and established set of global values and it includes values such as sense of security, sense of belonging, sense of accomplishment, self-fulfilment, being well respected, warm relationships, fun and enjoyment in life, excitement and self-respect.

Nevertheless, the subjects were not restricted to these lists. They were free to use their own words to describe their feelings about the attributes or the product in case they felt that the list did not provide sufficient elements or the elements were not relevant to themselves. Although the soft Laddering type is the one that constrains less the natural flow of speech of respondents, the fact that subjects were allowed to freely express themselves on paper using their own words offers a close approximation of the hard Laddering that was selected to be employed in this study.

The survey was initially piloted with a random sample of 15 respondents at Imperial College at Wye, Kent. The pilot survey was tested in January 2008 and the sample involved mainly research and taught postgraduates as well as staff. The group of respondents for the pilot survey was selected simply on the basis of being bread consumers. An email was distributed to all staff and students resident and working at the Colleges. The email provided information about the research (purpose and aim). The email also invited willing participants to help with the pilot stage of the overall study. Those that responded to the email were asked to participate in the piloting of the initial version of the questionnaire. A convenient time and place were agreed between the respondents and the researcher. The pilot survey also took place in small groups, although some “interviews” were conducted with only one participant present.

The different sections of the questionnaire were explained and the main focus was placed on the laddering part. The laddering chart was explicated in details as well as the provided lists of attributes, functional and psycho-social consequences and values. These lists were presented in the form of a four-column table.

The pilot survey helped to identify and clarify issues related to the implementation of Laddering. A few respondents found it not so easy to engage in the Laddering task, as it requires time to reflect and think about the issue of research. However, the complications are heavier to deal with in the case of soft laddering, where there is immediate interaction between researcher and interviewee. In the paper-and-pencil version chosen the subject had the time to consider the cognitive structures he/she follows so as to make a bread choice and write them down on the paper. Despite its difficulty almost all respondents commented positively on the method and showed curiosity for the results of the survey.

Respondents' comments and feedback was valuable to the researcher. First of all, the subjects contributed to the correction and enrichment of the list of attributes, consequences and values that was provided. More elements were included in the final version of the survey instrument to assist respondents in constructing their ladders. Additionally, an example was added to the questionnaire. This is because, although the task was explained to them, they suggested that a visualization of the actual exercise would help them to explicitly understand the laddering chart. Thus, a non-food related example was decided to be added in the survey instrument in order to better explain the laddering task. What is more, the instructions for the completion of the questionnaire provided were simplified using a less scientific language.

After the adjustments in the paper-and-pencil version of the questionnaire were completed, the data collection process initiated.

4.9 Distribution of the Final Survey Instrument

All interviews were conducted in March 2008 in a seminar room at the University of Kent. The time available to the respondents to complete the questionnaire was up to a maximum of an hour. Each interview was conducted with groups of between four and eight people. The size of the convenience sample employed was 70 respondents which is consistent with previous studies employing this method. (Chema et al., 2006, Bech-Larsen, Tino et al., 1996, Pieters, Baumgartner & Allen, 1995, Gutman, 1984). The sample population was mostly staff and students at the University of Kent.

All subjects were recruited randomly. Recruitment was conducted by employing an advertisement that was placed on the University's website. It was indicated that participants in the study would receive a £5 reward. An e-mail, informing about the research and inviting volunteers to participate, was distributed to most of the departments of the University of Kent.

In terms of the sample of participants considerably more females responded to the advertisement. The number of subjects that finally took place in the research was female biased (60 women – 10 men). Descriptive statistical details of the sample are presented in the next section.

In order for the Laddering task to be accomplished, the respondents were asked to imagine that they were in a shop and about to make a bread choice and think of the three most important attributes that they take into account so as to decide which bread to buy. This is the same approach as employed by Russell et al. (2004) and by Urala and Lahteenmaki (2003). Then for each of the attributes they had to develop ladders that lead to values orientations, through functional and psycho-social consequences.

At all points during data generation by the survey participants the researcher was present to explain the way the questionnaire should be completed (in case there were uncertainties) and clarify any issues related to the chart for the laddering, although guidelines in written form were provided.

In addition to completing the laddering part of the questionnaire, data on bread purchase behaviour, attitudes towards bread with health promoting properties and socio-demographic characteristics were collected. At the beginning of the questionnaire the concept of functional foods was explained and examples of foods offering health benefits were given. The completion of the questionnaire was finished on average in 30 minutes.

4.10 Empirical results and analysis

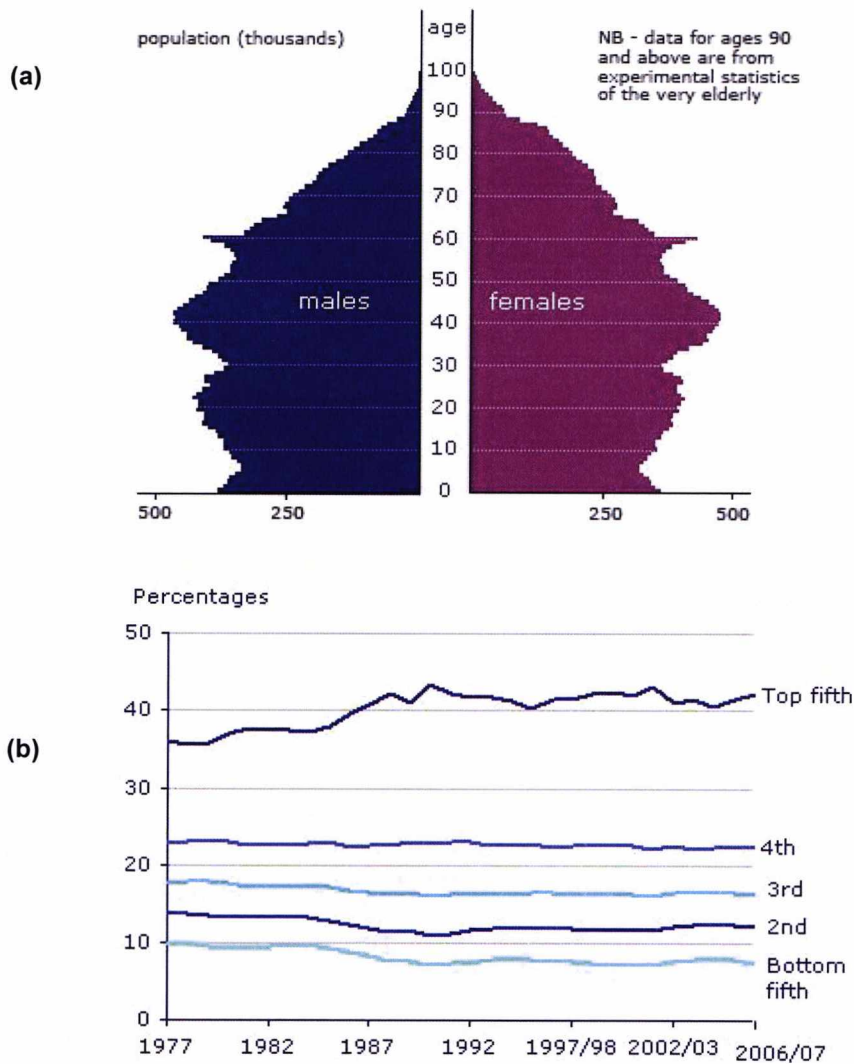
4.10.1 Sample description, purchasing behaviour and attitudes

The socio-demographic profile of the sample can be seen in table 4.1. As mentioned earlier, females make up the large proportion of respondents in the sample. Also, there is a slight bias towards younger people and towards lower annual income levels, as the majority of people replied to the advertisement were students of the University of Kent. This finding is supported by the two graphs displayed in figure 4.7. It is apparent the U.K. population is balanced in terms of gender (figure 4.7 (a)). Additionally, the numbers of the younger population seem to be slightly lower than those of the middle aged population. Similarly, while our sample is slightly biased towards the lower income levels, the shares of total household income are distributed slightly different, as one can see in figure 4.7 (b).

With respect to purchasing behaviour questions asked in the questionnaire, 92.4% of the sample's subjects buy bread once or twice per week. Lunch is the most popular time of the day people consume bread (it scored 53.7%), followed

by breakfast (it scored 29.6%). What is more, people try to avoid consuming bread during dinner and they prefer to have something else as a snack instead. The vast majority of people buy bread from the supermarkets (84.7%), while just a few show a preference towards local stores or speciality shops. Additionally, in terms of regularly exercising, more than 80% of the sample responded positively in this question.

Figure 4.7. (a) U.K. population by gender and age, mid 2007 and (b) U.K. shares of total household income by quintile group



Source: Office for National Statistics, 2007

In the survey instrument, a number of questions related to food products that offer health benefits, the so-called functional foods, were also included. This is because the survey was designed to gain insight into consumers' buying motivations for bread that could potentially deliver health benefits.

The survey participants indicated that they are aware of the concept of functional foods as almost 70% of the subjects answered positively the relevant question. 44.1% of the interviewees buy food products with functional properties occasionally, while the regular or very frequent functional food shoppers account for 34.2% of the sample.

The main source of information about food products with functional properties is the television as indicated by 34% of respondents, while newspapers and magazines follow very close with 33%. Other popular sources of information are the health care professionals (16%), the internet (15%) and friends (13%).

Table 4.1. Socio-demographic characteristics of the sample completed the paper-and-pencil laddering questionnaire

Sample's socio-demographic characteristics	Frequency	Percentage (%)
Gender		
Male	10	14.7
Female	58	85.3
Age group		
17-20	16	23.5
21-30	24	35.3
31-40	7	10.3
41-50	8	11.8
51-60	13	19.1
Marital status		
Single	39	57.4
Married/Living with partner	25	36.8
Widowed/Divorced/Separated	4	5.9
No of people living in the household		
1	14	20.6
2	17	25
3	6	8.8
4	12	17.6
5	10	14.7
6	8	11.8
8	1	1.5

(Continued from previous page)

Sample's socio-demographic characteristics	Frequency	Percentage (%)
Dependent children		
0	52	76.5
1	5	7.4
2	7	10.3
3	2	2.9
4	2	2.9
Education level		
Basic school education	3	4.5
A-level or equivalent	22	33.3
College education	13	19.7
Bachelor degree	14	21.2
Masters degree	9	13.6
Doctorate degree	5	7.6
Annual household income (pre-tax) in £		
0-10000	26	38.2
10001-20000	10	14.7
20001-30000	7	10.3
30001-40000	9	13.2
40001-50000	8	11.8
50001+	8	11.8
Weekly food expenditure in £		
Up to 30	20	29.4
31-50	10	14.7
51-80	15	22.1
81-100	11	16.2
More than 100	12	17.6
Profession		
Home keeper	1	1.5
Employed full-time	21	31.3
Employed part-time	8	11.9
Student	37	55.2
Exercise		
Yes	55	80.9
No	13	19.1

4.10.2 Analysis of the importance assigned to each bread attribute elicited from the laddering technique

A frequency analysis of the importance assigned to each bread attribute elicited from the completion of the hard laddering task shows that the attributes that people consider more important are in turn:

- the type of flour used for the production of bread
- the taste and aroma of it
- the price of bread
- its texture
- its perceived healthiness.

We have to stress that although less respondents mentioned the concept of “taste and aroma”, the number of times it was mentioned in a ladder was, fractionally, larger than price. This indicates that people take “taste and aroma” of bread very seriously into account when they are about to make purchase decisions. They do care about the price of the good, but if the good potentially be able to taste the actual product they buy, perhaps price could be less significant for their choice.

Table 4.2. Number and % of times each attribute was mentioned and number and % of respondents that mentioned it

Attributes	No of times concept was mentioned	% of times concept was mentioned	No of respondents mentioned concept	% of respondents mentioned concept
Type of flour	173	22.793	32	47.058
Taste & Aroma	101	13.306	25	36.764
Price	98	12.911	32	47.058
Texture	85	11.198	17	25
Healthiness	55	7.246	9	13.235
Shelf-life	44	5.797	8	11.764
Supplier/Retailer	41	5.401	7	10.294
Appearance	31	4.084	7	10.294
Nutritional information & ingredients	28	3.689	7	10.294
Sliced/Un sliced	28	3.689	8	11.764
Styles/Types of bread	24	3.162	5	7.352
Seeds/Grains content	24	3.162	6	8.823
Baking	10	1.317	4	5.882
Use of bread	9	1.185	2	2.941
Family norms	8	1.054	3	4.411
TOTAL	759	100		

Other, less important attributes revealed during the coding process are the bread's shelf-life, the brand of the product, its appearance, whether it is sliced or not, the different styles or types of bread available in the market and whether seeds or grains are contained in it.

The full list of bread attributes, as well as the number of times each of them was mentioned and the number of respondents that articulated them as well as the respective percentages can be seen in detail in table 4.2.

4.10.3 Analysis of the data collected with the paper-and-pencil laddering

After the end of all group interview sessions, the questionnaires were checked for comprehensiveness and completeness. This process led to two questionnaires being excluded from the analysis. The resulting analysis was conducted as follows:

- All ladders mentioned by each individual were recorded.
- Summary codes were developed reflecting everything that was mentioned
- Then the S.I.M. was generated
- Finally, the H.V.M. that best explains the data were constructed.

The analysis for the construction of the H.V.M. was performed using the M.E.C. Analyst Plus software (Zanoli & Naspetti, 2002)), although initially the data had been entered into another software.

The development of summary codes resulted from grouping together all similar elements mentioned by each individual at the different levels of abstraction (attributes, physical consequences, psycho-social consequences and values). As an example for the first level of abstraction, three subjects indicated as important attribute when choosing bread the "softness" of it, while for six subjects "density" of bread plays an important role. Both terms were grouped

under the general attribute – summary code “texture”. In a similar fashion, summary codes were created for functional consequences, psycho-social consequences and values. Table 4.3 presents the summary codes for each level of abstraction in the bread survey.

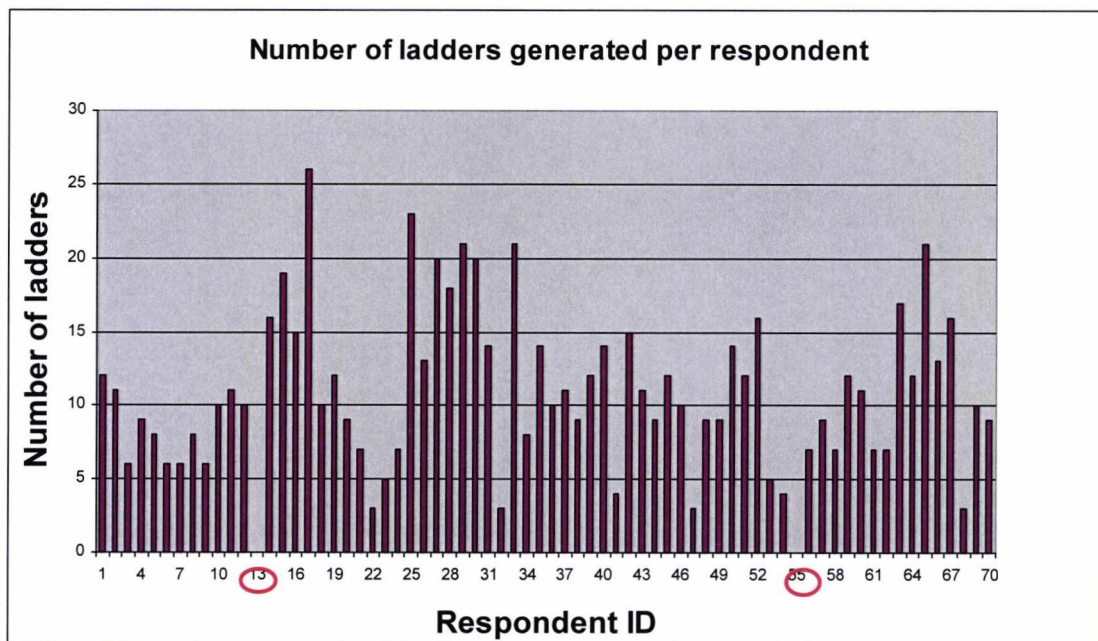
Table 4.3. Summary content codes from the Laddering technique for bread

Attributes	Functional Consequences	Psycho-social Consequences	Values
Type of flour	Quality product	Quality of life	Fun & enjoyment in life
Taste & Aroma	Good health	Satisfaction – Happiness	Sense of belonging
Price	Freshness	Feel relaxed	Sense of accomplishment
Texture	Pleasant experience	Keep active	Sense of security
Healthiness	Value for money	Be confident	Self-respect
Shelf-life	Maintain weight	Time & economic planning	Self-fulfilment
Supplier/Retailer	Loyalty	Keep figure - Improved image	Warm relationships
Appearance	Financial constraints	Physical well-being	Excitement
Nutritional information & Ingredients	Filling	Improved performance	
Sliced/Un sliced	Ease of use	Care for nature	
Style/Types of bread	Lasts longer	Feeling of social fairness & duty	
Seeds/Grains content	Good metabolism		
Baking	More energy		
Use of bread	Sharing		
Family norms	Variety		
	Appetizing		
	Environmental conscious		

As one can see from table 4.3, the paper-and-pencil Laddering identified fifteen (15) attributes that people consider when buying bread, seventeen (17) functional consequences, eleven (11) psycho-social consequences and eight (8) values.

The total number of ladders produced from the analysis of the data collected using Laddering is 757, On average, each respondent provided 11 ladders, while the minimum and maximum number of ladders elicited per respondent was three (3) and twenty six (26) respectively. The number of ladders most of respondents generated was nine (9). The actual number of ladders produced by each subject can be depicted in figure 4.8. The two numbers in the red circle are the respondents that were exempted from the analysis.

Figure 4.8. Bar chart illustrating the exact number of ladders created by each respondent



As the number of elements mentioned was large, the coding process took place iteratively. This means that a first coding was carried out (words or phrases that were clearly of the same meaning) and the results of this helped during the second refinement of the elements. The same practice was repeated up to the point that coding appeared to be satisfactory and all elements mentioned were assigned to a summary code. This procedure was performed for all levels of abstraction. As previously stated, a number of physical and psycho-social consequences codes/scales, available in the laddering and psychology literature, were considered for the coding process. Note that for the “values”

level, the summary codes were already available (Kahle's List of Values (L.O.V.)). Thus, only the assignment of the elements to each code remained (apparently, whenever respondents used a different word to describe similar meaning).

As can be seen from the table 4.4, the main bread purchasing motives (functional consequences) elicited from the laddering task are related to bread "quality", "good health", "freshness", "pleasant experience" as a resulting of consuming it, and "value for money".

Table 4.4. Number and % of times each physical consequence was mentioned and number and % of respondents that mentioned it

Functional Consequences	No of times concept was mentioned	% of times concept was mentioned	No of respondents mentioned concept	% of respondents mentioned concept
Quality product	202	26.649	56	82.352
Good health	155	20.448	48	70.588
Freshness	62	8.179	29	42.647
Pleasant experience	50	6.596	21	30.882
Value for money	46	6.068	25	36.764
Maintain weight	30	3.957	13	19.117
Loyalty	28	3.693	14	20.588
Financial constraints	28	3.693	15	22.0588
Filling	27	3.562	14	20.588
Ease of use	24	3.166	11	16.176
Lasts longer	24	3.166	9	13.235
Good metabolism	21	2.770	13	19.117
More energy	19	2.506	9	13.235
Sharing	15	1.978	8	11.764
Variety	13	1.715	6	8.823
Appetizing	8	1.055	3	4.411
Environmental conscious	6	0.791	2	2.941
TOTAL	758	100		

As can be seen from Table 4 only just above a third of the sample maintained a benefit related to bread's price, while the majority of the sample stated that the main benefits are the quality of the product and its perceived healthiness, which

originates from more abstract bread purchasing motives (psycho-social consequences) such as “quality of life”, “satisfaction – happiness”, “keep active”, “be confident” and “feel relaxed”.

The full list of psycho-social consequences, the number of times each of them was mentioned and the number of subjects reported this type consequences are shown viewed in table 4.5. The reader of this table can recognize that the concept that dominates the psycho-social level of abstractness is “quality of life”, which has been mentioned by more than 80% of the respondents. Just below two-thirds of the sample have designated “satisfaction-happiness” to be the second most important element of this level. Further down the “feel relaxed”, “keep active” and “be confident” elements follow in order. These are the main psycho-social benefits that impose the selection of the bread attributes we saw earlier. Various others psycho-social consequences follow, which had not been mentioned in the ladders as frequently as the ones described above.

Table 4.5. Number and % of times each psycho-social consequence was mentioned and number and % of respondents that mentioned it

Psycho-social Consequences	No of times concept was mentioned	% of times concept was mentioned	No of respondents mentioned concept	% of respondents mentioned concept
Quality of life	126	19.236	56	82.352
Satisfaction - Happiness	115	17.557	44	64.705
Feel relaxed	78	11.908	41	60.294
Keep active	67	10.229	40	58.823
Be confident	58	8.854	28	41.176
Time & economic planning	53	8.091	28	41.176
Keep figure - Improved image	52	7.938	32	47.058
Physical well-being	39	5.954	26	38.235
Improved performance	37	5.648	22	32.352
Care for nature	16	2.442	11	16.176
Feeling of social fairness & duty	14	2.137	9	13.235
TOTAL	655	100		

Furthermore, similar buying motives stem from Kahle’s verified list of consumers’ personal value system, which encompasses concepts such as “fun and enjoyment in life”, “sense of accomplishment”, “sense of belonging”, “sense

of security”, “self-respect”, “self-fulfilment”, “warm relationships” and “excitement”. The details of the values list are presented in table 4.6.

Table 4.6. Number and % of times each value was mentioned and number and % of respondents that mentioned it

Values	No of times concept was mentioned	% of times concept was mentioned	No of respondents mentioned concept	% of respondents mentioned concept
Fun & enjoyment in life	222	32.840	61	89.705
Self-fulfilment	161	23.816	59	86.764
Sense of accomplishment	77	11.390	42	61.764
Self-respect	75	11.094	33	48.529
Sense of security	56	8.284	31	45.588
Sense of belonging	54	7.988	30	44.117
Warm relationships	17	2.514	14	20.588
Excitement	14	2.071	12	17.647
TOTAL	676	100		

In the preceding pages a frequency analysis of both the number of times an element has been mentioned and the number of participants that mentioned each specific element has been presented. This clearly shows what are the attributes people consider important for the selection of bread, as well as the consequences and values they attach to them.

It is worth being noted that segmentation and strategies, if based only on respondents’ single answer and socio-demographic profiles, would not identify marginal motivational differences, still significant for products oriented towards small segments of the population. The fact that people behave differently, despite the fact that they prefer the same product attributes, is widely accepted. However, the existence of mainly younger participants in the sample could be an explanation for the confluence in attitudes presented in the previous tables. Therefore, further justification is needed with the use of H.V.M. resulting from the analysis of Laddering data.

The previous findings that have been described and presented in tables 4.2, 4.4, 4.5 and 4.6 offer an explanation as to what enforces the bread attribute selection. Bread buyers mostly prefer intrinsic quality notions (type of flour,

texture, taste and aroma) and the associated concepts of healthiness. The reason is their purchasing motives of “quality product”, “good health” and “freshness”. What is more, the higher attribute elicitation frequencies along with the smaller number of values could, according to Fotopoulos et al.(2003), be an indication of more concrete combination of preferences concerning bread choice. This might suggest a tendency for a more clearly expressed need for specific bread attributes.

4.10.4 Calculation of the indices of abstractness and centrality

To provide insight into the position that individual elements have in an individual’s cognitive structure, we now calculate two indices (index of abstractness and index of centrality) using information about the out-degrees and in-degrees of elements. Before moving on to the description, a number of terms needs to be defined, so as the reader has a clear idea of the analysis. This involves comparing the number of times each individual element was mentioned as the destination or end of a connection versus the number of times that element was mentioned as the origin of a relationship. These frequencies have been termed as “in-degrees” and “out-degrees” respectively.

More specifically, the *out-degrees* of a particular element refer to the number of times that this element has served as the source or origin of a connection with other elements in respondents’ ladders. The out-degrees of a particular item are determined by summing up, across subjects and ladders, the number of times this element appears in its row in the S.I.M.

The *in-degrees* of an element refer to the number of times that element has served as the destination or end of a connection with other elements in respondents’ ladders. The in-degrees of a particular item are determined by

summing up, across subjects and ladders, the number of times this element appears in its column in the S.I.M.

Based on the definitions of in- and out-degrees of an element, abstractness of a certain element, as Pieters et al. (1995) define it, is the ratio of in-degrees over in- and out-degrees of that specific element. In other words, the number of times this element appears in a column of the S.I.M. over the number of times it can be pointed out in a row of the S.I.M. It ranges from 0 to 1 and is an index of the “level” of each element in the cognitive structure. The higher the abstractness score of an element, the larger the proportion of that element’s association with other elements, in which that element is the destination.

In M.E.C. terms, an element with high abstractness score is the “end” of the connection between two elements, while low abstractness scores indicate elements that act as “means” (or origin) in the ladder.

On the other hand, *centrality*, as Pieters et al. (1995) again describe it, is the ratio of in-degrees and out-degrees of a certain element over the sum of all cell entries in the S.I.M. Alike abstractness, centrality ranges between 0 and 1 and is an index of importance of the elements. The higher the centrality score of an element, the larger the proportion of associations in the cognitive structure map that run through this element, either as the origin or the destination of a link.

Consequently, based on the above definitions the abstractness and centrality scores were calculated for each element in each level of abstraction and the results are presented in tables 4.7, 4.8, 4.9 and 4.10. This was done with the assistance of the software, as automatically – based on the S.I.M. produced – it calculates the centrality and abstractness indices for the elements.

It is clear that as one move from lower to higher levels, the abstractness score increases from zero at the attribute level to one at the value level. Out of all the elements mentioned and which formed the S.I.M., the most central one is the

value “fun and enjoyment in life”, followed by another value (“self-fulfilment”) and the benefit “quality product”.

Obviously, as it was expected the abstractness scores for the attributes and values levels are 0 and 1, as these correspond to the origin and end respectively of each ladder and chain in our research (table 4.7 and table 4.10). Also, the scores of psycho-social consequences are higher than those of physical consequences (table 4.8 and table 4.9). This indicates that the ladder moves to more abstract (higher order) level and also it provides an indication of the proportion of each specific element’s connections with other elements in which the former is the destination. Suggestively, the most abstract elements in the physical consequences level are “freshness”, “sharing” and environmental conscious”.

Furthermore, the most important, according to centrality scores, elements in the four levels of abstraction are “type of flour”, “quality product”, “quality of life” and “fun and enjoyment in life”. These are the elements, through which most of the connections in the cognitive structure map run. This substantiates the frequency analysis presented in tables 4.2, 4.4, 4.5 and 4.6.

Table 4.7. Degree of abstractness and centrality for the attributes elicited

Content Codes for ATTRIBUTES	Abstractness	Centrality
Type of flour	0	0.05
Taste & aroma	0	0.03
Price	0	0.03
Texture	0	0.03
Healthiness	0	0.02
Shelf-life	0	0.01
Supplier/retailer	0	0.01
Appearance	0	0.01
Nutritional information & ingredients	0	0.01
Sliced/unsliced	0	0.01
Styles/types of bread	0	0.01
Seeds/grains content	0	0.01
Baking	0	0
Use of bread	0	0
Family norms	0	0

Table 4.7 proves that healthiness is within the top-5 of the attributes people consider when buying bread, with a centrality score of 0.02. Also, the type of flour used for the production of bread comes on the top of the attribute list with a score of 0.05 providing evidence that the perceived healthiness is conveyed not only from added functional ingredients but also from the type of bread itself.

Interestingly, from a first look at table 4.8, one could be surprised by the fact that the abstractness score for “good health” is rather low (0.23), while other physical consequences score much higher (see “environmental conscious” and “sharing” that share the same score, 0.30). According to Pieters et al. (1995), this is normal as abstractness is an index of the level of individual elements in the hierarchical structure. Therefore, the abstractness score might be high although the element is involved only in few connections or low while many connections with other elements are observed. However, “good metabolism” – which is related to health – has a score of abstractness equal to 0.29, the second best. This could possibly be an explanation for the paradox observed, as good metabolism is perceived as an indicator of good health.

Table 4.8. Degree of abstractness and centrality for the physical consequences elicited

Content Codes for PSYSICAL CONSEQUENCES	Abstractness	Centrality
Quality product	0.27	0.06
Good health	0.23	0.05
Freshness	0.30	0.02
Pleasant experience	0.27	0.02
Value for money	0.26	0.02
Maintain weight	0.20	0.01
Loyalty	0.25	0.01
Financial constraints	0.28	0.01
Filling	0.25	0.01
Ease of use	0.24	0.01
Lasts longer	0.22	0.01
Good metabolism	0.29	0.01
More energy	0.23	0.01
Sharing	0.30	0.01
Variety	0.25	0
Appetizing	0.23	0
Environmental conscious	0.30	0

Furthermore, the centrality index score (which according to Knoke and Burt (1983) is an index of importance, prominence or salience of individual elements) for this consequence is the second highest (0.05) after quality of product. This confirms that people place a lot of value on healthiness resulting from the consumption of a product that offers health benefits.

Also, the consequences with the lower abstractness scores appear to refer to the relatively more tangible, immediate benefits associated with experiencing the attributes of a bread product.

Looking at the table 4.9, one can see higher abstractness scores for the psycho-social consequences compared to the respective ones for the physical consequences. This is expected as the index increases as one moves from the more concrete elements or means to more abstract ones or ends. Although there are still elements that score very high in the abstractness index, their importance is rather low within the group of psycho-social consequences (see “care for nature”). Nevertheless, there are elements that their high centrality scores are accompanied by high abstractness scores. This shows the large proportion of those elements’ associations with other elements, in which they are the end of the connection.

Table 4.9. Degree of abstractness and centrality for the psycho-social consequences elicited

Content Codes for PSYCHO-SOCIAL CONSEQUENCES	Abstractness	Centrality
Quality of life	0.68	0.05
Satisfaction - happiness	0.67	0.04
Feel relaxed	0.70	0.03
Keep active	0.67	0.03
Be confident	0.69	0.02
Time & economic planning	0.66	0.02
Keep figure - improved image	0.68	0.02
Physical well-being	0.66	0.02
Improved performance	0.67	0.02
Care for nature	0.73	0.01
Feeling of social fairness & duty	0.65	0.01

Finally, table 4.10 reports the abstractness and centrality scores for the elements at the value level in Laddering. As it was expected, the abstractness scores for all the “value” elements are equal to one. This is because the value level is the end of every connection in each ladder. Because abstractness ranges from 0 to 1 and because the elements mentioned as values were not mentioned at a lower level in a ladder, therefore it was expected that their abstractness indices would be equal to one. Table 4.10 also reveals that the elements “fun and enjoyment in life” and “self-fulfilment” are the most important among all value elements, as their centrality scores are higher the remaining values.

Table 4.10. Degree of abstractness and centrality for the values elicited

Content Codes for VALUES	Abstractness	Centrality
Fun & enjoyment in life	1	0.07
Self-fulfilment	1	0.06
Sense of accomplishment	1	0.03
Self-respect	1	0.03
Sense of security	1	0.02
Sense of belonging	1	0.02
Warm relationships	1	0.01
Excitement	1	0.01

4.11 The Hierarchical Value Maps (H.V.M.)

The M.E.C. Analyst plus software was used at this stage of the research. First, the general results of the study will be discussed and then the results regarding influences arising from demographic differences.

H.V.M. illustrates the patterns of meaning by which respondents give personal relevance to product characteristics. In other words, H.V.M. gives a graphic interpretation of the concepts/elements and associations most frequently stated by consumers. An association will only be illustrated in the H.V.M. if it meets a minimum frequency requirement, namely when the number of links between two

elements in the S.I.M. goes beyond a specific value. This is called the cut-off level. The thickness of the lines connecting the elements in the map denotes the varying frequencies of associations. The absolute value reported in each node represents the number of participants that mentioned each element within each level of abstraction. The respective percentage of them is also reported.

4.11.1 *The determination of the cut-off value*

As mentioned in the paragraph above, cut-off value is defined as the number of links between two elements above which the connection of these two elements is depicted in the H.V.M. The decision on the cut-off value is the one that determines how many and which associations will be exhibited in the H.V.M. Nevertheless, researchers always face difficulties in determining the cut-off value, as it is not clear what constitutes paramount the link between two elements.

The selection of a high cut-off value will generate a rather simple illustration that will not convey much information. On the other hand, by selecting a low cut-off value, there is the risk of producing a rather intricate H.V.M. that will be problematic to interpret and therefore draw conclusions.

Pieters et al. (1995) have reported a number of heuristics for the selection of the cut-off value:

- a) Selecting the most informative and interpretable solution, after trying various cut-off values. This is a method that has been suggested by Reynolds and Gutman (1988) and has been saluted by Audenaert and Steenkamp (1997).
- b) The second heuristic, also proposed by Reynolds and Gutman (1988) is a type of "goodness of fit". In this case the cut-off value is selected according to the sample size and the number of ladders that could potentially interpret two thirds of all the connections.
- c) A third way to decide upon the cut-off value is to create a graph of either the number or percentage of connections at a particular cut-off value and

other cut-off values and compare then searching for some type of “elbow” in the graph.

- d) Finally the last, heuristic is that of the comparison made between the proportion of active cells (namely a connection between two elements in the S.I.M. that at a cut-off value equal to one they are mentioned at least once across all subjects and ladders) in the S.I.M. to the proportion of all the connections between the elements at a certain cut-off value. This is the way that was selected by Pieters et al. (1995) for the purpose of their research. This way of establishing the cut-off value approximates the second heuristic.

Leppard et al. (2004) proposed the “top-down cut-off” approach for the determination of the cut-off value that take into account the number of linkages selected between the various levels of abstraction. This is based on the selection of the first largest (top-1), second largest (top-2) etc. value of the entries in the cells of S.I.M., starting from the attribute level of abstraction. The same process is repeated for the other levels until the resulting H.V.M. each time are difficult to interpret.

As a final comment, the selection of the cut-off value is complicated issue. This is because the number of entries in the S.I.M cells varies based on the number of survey participants and on the total number of links generated by the participants as well as the level of abstraction. Consequently, the cut-off level chosen will vary too. Additionally, the method of laddering used (hard or soft) plays an important role in the determination at a later stage of the cut-off value, as hard laddering methods generate large data sets and therefore larger cut-off value is more likely to be selected. Another possible factor affecting the cut-off value is the differences in culture. Research has proven that cultural variations generate dissimilar number of ladders across different countries. Finally, the establishment of the cut-off value relates to the direct or indirect linkages among elements.

In the present research, the approach followed is the one initially proposed by Reynolds and Gutman (1988). A number of different cut-off values were selected and several H.V.M. were produced. This allowed the researcher to evaluate and present those that contained the most stable set of relations, provided more information about meaningful cognitive associations and were relatively less troublesome to interpret.

4.11.2 H.V.M. of the general sample

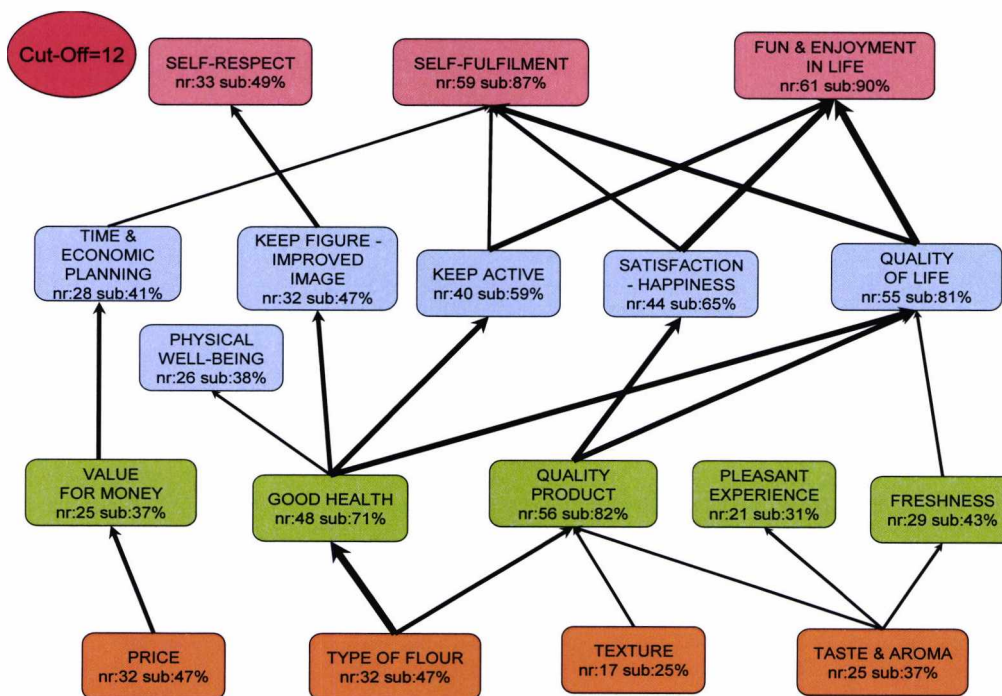
Before moving to the interpretation of the H.V.M., a few things need to be clarified so as the reader is able to have a better understanding of the maps. The boxes presented in the maps are positioned based on the centrality and abstractness indices of the content codes. In each box, the content code assigned to similar elements mentioned, the number of respondents (nr) as well as the percentage of subjects (sub) that mentioned that code is displayed. The width of the arrows that connect the boxes is directly proportional to the number of links between the content codes and designates the strength of relations between the elements on the different levels of the H.V.M. This is related to the S.I.M. discussed earlier in this chapter. S.I.M. is a square matrix, whose rows and columns correspond to the elements identified from the Laddering. The entries, namely every box in the S.I.M., summarize the number of times each element (rows) led to every other element (column). In other words, the total number of times an association between two different elements has been mentioned by the respondents provides the information regarding the strength that association. It is necessary to note that the width of the arrows in the H.V.M. can be adjusted using the settings of the M.E.C. Analyst plus software before printing the map.

Finally, at the top left corner of the H.V.M. the cut-off value selected is shown.

Examining figure 4.9 and focusing on the attribute level, the “type of flour” appears to be the dominant attribute followed by “price”, “taste and aroma” and

“texture”. At the physical consequence level, the map’s most important area is constituted by elements related to health and product’s perceived quality. In particular, the concept of “good health” provides links to almost all elements being at the higher psycho-social level, such as “keep figure and improved image”, “quality of life”, “physical well-being” and “keep active”. The last concept is, in turn, strongly allied with the value “fun and enjoyment in life”. A solid relation also holds between the “quality of life” psycho-social consequence and the values “fun and enjoyment in life” and “self-fulfilment”. The thickness of lines, mainly with two of them, indicates the strong association they hold with “good health”. This is a cognitive structure strongly related to type of flour used for the production of bread.

Figure 4.9. H.V.M. of the sample indicating the direct connections, using the top-5 elements from each level and a cut-off value of 12



On the other hand, “quality product” holds strong associations with “quality of life” as well as with “satisfaction – happiness” concepts. The latter concept also yields very strong relations with the values “fun and enjoyment in life” and “self-fulfilment”. A third important area of the map is the one related to price. The

elements included in the chain, which “price” is the source of, only appear in this chain and not in any other (like for example quality, as often individuals relate quality with price). It is worth noting that the strength of the links in this chain is not so powerful, as in the previous cases. These two observations may imply that people are mainly concerned with product related attributes and to a lesser extent price. Finally, the “taste and aroma” of bread provide three, not so strong connections with “freshness”, “pleasant experience” and “quality product”. Nevertheless, the last concept develops strong association with “quality of life” and this is why taste appears on the map.

4.11.3 H.V.M. of those subjects in the sample aged 17–30 and 31-60 years old

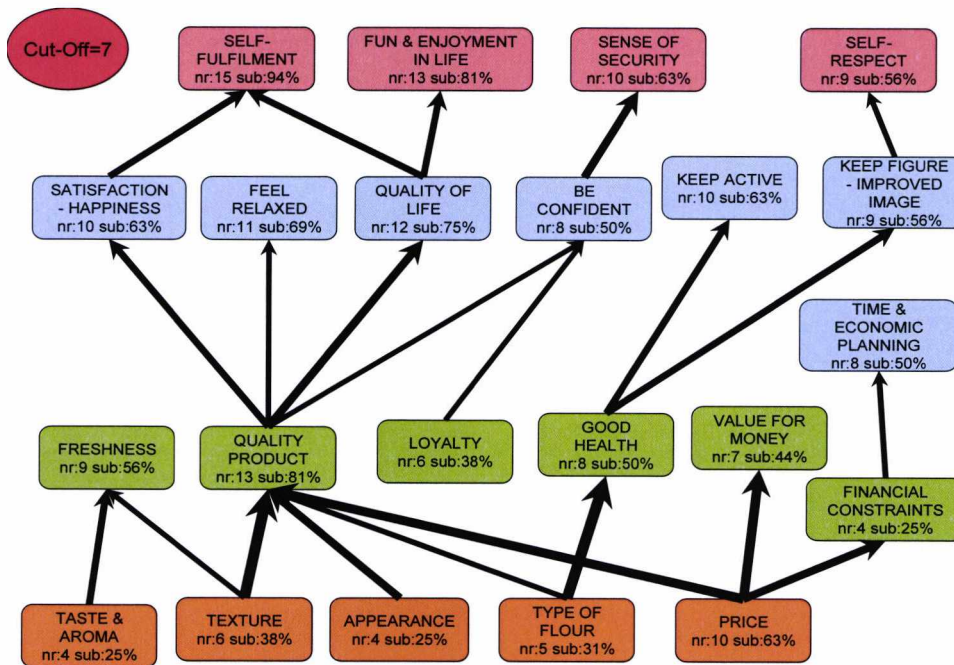
As it was reported at a previous section, the sample that participated in the Laddering group interviews was consisted mainly of female respondents and subjects that belong to the younger groups of the sample. For that reason, two more hierarchical value maps are presented here. The first one examines the meanings the young respondents assign to bread by revealing the most important attributes this group considers. The second map illustrates the cognitive structures of the mature group of the sample population. By doing so, interesting differences in the relevance people attach to each element will be highlighted, distinguishing the two groups.

Thus, inspecting figure 4.10, one can say that similar elements are presented (compared to figure 4.9) but their importance is different, while different are the cognitive structures are shown on the map.

First of all, the “price”, “type of flour” and “texture” appear to be the most important determinants for bread choice for the young population of the sample. All three of them deliver a “quality product” indicating what young respondents consider as good product. Also important is how the bread looks (“appearance”) in order for it to be chosen by young adults. The choice of quality food products satisfies people, as they relate that benefit to a “quality of life” and “happiness”,

which in turn fulfil higher order values such as “enjoyment in life” and yield “self-fulfilment”. It is worth noting that “price” is also linked at the same time with “value for money” and “financial constraints”. Despite that rather expensive bread is regarded as a quality product, young population prefers value for money as they face financial difficulties and therefore they are looking to plan their time and money accordingly. The “confidence” that a consumption of a quality product is linked with, is strongly associated with the perceived “sense of security”, possibly because bread is then considered a safe product.

Figure 4.10: H.V.M. of the population of the sample aged 17-30, indicating direct connections, using all elements of S.I.M. and a cut-off value of 5



Another important structure shown on the same map is the benefit of “good health” that results from the “type of flour” and which is regarded as imperative for people to “keep active” and “keep their figure and have a better image” among their social surroundings.

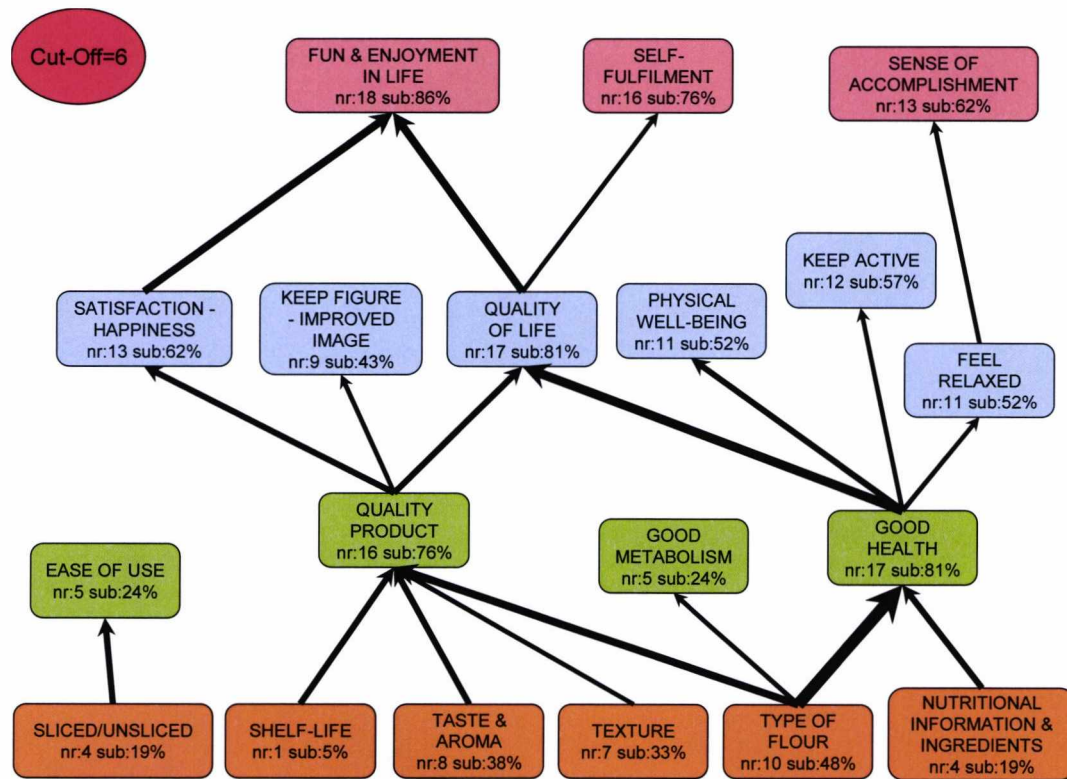
Finally, two more issues that are illustrated in the map: “taste and aroma” is central in this group’s choice decisions making process, as it designates the freshness of bread. However, this structure does not reach a higher cognitive level. The fact that people may trust a certain retailers/suppliers and therefore being “loyal” to them seems that results in increased “confidence” for the product and consequently they “feel secure”.

Looking at the second category’s map figure 4.11 of the sample (that aged 31-60), we identify similar elements being depicted but the paths for the construction of the cognitive structures followed by the more mature group of the population are different.

Focusing on the consequence level, the most condensed area of cognitive pathways is the one consisted of elements related to what could be termed as pursuit of quality. In particular, this is related to “bread’s quality”. The older respondents of the sample prefer a variety of different bread attributes, such as “type of flour”, “texture”, “taste and aroma” and “shelf-life” of the product. This attributes translate to a quality product that in turn leads to “quality of life” and “happiness”. These elements are linked to the more abstract value concept of “fun and enjoyment in life”. “Quality product” for this subgroup of the sample means that people can “keep their figure and have an improved image”.

Another crowded area of the map is the one surrounding the concept related to health. Respondents associate the “type of flour” attribute to one’s “good health” and that translates to a number of concepts such as “physical well-being”, “keep active”, “quality of life” and “feel relaxed”. The last two psycho-social consequences lead to higher level values. When the individual feels relaxed as a result of having good health, the abstract value of “sense of accomplishment” is satisfied. On the other hand, “quality of life” creates a sense of “self-fulfilment” and one can experience joy and have fun in his/her life.

Figure 4.11. H.V.M. of the population of the sample aged 31-60, indicating direct connections, using all elements of S.I.M. and a cut-off value of 6



A few more elements remain to be explained so as the map gives a clearer idea of the connections between the concepts. Not so strongly compared to the type of flour, still respondents link the “nutritional information” of bread product to “good health”, which again relates this to higher level values. On the other hand, apart from good health, people have stated that “good metabolism” is the benefit that arises from the type of flour used for the production of bread product. Finally, this subgroup of the sample population has mentioned an attribute that does not appear in the H.V.M. of the young population and which is considered important. This is whether bread is sliced or not. The tangible benefit for the consumers is that bread can be used easier.

4.12 Discussion of the results and summary of the chapter

To the best of the author's knowledge, one research (Grunert, K. G. & Grunert, 1995) that utilized M.E.C. and Laddering methodology on data related to bread (organic) has been conducted to date. Therefore, there is little chance for comparison of the results from the present study with results from previous laddering attempts investigating bread. However, there is something that needs to be pointed out. In the H.V.M. presented in their work, although not detailed and the data used for other methodological purposes, similar elements and links were displayed as to those generated in this study. Specifically, they had discovered that regular organic food buyers identified as important attribute the "ingredients" and linked it to health. This is also confirmed by this study. In all three H.V.M., respondents have mentioned the main ingredient for the production of bread, "type of flour", and associate it with "good health". In fact, the "type of flour" attribute is the one mentioned most of the time by interviewees and is by far the most important element mentioned during Laddering. The group of respondents that belongs to the age category of 31-60 has also identified the attribute "nutritional information and ingredients" and again relate it to "good health". The difference with Grunert and Grunert (1995) is that researchers used soft Laddering for the collection of data, while this research employs the more structured version of hard Laddering.

Nevertheless, the present study goes a step further and examines consumer preferences for an extended number of bread attributes and reveals buying motives that involve the relatively new concept of functional bread.

The main findings, therefore, of this study are as follows:

As mentioned previously, the type of flour appeared to be the main factor influencing purchasing intentions. Healthiness was also identified as a bread characteristic that holds an important role during purchasing decisions. What is interesting is the fact that the "type of flour" as well as the "healthiness"

attributes have been used by respondents in a complimentary way. This made the coding process of the data more complicated and tricky. The reason is the way respondents expressed themselves, as the “type of flour” attribute could be coded either as such or as “healthiness” and vice versa. People consider bread as healthy product in general (Saba et al., 2010). Therefore, this observation attracts the attention because it might imply that the functionality is perceived to come as a result of the flour used for the production of bread. Or that certain types of flour are associated in consumers mind as healthy by default and therefore the added functionality receives separate consideration. Consequently, it would be very interesting to see if there would appear any difference in the results, if the data were coded in a contrasting way.

Taste and aroma is a decisive attribute, which scores higher than price, that consumers take into account and shows that they are not willing to give it away easily. This finding was expected and is in line with findings from other studies (as mentioned earlier in chapter 2, where the literature in the area of functional foods was reviewed), which have concluded that developers of functional foods should not rely on consumers’ willingness to compromise on taste for health. This would constitute a very risky choice. This is because consumers seem to evaluate functional foods first and foremost as foods. Consequently, functional benefits may provide added value to consumers but cannot outweigh the sensory properties of foods.

Furthermore, as far as the other attributes is concerned, “texture” was mentioned as one of the most important reasons for choosing bread. This is in harmony with the results of Grunert and Grunert (1995), since they refer to it with the term “consistency”. Additionally, Pohjanheimo et al. (2010) in their research addressed the effect of personal values on consumers’ food choice motives and on the liking of bread (rye bread). More specifically, they found that texture had a positive influence on bread liking. This could prove useful for bread makers as they could emphasize the importance of bread’s sensory

attributes along with the values that characterise the segments of the population and target their products accordingly.

A few more things need to be stressed. These are related to the age of respondents. Although similar but not the same elements appear in each level of the H.V.M. of both the younger and the older groups, there are differences in a few bread attributes that are taken into account by each group for bread selection. Some degree of variation appears when comparing the H.V.M. of the two groups. For the group of younger respondents, the “appearance” of bread is important. Perhaps this could be explained by the fact that younger respondents are easily impressed by imaging of things.

Another remark has to do with “price”, which scored very high as decisive factor for choosing bread. Interestingly, price appears to be very important for the young group of the sample, as their corresponding H.V.M. exhibits. On the other hand, the H.V.M. for the older group reveals that price does not even exist as influential reason for choosing bread. Possibly this has to do with the fact that most respondents were students at the University of Kent and as a result they have financial constraints. The H.V.M. of older group of respondents, on the other hand, states that people belonging in this group are interested in the quality and convenience characteristics of bread, such as “nutritional information and ingredient”, “shelf-life” and “sliced bread”. Interestingly, “price” is not present in this group’s H.V.M. this is something that supports the above statement about seeking of qualitative characteristics, which could contribute to the increase of price of bread. A final comment has to do with is related to the way the cognitive structures are connected. Although, as demonstrated similar elements are present in both H.V.M. for younger and older groups, different routes are followed in order for them to be connected. This is something that might have implications as to how a campaign should be communicated to these two different subgroups of the sample. Krystallis, Maglaras, and Mamalis (2008) also state that the demand for fairly-priced functional foods by young adults could be

an indication for companies to develop more tailor-made pricing policies for functional product types, targeting different consumer segments.

In conclusion, this first part from the dual-mode type of research undertaken and presented in this thesis has demonstrated an approach to investigate consumer preferences towards bread products that are able to deliver an additional health benefit. This is done by revealing in a structured way purchasing motives that comprise the relatively new concept of functional bread. These purchasing motives are related to consumers' cognitive structures created by their higher order values.

With the use of laddering and M.E.C. model, one of the main research objectives has been achieved. The approach has identified the bread characteristics that consumers value the most or alternatively those characteristics that are perceived to make bread healthier. Those bread attributes have been linked based on consumers' personal value system.

The main motivational benefits of bread purchase is "good health" and "quality product", while the most abstract construct is the value-leverage "fun and enjoyment in life".

The perceptual constructs depicted in the H.V.M. can be used as a basis for developing a bread advertising strategy that will appeal to consumers with particular orientations towards bread that can deliver health benefits.

The results from this part of the research will inform and comprise the basis for the subsequent part of the methodology.

Concluding, the perceptual orientations presented here in the form of H.V.M. could be used as prospective positioning strategies for bread offering health benefits. However, this part of the research corresponds to the starting point for a number of more reflective and knowledgeable inferences.

CHAPTER 5

EXAMINING FUNCTIONAL FOOD SELECTION BY EMPLOYING A CHOICE EXPERIMENT

5.1 Introduction

This chapter introduces and explains the methodology employed to conduct the second part of the research undertaken in this thesis, namely a Choice Experiment (C.E.). As previously explained, the C.E. employed in this research builds up on the piece of research that was undertaken prior to C.E. and explained in Chapter 4, i.e. Laddering. Specifically, we draw on key aspects of consumer choice in relation to bread products and employ these in the C.E. developed here. As a result the development and design of the C.E. presented in this chapter of the thesis provides an interesting link between qualitative and quantitative methods of consumer research.

Another important aspect of the C.E. employed in this thesis is the inclusion of the Dutch Eating Behaviour Questionnaire (D.E.B.Q.) (van Strien et al., 1986)(van Strien et al., 1986) in the survey instrument. The rationale for including the D.E.B.Q. in the survey instrument was so that information about participants underlying eating behaviour could be collected. The D.E.B.Q. is a widely used survey instrument (Ashcroft et al., 2007, Caccialanza et al., 2004) but its inclusion in an economic study is unusual. However, the inclusion of the D.E.B.Q. was considered an important component of the survey as it provides useful insights into the underlying factors that might be driving the responses to the C.E. As will be revealed by the C.E. results the inclusion of the D.E.B.Q. proved very informative.

We begin this chapter by introducing Stated Preference methods in general. This allows us to place C.E. in context. Next we explain in detail the C.E. methodology. This also allows us to discuss why a C.E. is appropriate to employ

to achieve the objectives of this thesis. Having introduced C.E. we then describe in detail the survey instrument. We explain the steps involved in the design and the development of the survey instrument. Finally, the results of our C.E. are presented and the estimates of people's W.T.P. are discussed.

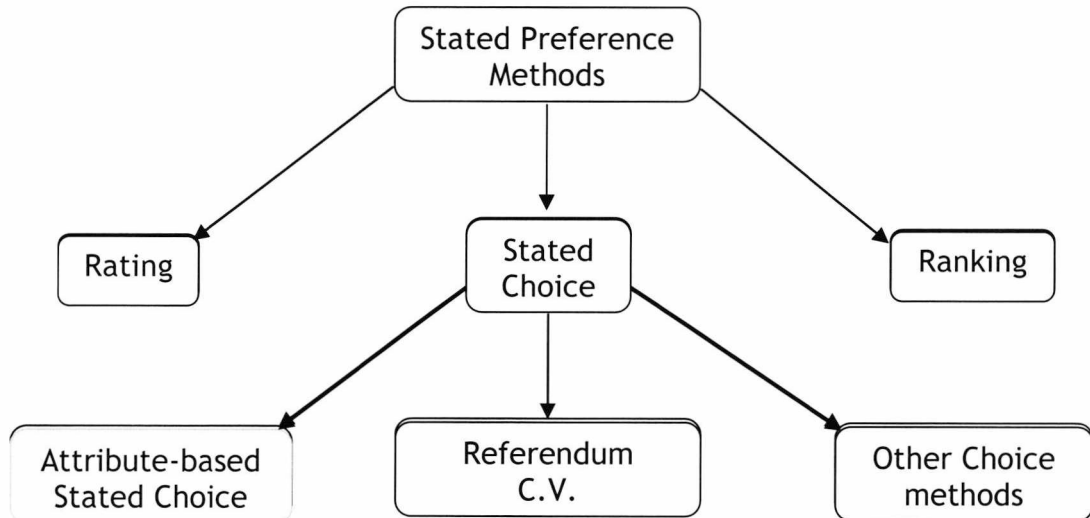
5.2. Stated Preference Methods

Stated Preference (S.P.) methods are a very popular approach to conducting research in economics and marketing. Within the economics literature the development of S.P. methods initially concentrated on the Contingent Valuation (C.V.) methodology. However, limitations with the C.V. methodology as well as developments in the marketing literature have led to the rapid use and implementation of C.M. approaches in general and C.E. specifically.

Before we describe the C.E. in detail let us briefly explain the relationship between C.V. and C.E. approaches. C.V. is a powerful survey-based technique that has long been used to evaluate environmental goods and services that cannot be found in the marketplace (Carson, R., 2000) as well as to estimate consumer preferences and willingness-to-pay for characteristics of many goods and services, including food (Boxall, P. et al., 2007, McCluskey et al., 2007).

Figure 5.1 shows the range of S.P. methods, which have been utilized in the economics, marketing, transportation and environmental literature. It is clear from figure 1 that referendum C.V. is one form of Stated Choice (S.C.) methods, while "open-ended" C.V. studies come under the "ranking" category, as it deals with ranking tasks that include monetary values. It needs to be mentioned that if the S.C. study involves a single attribute to be evaluated, then it is automatically converted to a referendum C.V. exercise.

Figure 5.1. Stated Preference Methods



Source: (Adamowicz et al., 1998)

Therefore, in a C.V. task, with the use of a suitably designed questionnaire, a hypothetical market is described, where the good or service in question can be traded and details of the institutional context and value of the good are provided. Using a dichotomous elicitation format, respondents are asked to express their W.T.P. for a hypothetical change in the level of provision of a commodity. Data generated using this C.V. format can then be estimated using the procedures described in detail by Hanemann (1984) and by Hanemann and Kanninen (1999).

However, with C.V. methods, emphasis is instead placed on the accuracy and completeness of the description of one particular good and the context in which it appears. Possible mistakes in the presentation of the good to respondents, which will be found out after the C.V. has been conducted, cannot be resolved (Adamowicz, V. & Boxall, 2001, Adamowicz, Wiktor et al., 1998, Boxall, P. C. et al., 1996). The criticism of C.V. is such that economists have more and more frequently employed various forms of Choice Modelling with which to conduct SP research.

5.2.1 Choice Experiments

As the research presented in this thesis has employed a CE, we will focus our discussion from this point forward on C.E. specifically. To do this, let us begin by asking a question: What is C.E.?

Briefly, C.E. is a form of a stated preference exercise, closely related to economic theory, in which respondents are presented with a set of different (in terms of value levels) alternatives and are asked to indicate what is the most preferred to them. Thus, the analyst has the chance to evaluate the diversification of choices made.

Because C.E. is a stated preference method, the data is collected using surveys and appropriately designed questionnaires. One attribute that needs to be employed in a C.E. is price, so that people's W.T.P. can be estimated. Thus C.E. do not directly ask respondents to place monetary values on goods or services. Instead, each of the choices in a C.E. involves an implicit trade-off between money (such as the level of income, an entrance fee, or a tax rate) and the level of other attributes such as environmental quality or health related benefits from specific foods.

Bateman et al. (2002) summarise the information about the value of a good that can be revealed by C.E. as follows:

- a) Which attributes are significant determinants of the values people place on specific goods or services.
- b) The implied ranking of these attributes amongst the relevant population(s).
- c) The value of changing more than one of the attributes at once.
- d) As an extension of the above, the total economic value of a resource or good.

5.2.2. Advantages of Choice Experiments

C.E., and C.M. in general, provide several advantages over alternative S.P. methods such as C.V. The fundamental reason why many of these advantages occur can be justified by the detailed design and information provided as part of the C.E. survey, compared to the simple context description that occurs in C.V. methods. Hence, C.E. appears to be preferable compared to C.V. methods in marketing, economic, environmental and transportation valuation studies. The advantages of C.E. over C.V. have discussed by a number of authors in the literature (Hanley, Mourato & Wright, 2001, Rolfe, Bennett & Louviere, 2000, Adamowicz, Wiktor et al., 1998, Adamowicz, W., Louviere & Swait, 1998, Hanley, Wright & Adamowicz, 1998).

Briefly summarising the advantages of a C.E., one can stress the ability of the researcher to estimate the perceived usefulness or value placed by consumers on specific attributes of the product examined. Additionally, C.E. are preferred to other stated preference techniques as the values estimated in one study could be transferred to a different but contiguous study subject to certain restrictions. What is more, the prospective reduction of respondents' heuristic techniques when choosing a product over alternatives offers valuable information for their responses. Another merit of C.E. is that it could potentially shrink respondents' natural tendency not to reveal the real economic preferences, something that occurs in C.V. exercises. With regard to the estimation of the model, C.E. produce smaller error variances of welfare values compared to the ones generated from a C.V. exercise. Consequently, they are more informative. Finally, because choice experiments are designed with orthogonality in mind, collinearity issues when the model is estimated are reduced.

a) Marginal welfare estimation

An important advantage of the C.E. approach is the ability they offer to the researcher to estimate the marginal utility of specific qualitative characteristics of the product. (Kristrom & Laitila, 2003, Hanley, Wright & Adamowicz, 1998). Therefore, the analyst can determine, separately yet simultaneously, the relative importance of economic, social and other factors in a valuation exercise. This can be done by modifying the levels of provision of the preferable product attributes (especially if the attributes are continuous in nature), allowing the calculation of accumulative contribution to the utility function and subsequently monetary welfare. Employment of C.V. methods will not provide such specific information.

b) Multidimensionality

A problem that has been identified with the use of the C.V. method is the inability of the approach to provide direct values for an attribute associated with the commodity or service in question. This is accommodated in the C.E. approaches that represent an extension of the binary discrete choice C.V. method. This is because in a C.E. more than two alternative options are always presented to consumers and therefore the values related to certain attributes as well as the trade-offs between them are allowed to be estimated (Rolfe, Bennett & Louviere, 2000, Adamowicz, Wiktor et al., 1998). This is not the case in C.V. methods where the good is either present or not.

c) Benefits transfer

Benefit transfer refers to the technique that adjusts values estimated from one study in order them to be used in others studies of similar context (Christie et al., 2004). For this reason estimates of attribute parameters can prove valuable, as suggested by Morey *et al.*, (2002), Morrison *et al.*, (2002) and Christie *et al.*, (2004).

However, this action can take place if and only if socio-economic variables are included in the C.E. models employed (Hanley, Wright & Adamowicz, 1998), as

they will be needed to adjust the welfare contributions of attributes in one area to the conditions prevailing in another. Haener *et al.* (2001) state that the predictive ability of estimates from C.E. approaches can be compared to the respective one of Revealed Preference (R.P.) models in choice exercises on recreational sites.

d) Heuristic and consistency of responses

As Swait *et al.* (2002) state, "*optimisation over all alternatives and attributes using compensatory decision rules is a common assumption in economic theory and analysis*". It is suggested by the literature that individuals employ a number of different decision-making principles that are not consistent with the utility maximization theory (Swait, Joffre *et al.*, 2002, Swait, Joffre & Adamowicz, 2001a, 2001b). For example, it has been suggested that when the complexity of the task increases or when tiredness (as a result of it) appears, people make use of simple fundamentals of behaviour that might result in processing less information or even avoiding making choices at all. All these principles utilised by respondents are called heuristics. The merit of a CE survey is that the repeated choice task allows for the construction of preference structures (or in other words for the modelling of the relation between heuristics and actual preferences), which might help to the removal of heuristics used by respondents. Consequently, choice experiments are considered to be more informative than C.V., as they may provide extremely useful information into the consistency of individual responses.

e) Hypothetical bias and "yeah-saying"

In many non-market studies, an individual's actual W.T.P. is frequently less than their stated W.T.P. This is often the case in C.V. approaches (Murphy *et al.*, 2005). The way people tend to respond in such studies, as Blamey *et al.* (1999) define it, the "yeah-saying", commonly occurring in C.V. surveys is "the tendency to subordinate outcome-based or "true" economic preferences in favour of expressive motivations". This could be reduced when employing the choice

experiment methodology. This is because the options are described using attributes and levels of attributes, which makes it rather more difficult for subjects to recognize those options that over- or under-represent a certain valuable good. Choosing among a number of different alternatives, with the use of which a qualitative characteristic is under evaluation should be a more difficult task than choosing between a status quo and an enhanced scenario. However, this debate needs to be further investigated.

f) Smaller error variances of welfare values – more informative estimates

According to Adamowicz et al. (1998), the error variances of C.E. and C.V. methods as well as their respective monetary attributes are usually not significantly different. However, the error variances of welfare values that are calculated when a C.E. is employed are significantly smaller than those calculated from the utilisation of the C.V. method. Consequently, C.E. welfare estimates derived from choice experiments are more enlightening compared to those derived from the use of C.V. data.

g) Collinearity

Because of the way in which C.E. choice sets are constructed (attribute levels are typically designed to be orthogonal) issues associated with collinearity in model estimation are significantly reduced. Thus, C.E. give the researcher that chance to identify marginal values of attributes that would be difficult to be estimated using revealed preference data (Hanley, Wright & Adamowicz, 1998) or C.V. methods.

h) Incentive compatibility

It is frequently argued that a C.E. will yield an incentive compatible survey design. Incentive compatibility refers to the idea that respondents will be truthful in their answers. The issue of incentive compatibility has been the subject of much research for C.V. and has been the reason for the development of several different bidding formats. A C.E. with a generic choice set formats has this

property, whereas an open-ended C.V. question may give rise to strategic overbidding or underbidding.

In addition to the advantages listed above, C.E. are frequently considered to deal with some of the main biases that have been identified to impact C.V. exercises. Bateman et al. (2002) provide an interesting discussion of which a couple of points are mentioned below.

i) Ethical Protesting

It has been claimed that because C.E. avoid direct questions regarding specific issues, respondents are less likely to protest. Indeed, nowadays, investigators design C.E. in such a way so as to allow respondents the ability to answer with a “no choice” option. However, how the researcher deals with this data in C.E. remains an issue.

j) Insensitivity to Scope

This problem arises when W.T.P. estimates do not change as the size of the good in question changes scale and/or context. It has been found in research that C.V. passes a scope test. With respect to C.V., the issue of insensitivity to scope has been less easily resolved. This can be partly attributed to the fact that as the number of attributes increases, all of which yield an estimate of W.T.P. at least one of the attributes will not be subject to scope insensitivity.

5.3 Designing a CE Survey Instrument

The design of a C.E. survey instrument is a complex task. The key stages of the design of such a study are described in detail by Hanley et al. (2001) and Adamowicz et al. (1998). These stages are as follows:

1) Characterisation of the research issue and attributes selection

This stage is the most important during the design of the C.E. The researcher employs a number of tools such as literature review, focus groups or other similar techniques in order to identify the problem, which needs to be presented to the respondents in a way that is coherent and understandable. This is important as the choices they will make need to be meaningful. The definition of the problem will emerge as a result of a policy question. However, sometimes the problem in question needs to be defined in such a way that C.E. can be employed. In the case of healthy food and functional ingredients that could potentially deliver health benefits, the challenge is to formulate a decision problem that every individual is familiar with in real life. At the end of the first stage, according to Adamowicz *et al.*, (1998), the researcher must have accomplished the following goals:

- a) Define a suitable choice set size and composition. Decisions on whether a status quo option should be included or not, whether the experiment will be labelled or not all need to be made. It is worth noting that, as Hanley *et al.* (2001) have suggested, the omission of the status quo option might lead to the estimation of inaccurate welfare estimates. This is because survey participants without a preferred option and no status quo alternative, will be forced to choose something or even quit from completing the survey questionnaire.
- b) Define those attributes that appear to be relevant and of significant importance to the product evaluated. This will include a price attribute so as inferences about the W.T.P. estimates can be drawn.
- c) Decide on the most important socio-demographic, attitudinal and behavioural variables to be included in the survey in order to assist in the explanation of the W.T.P. estimates. This will also assist in the explanation of respondents' heterogeneity if it is identified in the survey data.
- d) Decide on the appropriate sampling frame. This is important in relation to how the results of the survey can be interpreted in a context beyond the

survey itself. Thus, if the purpose of the CE is generate information that is important for policy making at the national level then it is important to have a set of sample data that appropriately captures the necessary demographic characteristics.

2) Assignment of number and value of attribute levels

In the second stage, the number of attribute levels as well as the value assigned to each of them need to be decided. The level of the values employed need to be sensible in terms of number employed. They must also be as realistic as possible and described in a way so as they are understood by individuals of all backgrounds. Techniques also employed in the first stage can offer great help in deciding about the levels of the attributes. At this point, the analyst can consider about delivering these levels in words or with the use of graphics and pictures. Also, in most C.E. exercises a status quo is included for each one of the attributes selected. This happens because there might be respondents that would not choose an improved option from the set given to them, but rather they would prefer the option that is more familiar with (and which most likely also represents the cheapest alternative), namely status quo. This is indeed a realistic condition. Also, the inclusion of the status quo option ensures that the resulting welfare estimates are, theoretically, consistent (Kontoleon & Yabe, 2003).

3) Experimental design and choice set construction

In virtually every practical C.E. application it is necessary for the analyst to try and reduce the number of attributes as well as the number of levels each attribute takes. This is because the researcher is confronted by an experimental design issue.

Thus, after the selection of attributes and attribute levels, the investigator employs the property of orthogonality⁴, in order to produce various combinations of the attribute levels. These are commonly denoted as “profiles”. According to Adamowicz et al. (1998), a profile is defined as

“a single attribute level combination in a complete factorial combination of attribute levels”, while design is “a sample of profiles which have a particular set of statistical properties that determine the utility specifications that can be estimated”. (pp. 13)

Profiles are grouped into a number of choice sets following a design that has statistical properties. Designs that include all possible combinations of attribute levels and choice sets, which are commonly referred to as “Complete factorial designs”, usually generate an extremely large number of alternative scenarios, which makes the administration of the survey impossible. Hence, alternative design formats are utilized by researchers, namely “fractional factorial designs” that generate reasonable number of alternative scenarios, solving the problem of survey administration. Current computer software (such as SPSS) can generate this output. Green (Green, 1974a, 1974b) describes such designs called “main effects designs” in his work. Using a main effects design, which is an orthogonal type of design, composed of a subset of the full factorial design, the analyst assumes the interactions between attributes are insignificant and consequently is able to estimate a strictly additive utility function without

⁴ Orthogonality is a mathematical property that requires all attributes be statistically independent of one another. Therefore, orthogonality implies zero correlations between attributes. Consequently, an orthogonal design is that in which the columns of the design display zero correlations. It must be noted though that the attributes themselves may be perceptually correlated but they have to be statistically independent.

interactions between the attributes. If this assumption does not hold, then the utility parameters will be hugely biased.⁵

Another important aspect of the C.E. design is the relationship between the number of attributes employed and the number of levels. These decisions will impact on the construction of the choice offered as part of the final C.E. As a simple example, if we had four attributes and each attribute had three levels then we would be able to generate 81 alternative sets: $3 \times 3 \times 3 \times 3 = 81$. However, in most practical settings there is no way in which we could employ all 81 sets. The costs involved would make this a very expensive task. Thus, in practice we can reduce this number to a much smaller subset that will contain sufficient alternatives to ensure a statistically robust design.

Once the scenarios have been constructed, they are presented to participants in groups usually into sets of alternatives, with one of them being the status quo profile. However, it needs to be pointed out that it is not clear from the literature, whether the inclusion of the improved alternatives, the status quo profile and the opt out option (not choosing anything at all) is in favour of the C.E. design or complicates the scenarios.

4) Questionnaire development, pilot survey and sampling

The survey instrument can take several forms. The most common approach used to date is a paper-and-pencil self-administered questionnaire. It is most commonly sent by post to participants, who will post it back to the researcher completed, using a pre-paid envelope. Alternatively, the questionnaire is presented by the analyst in person, taking the form of an interview. Also, with

⁵ It is briefly worth noting that the inclusion of interaction effects in a survey design significantly increases the number of resulting profiles. It is also the case that interaction effects frequently yield limited additional statistical power when the choice data is estimated. As a result the inclusion of interaction effects in a CE experimental design is reasonably limited.

the use of technology, C.E. can be designed and delivered to participants via electronic mail or completed on-line. The selection of delivery method depends on the financial resources and time available. In general, the first method is more economical and less time-consuming than the second, which in turn enables the analyst to have control over the data collection process, as he/she can make sure that respondents have sufficient information to provide sensible responses. The last method is economical and a fast way to collect the data, but the researcher has no control on the collection of data.

As mentioned earlier the main part of the questionnaire is the choice task, but information on other issues (such as attitudes) will be collected and several sections will be included in the survey instrument, such as introduction to the survey and its purpose and informative text regarding the context of the research. This is a vital feature of the survey instrument explaining the context of the choice. It is important to note that if the choice context is unfamiliar to the participant or their knowledge is limited, the instructions provided need not only to be informative, but also to support the respondent in a unbiased way in order to form preferences.

Additionally, the inclusion of an example of how the choice task should be completed could offer significant help to respondents, as C.E. represents a complex task for people with no familiarity to engage in. Finally, questions about socio-demographic characteristics will be included in the survey, as they usually account for heterogeneity reported in the sample.

An important issue that the analyst needs to take into account is the number of choice scenarios each of the participants will be called to answer. There is some confusion in the relevant literature on this issue. The number of choice sets has ranged from one up to thirty-two. The investigator has to consider the learning and fatigue effects that result as the respondent completes the task before taking his decision. As a rule of thumb, in the process of blocking the design into easily controllable choice sets, one can randomize the sets and then subdivide

the ordered design into subsets of the desirable size. So, if for example the choice sets were 81, it would be common practice to block them in 9 groups of 9. Consequently, it would be vital that almost an equal number of completed survey questionnaires from each group is returned.

Before the actual survey is sent out to the public, a pilot of it is important. It ensures the description of levels is concise and relevant to the respondents and helps remove inappropriate choice sets (dominant alternative⁶). A pilot survey, also, corrects inconsistencies and provides an idea of whether the survey is well understood by the participants. There also exist other methods which can be employed to pair the various choice profiles. This is an active area of experimental research design (e.g., Scarpa and Rose(2008)). Also the C.E. analyst must decide on the survey procedure to measure individual preferences. A number of options exist: rating options on an integer preference scale (Mackenzie, 1993), ranking alternatives in order of preference (Foster & Mourato, 2000, Mourato, Ozdemiroglu & Foster, 2000), or choosing the most preferred case, which signifies the C.E.

The final decision to be taken relates to the size of sample. Accurate data collection or consideration of the data collection cost? This is the question that needs to be answered. In general, the total sample size will be dependent upon the total number of choice scenarios and the number of alternatives in a specific scenario.

⁶ A dominant alternative exists in the case where two profiles A and B have the exact same attribute levels, except one, price for example, where the B alternative has lower price. It is argued though by some researchers that these choice sets should be left in the design as a way to check if the answers are meaningful.

5.4 Model Estimation⁷

Attribute-based stated choice models and C.E. in particular are consistent with Lancaster's theory of value and with R.U.T. Because of that and because of the inclusion of a price or cost attribute not only can welfare estimates be derived, but also marginal welfare evaluations (marginal utilities or partworths that correspond to each of the explanatory product's attributes) can be calculated. The basic econometric model that is used to estimate C.E. is the Multinomial Logit (M.N.L.) model. Once the M.N.L. model has been estimated, it is common place for researchers to then consider more advanced model specifications such as the Mixed Logit and Latent Class Models. These models are typically estimated so as correctly capture preference heterogeneity. In this section we will begin by describing the M.N.L. and then subsequently describe the more advanced specifications.

5.4.1 Standard M.N.L. specification and estimation

Consistent with Hensher et al. (2005), let us assume that an individual n is confronted with a choice task and asked to choose his/her favourite option i that is drawn from a choice set CS . The n individual's utility U_{ni} gained from choosing

⁷ The standard multinomial logit is the most common model estimated in the C.E. literature (McFadden, D., 1974). One can also come across several alternative choice models can also in the literature. Examples of such models include the multinomial probit (M.N.P.) (Magnusson & Cranfield, 2005, Lusk & Schroeder, 2004), or variants of the CL model, such as the nested logit (von Haefen, 2003, Blamey, R. et al., 2002, Burton et al., 2001) and the rank-ordered logit (Foster & Mourato, 2000, Roe, Boyle & Teisl, 1996). Despite the differences between the models, all of them have one thing in common. This is the procedure followed, called maximum likelihood estimation. Briefly, ML utility parameter estimates would maximize a probabilistic function. This is done using iterative algorithms that are widely available nowadays in such commercial computer packages as Limdep, Stata and Gauss. One such algorithm, the Newton-Raphson technique for gradient search, is described at length in Louviere *et al* (Louviere, J., Hensher & Swait, 2000).

the alternative i in a choice occasion t can be divided into two contributions: the observed by the researcher (deterministic) term V_{ni} and the stochastic (or error) term ε_{ni} . The deterministic part is the part of the utility function that the product's attributes contribute to, while the error term reflects all these things that cannot be observed by the researcher. Consequently,

$$U_{nit} = V_{nit} + \varepsilon_{nit} \quad (5.1)$$

which in turn can be written as:

$$U_{nit} = V_{nit} + \varepsilon_{nit} = \beta X_{nit} + \varepsilon_{nit} \quad (5.2)$$

where β is a vector of parameters representing preferences to be estimated and X_{ni} corresponds to an observed attribute vector. Note that β is allowed to differ for each individual in order to incorporate the heterogeneity associated with individual preferences.

The utility function presented in equation (5.2) is known as the “conditional indirect utility function” because it is provisional on the choice of alternative i . This implies that an individual n in a choice occasion t chooses alternative i , as apparently its utility is higher than the utility of alternative j . This can be written as follows:

$$U_{ni} > U_{nj} \Rightarrow V_{nit} + \varepsilon_{nit} > V_{njt} + \varepsilon_{njt}$$

Because of the stochastic nature of utility, the researcher can only calculate the probability of individual choosing alternative i over alternative j . This can be written as:

$$Prob\{n \text{ chooses } i \text{ from choice set CS}\} = P_{ni} = Prob\{V_{nit} + \varepsilon_{nit} > V_{njt} + \varepsilon_{njt}\} \quad (5.3)$$

for every i, j that belong to CS_{nt} . Equation (5.3), after some rearranging, yields the following form:

$$Prob\{n \text{ chooses } i \text{ from choice set } CS\} = P_{ni} = Prob\{V_{nit} - V_{njt} > \varepsilon_{njt} - \varepsilon_{nit}\} \quad (5.4)$$

for every i, j that belong to CS_{nt} . In order to move forward and perform statistical analysis, it is necessary to make an assumption about the error term ε . It is typically assumed that the error terms are independently and identically distributed (iid) with a Gumbel (Type I Extreme Value) distribution. This is done so as the predicted choices and trade-offs match as closely as possible the actual choices revealed in the survey (Burton et al. 2001):

$$F(\varepsilon) = \exp[-\exp(\varepsilon)] \quad (5.5)$$

where $F(\varepsilon)$ represents the cumulative density function of the error terms.

The assumption above allows us to re-express the problem that the individual faces as:

$$P_{nit} = \frac{\exp(\mu V_{nit})}{\sum_{\forall j \in CS_{nt}} \exp(\mu V_{njt})} \quad (5.6)$$

where μ is a scale parameter that is inversely proportional to the variance of the error term standard deviation of the error distribution. When μ tends to infinity, the model becomes deterministic. This term cannot be independently identified and therefore is usually assumed to be equal to one. This has no implication for the estimation of the partworths, welfare change and marginal rates of substitution, since these essentially involve parameter ratios from which the scale parameter will be dropped. The scale parameter will influence only the magnitude of the parameter estimates. However, this has impact neither on respondent behaviour nor to welfare estimation.

Assuming that the deterministic part of the utility function is linear then the equation (5.6) becomes as follows:

$$P_{nit} = \frac{\exp(\mu\beta X_{nit})}{\sum_{\forall j \in CS_{nt}} \exp(\mu\beta X_{njt})} \quad (5.7)$$

The model in the equation (5.7) corresponds to the M.N.L., which is also known as the Conditional Logit (C.L.) (McFadden, D., 1974). It is also known as the binary logit, if the dependent variable in a regression analysis only takes two values. The M.N.L. is typically the first model a researcher will estimate with data collected by employing a C.E.

The M.N.L. model assumes that the choice options in a choice set follow the Independence from Irrelevant Alternatives (IIA) property (or Luce's Choice Axiom (Luce, 1959), which maintains that the relative probabilities of two alternative options are chosen, remain unaffected by the introduction of more options. This property stems originally from the fact that Gumbel error terms are iid across the different alternative profiles in a given choice set. Hence, the introduction of more than two alternatives to the choice set CS_{nt} will leave the ratio of relative probabilities unchanged. It can be shown that the relative probabilities of a respondent n choosing options i and m from choice set CS_{nt} can be algebraically expressed and simplified as follows:

$$\frac{P_{nit}}{P_{nmt}} = \frac{\exp(V_{nit})}{\sum_{\forall j \in CS_{nt}} \exp(V_{njt})} \bigg/ \frac{\exp(V_{nmt})}{\sum_{\forall j \in CS_{nt}} \exp(V_{njt})} = \frac{\exp(V_{nit})}{\exp(V_{nmt})} = \exp(V_{nit} - V_{nmt}) \quad (5.8)$$

This means that the introduction of additional alternatives to the choice set CS_{nt} will leave the probability ratio unchanged, as the denominators of both probability expressions will cancel out each other.

The estimation of this model can be carried out using conventional maximum likelihood estimation procedures. The respective log-likelihood function is the one shown in equation (5.9) below. The value of the variable y_{ni} will equal 1 if respondent n chooses the alternative i and zero otherwise, for every i that belongs to CS.

$$\log L(\beta) = \sum_{n=1}^N \sum_{t=1}^T \sum_{\forall j \in CS_{nt}} y_{njt} \cdot \log P_{njt} = \sum_{n=1}^N \sum_{t=1}^T \sum_{\forall j \in CS_{nt}} y_{njt} \cdot \log \left(\frac{\exp(\beta X_{njt})}{\sum_{j \in CS_{nt}} \exp(\beta X_{njt})} \right) \quad (5.9)$$

where N is the number of respondents, T the number of choice occasions or sets presented to each respondent, and y_{njt} an indicator variable which assumes the value of 1 if individual n chooses alternative j on occasion t , and 0 otherwise. It is worth noting that the sample size in the standard M.N.L. analysis is the total number of observations or choice occasions rather than the number of respondents N . In other words, any choices made by the same or different individuals are assumed to be independent draws from the distribution.

5.4.2 Partworths and Welfare Estimates

After the calculation of the parameter estimates from the M.N.L. model, the analyst can obtain the marginal W.T.P. for certain product or service characteristics. This is an important benefit from employing a C.E., as the researcher can place a monetary estimate on every attribute included in the C.E. This can provide significant pieces of information from a policy context point of view.

The W.T.P. values are derived simply by dividing the parameter estimate of a certain (non-monetary) attribute over the parameter estimate of the monetary attribute included in the C.E. The formula is illustrated in the equation (5.10) below.

$$WTP = -\frac{1}{\beta_{price}} \left(\ln \sum_{\forall i \in CS} \exp(V_i^1) - \ln \sum_{\forall i \in CS} \exp(V_i^0) \right) = -\frac{1}{\beta_{price}} \left(\ln \sum_{\forall i \in CS} \exp(\beta X_i^1) - \ln \sum_{\forall i \in CS} \exp(\beta X_i^0) \right) \quad (5.10)$$

where V_i^1 corresponds to the marginal utilities associated with the different alternatives of the CS choice set after the change (improved alternative), while V_i^0 corresponds to the marginal utilities of the current situation (status quo).

Simplifying the equation (5.10), it can be shown that the W.T.P. values, which in essence correspond to the marginal rate of substitution between income and each non-monetary attribute i , are easily calculated using the equation (5.11) below:

$$WTP = -\left(\frac{\beta_i}{\beta_{price}} \right) \quad (5.11)$$

The ratios calculated from the equation (5.11) are often referred to in the literature as implicit prices. Finally, it is worth noting that heterogeneity in preferences is a function of socioeconomic, demographic and attitudinal variables that vary across respondents and influence their tastes and their willingness to pay. For this reason in models used to estimate W.T.P. values, the inclusion of such variables is widely done. This is because the researcher wants to see the way survey participants react to the questionnaire. This will help the analyst conclude about participants' behaviour and whether it is in line with economic principles and our expectations about how people will respond to the C.E. choices.

5.4.3 Identifying Preference Heterogeneity

Modelling preference heterogeneity in random utility models is a complicated task. As Kline and Wichelns (1998) discuss, the most widely used way of doing so is by including socio-economic, demographic as well as factors in the model.

However, these characteristics are specific to each individual and the analyst cannot assume homogeneity. Moreover, the M.N.L. model assumes substantial behavioural restrictions, which in turn result in significant statistical limitations. In particular, as mentioned previously, it assumes that the choice options in a choice set follow the IIA property.

The limitations of the M.N.L. model, though, have forced researchers to look for alternative ways to model heterogeneity. This led to the advancement of two models that nowadays gain a lot of popularity among academics. These two models are the Mixed Logit (M.L.) or Random Parameter Logit (R.P.L.) model and the Latent Class model (L.C.M.). Next, the form and basic features of the M.L. and L.C.M. models are outlined.

5.4.3.1 The Mixed Logit (M.L.)

The M.L. or R.P.L. are a form of the random utility model in which it is assumed that the functional form and arguments of utility are common but that the parameters vary across individuals. Thus M.L. model does not assume IIA, as it can allow for a distribution of preferences within the population rather than only identifying the 'mean' preference.

With the M.L. the conditional utility function given in equation (5.2) becomes individual specific. Therefore:

$$U_{nit} = V_{nit} + \varepsilon_{nit} = \beta X_{nit} + \varepsilon_{nit} \quad (5.12)$$

where X_{ni} is the vector of observed variables while the parameter vector β corresponds to people's preferences and cannot be observed. This parameter vector varies in the population and its density is $f(\beta|\Omega)$. Ω represents the true parameters of this density function. The parameter vector β can be divided into two components: one is the population mean b and the other is the individual

specific deviation from that mean η_n . Therefore, the equation (5.12) can be written as:

$$U_{ni} = \beta X_{ni} + \varepsilon_{ni} = bX_{ni} + \eta_n X_{ni} + \varepsilon_{ni} \quad (5.13)$$

Now, if individual preferences were known, the analyst could condition on β , and the choice probability would take the form of a logit, for the probability that the n individual selects option i :

$$Lni = \frac{\exp(bX_{ni})}{\sum_j \exp(X_{nj})} \quad (5.14)$$

However, the β are unknown and thus the probability corresponds to the integral of the equation (5.14) and will have the form:

$$\pi_{ni}(\Omega) = \int P_{ni}(\beta) \cdot f(\beta | \Omega) d\beta \quad (5.15)$$

The sequence of selections of the options available per individual is required for maximum likelihood estimation. Let us assume that an individual in choice occasion t selects option $i(n,t)$ then the probability that the n^{th} individual's observed sequence of selections is given by the following equation:

$$S_n(\beta) = \prod_t L_{ni(n,i)t} \beta \quad (5.16)$$

However, because β cannot be observed by the analyst, the probability for the sequence of selections corresponds to the integral shown in equation 5.17:

$$P_n(\Omega) = \int S_n(\beta) f(\beta | \Omega) d\beta \quad (5.17)$$

Importantly, the equation (5.17) cannot be calculated exactly as the integral does not have a closed form in general. For this reason the model will need to be estimated by simulation methods. Currently the M.L. model can be estimated with a small a number of statistical packages (e.g. NLOGIT, which is well supported by textbooks examine C.E. such as Hensher et al., (2005), as opposed to M.N.L. model, which is less econometrically complicated and as such can be estimated using basic statistical software, such as S.P.S.S.

Within a logit specification the error term ε is independent and identically distributed (iid). The iid assumption is restrictive. However, the logit specification breaks this restriction, which does not allow for the error components of different alternatives to be correlated, by partitioning the stochastic component additively into two parts. One part is correlated over alternatives and heteroskedastic, and another part is iid over alternatives and individuals. This can be seen in equation 5.13, where η is a random term with zero mean and distribution that depends on underlying parameters and observed data relating to different alternatives and different individuals. The error term ε is random with zero mean that is iid across alternatives and does depend on any underlying parameters or observed data. Having clarified this point, it is easily understood that the M.L. model holds advantages that can help the researcher identify close approximations of consumers' preferences. The M.L. incorporates the fact that different consumers have different preferences. Also, it considers that information unobserved could be sufficiently rich to induce correlation across alternatives and changes among individuals.

A problem that occurs when using the M.L. model is that related to distributional assumptions. The parameters selected as random can have a number of predefined functional forms. Establishing the distribution that corresponds to reality is a challenge, as various biases can exist in the real data. Finally, small sample sizes can lead to misinterpretations about the model's covariance structure.

5.4.3.2 Latent Class Model

Although the M.L. model is very effective at capturing respondent heterogeneity, it has a number of weaknesses that diminishes its applicability. For example, the M.L. can take a long time to solve and there are examples where M.L. models have failed solve (i.e. converge) (Provencher & Bishop, 2004). This can happen when some parameters are set to follow a lognormal distribution⁸ or when the starting values of the estimation are far from the maximum likelihood maxima (Train, 2003).

Of maybe more importance for the use of the L.C.M. is the way in which heterogeneity is modelled. Both Boxall and Adamowicz (2002) and Scarpa et al. (2005) suggest that in order to respond to policy questions, the identification and quantification of a finite number of types in the population is preferable to characterization based on a continuous distribution. In addition, compared to the M.L., the L.C.M. employs a semi-parametric approach to modelling heterogeneity, which avoids strong distributional assumptions to be made about the form of individual heterogeneity (Greene & Hensher, 2003).

The use of the L.C.M. is growing in the agricultural and resource economics literature (Milon & Scrogin, 2006, Scarpa, Riccardo & Thiene, 2005, Hu et al., 2004, Scarpa, Riccardo et al., 2003, Boxall, P. C. & Adamowicz, 2002).

Hu et al. (2004) examined the trade-offs made by consumers between possible risks and benefits associated with health and the environment from the application of G.M. ingredients in food products. The researchers took a different approach from what had been done in the past by considering heterogeneous consumer preferences. This is important because the models to be estimated

⁸ A coefficient vector in a M.L. model can take a number of different forms of distribution, regardless of the type of distribution the remaining variables will follow. The types of distribution include the normal, lognormal, triangular and uniform.

are unbiased and, additionally, consumer behaviour can be predicted more precisely. Thus, the approach they took is different to Burton et al. (2001) who used socio-demographic characteristics along with alternative specific constants (A.S.C.) plus specifying a heteroskedastic variance term. However, as noted by Fennell et al.'s (Fennell et al., 2003) the inclusion of socio-demographic variables into the utility function is not a satisfactory way to describe heterogeneity. Thus, Hu et al. defined heterogeneity as the latent differences in the patterns of consumers' responses. This pattern can be revealed using a L.C.M.

As Boxall and Adamowicz (2002) explain, an advantage of this model is the fact that the number of segments can be determined jointly with the utility coefficients, using various information criteria (A.I.C., A.I.C.3, B.I.C.). Consequently, the L.C.M. makes use of the information collected from individual's choices, rather than subjectively splitting consumers into separate segments and estimating preferences for each individual class. However, there is an inconvenience using this approach. The number of parameters, for each variable, that need to be estimated may increase dramatically if many classes or variables are included.

Boxall and Adamowicz (2002) employed the L.C.M. to try and understand systematic heterogeneity. The model was applied to wilderness recreation data collected after the implementation of a C.E. The questionnaire developed for that survey was divided in various parts. The questionnaire collected information on wilderness management, past visits to parks and socio-demographic characteristics. Additionally, three more sets of information were collected that were used in the L.C.M. The first set involved a series of statement that signified the reasons why respondents visited the recreational areas. The respondents were asked to rate the importance of the statements in a Likert scale. The second set of information was the actual choice experiment. Each respondent faced 6 options to choose from, two of which were the status quo and "none of

them” options. Five wilderness characteristics each one explained in four different levels were developed. The 6 options were branded. However, the researchers assumed that individuals were able to evaluate the representations of the sites and did not confuse the actual site attributes with the ones asked to assess. The choice sets were constructed from an orthogonal main effects design, generating 64 possible choice tasks that were split in 8 groups of eight. The final set of information dealt with respondents’ perceptions of the levels of attributes in each park. The survey was sent out by post to 1000 individuals, a sample which was extracted from parks’ registries. The final sample consisted of 620 people.

Chalak et al. (2008) also employed a L.C.M. to analyse C.E. data collected to quantify consumer W.T.P. estimates for a reduction in the use of pesticides for both environmental quality and consumer health. The authors translate these estimates into tax estimates, associated with each particular type of externality.

We follow approach adopted in the existing literature when estimating out L.C.M. specification. The L.C.M. used in this research represents a generalization of the M.N.L. model with the condition that more than one class (i.e. segments) exists in the population. Therefore, the segment-specific utility functions are expressed as a standard M.N.L. function. Formally, the L.C.M. model is generalised by assuming that C classes exist in the population. Consequently, the equation (5.7) of the standard M.N.L. model takes the form of class-specific (all scale parameters will be set equal to one). Therefore, the utility gained by an individual n from choosing the alternative i from a choice set CS , assuming that he/she is a member of a class c , is shown in equation (5.18) below:

$$U_{ni|c} = \beta_s X_{ni} + \varepsilon_{ni|c} \quad (5.18)$$

where the respective probability for this scenario is given by the formula, taking into account that the individual is a member of class c :

$$P_{ni|c} = \frac{\exp(\beta_c X_{ni})}{\sum_{\forall j \in CS} \exp(\beta_c X_{nj})} \quad (5.19)$$

Following Swait (1994) and Boxall and Adamowicz (2002), the membership likelihood function M , is given by the following formula:

$$M_{nc} = \lambda_c Z_n + \zeta_{nc} \quad (5.20)$$

where Z_n is a vector of attitudinal and socio-economic characteristics, λ is a vector of parameters to be estimated and ζ is the vector representing the error terms. Let us assume that the error terms are iid across each individual and that they follow a Type I extreme value distribution (Gumbel distribution). In this case, the probability of an individual to be part of a class c of the population is given by the following formula:

$$P_{nc} = \frac{\exp(\lambda_c Z_n)}{\sum_{c=1}^C \exp(\lambda_c Z_n)} \quad (5.21)$$

Without regard to which distribution the error terms follow, the $\sum P$ must fall within the range of [0,1]. The joint probability of an individual selecting the i alternative option and at the same time be a member of a class c is:

$$P_{nci} = P_{nc} \cdot P_{ni|c} \quad (5.22)$$

Substituting 5.19 and 5.21 in 5.22, the unconditional probability is derived:

$$P_{ni} = \sum_{c=1}^C P_{nc} \cdot P_{ni|c} = \sum_{c=1}^C \left(\frac{\exp(\lambda_c Z_n)}{\sum_{c=1}^C \exp(\lambda_c Z_n)} \right) \cdot \left(\frac{\exp(\beta_c X_{ni})}{\sum_{\forall j \in CS} \exp(\beta_c X_{nj})} \right) \quad (5.23)$$

Note that when $\lambda_c = 0$, then the L.C.M. is equivalent to the standard M.N.L. The parameters λ and β of the model represent the attitudinal and socio-economic characteristics for individual and attribute choices respectively. These parameters can be estimated simultaneously using maximum likelihood estimation procedures where the number of classes, s is selected before the estimation.

We employ the conventional approach described in the literature to select the optimal number of classes (Milon & Scrogin, 2006) state. Specifically, the selection of the optimal number of classes employs two statistical information criteria: A.I.C. (Akaike Information Criterion) and B.I.C. (Bayesian Information Criterion). The formulas with which these two criteria are calculated are:

$$\text{A.I.C.} = -2(\ln L - k) \quad (5.24)$$

$$\text{B.I.C.} = -2\ln L + \ln N \cdot k \quad (5.25)$$

where L is the log-likelihood at convergence of the model, k is the total number of parameters estimated and N is the sample size.

It is suggested for an analyst to use both of these criteria. The reason being that AIC usually overestimates the optimal number of classes, while BIC underestimates the number of classes when the sample is relatively small.

Finally, the attribute-specific partworths or W.T.P. estimates, which correspond to the marginal rate of substitution, are calculated using the formula:

$$WTP_n = - \sum_{c=1}^C P_{nc} \cdot \left(\frac{\beta_{ac}}{\beta_{pc}} \right) \quad (5.26)$$

where β_{ac} is a segment-specific non-monetary coefficient and β_{pc} is the segment specific monetary coefficient. The welfare estimates are complex non-linear functions of the estimated parameters since they correspond to ratios of sums of parameters. Following Greene and Hensher (2003), simulation methods can be used to estimate confidence intervals.

5.5 Antecedent Literature

Before we present our own C.E. it is useful to understand how our research fits into the existing literature and what issues and lessons can learn from the existing literature. The literature we consider is Stated Choice (S.C.) applications to food choice, functional food and bread. Drawing on this literature we find that there exists a large body of research dealing with consumers' concerns about food-related issues, in particular Genetically Modified (G.M.) food products or with food products that can utilize technology to improve the final product by adding a functional ingredient.

For example, Burton et al. (2001) investigated U.K. consumers' attitudes to Genetically Modified Organisms (G.M.O.) in food products and the extent to which these attitudes translate into W.T.P. to avoid these products by employing a C.E., in which various aspects of the food system were taken into account. The attributes selected by the researchers were: weekly food bill, form of production technology, use of chemicals in farm, structure of food system (global/local – food miles) and finally the health risk of food-related illness. They employed a conditional logit model in order to estimate the random utility

function. They identified three consumer groups based on the consumption frequency of organic foods.

In one of the few S.C. studies that have examined the functional food products, West et al. (2002) investigated the attitudes, beliefs, knowledge and W.T.P. for products that promote health. They implemented a C.E. in Canadian households so as to derive the distribution of the price – functional property trade-offs made by consumers. Their results from random parameters logit (R.P.L.) model showed that Canadian consumers highly rated and approved the functional properties of the food products used in the C.E. In fact, they were willing to pay for a functional food property under the condition that, apart from the safety and nutritional dimension of food, this would deliver disease prevention properties. This result was further emphasized by the belief the Canadian population currently holds that food choices influence the disease – preventive role of food. The last finding is also supported by a similar study by Ara (2003), who concluded that the primary concern of the consumers in Philippines was the reduced health-risk level associated with food consumption.

James and Burton (2003) employed a C.E. in Australian to explore consumer attitudes to G.M. foods and discover necessary price reductions that could potentially motivate consumers to buy these products. Their C.E. was part of a survey that included open-ended Contingent Valuation questions, scale-differentiated attitude statements and socio-demographic questions. Prior to the survey being designed and distributed, James and Burton employed a focus group.

The C.E. was constructed following a “main effects” design and the following attributes were included: percentage change in weekly food bill, production technology used, environmental risk, health risk, percentage of G.M. ingredients in basket C and level of on-farm chemical use. In the conditional logit analysis that followed. Something that should be taken into account is that G.M. products

that could offer direct benefits to the consumer, it is likely to prove a good competitor for the non-GM food products.

Hu et al. (2006) reported on the construction of reference point effect measures of consumers' perceptions on price and a quality attribute for a food product. More specifically, they used labelling context effects (mandatory labelling, voluntary labelling and any type of labelling where no specific requirements are applied) and fatigue effects and socio-demographic characteristics as factors that explain variability in order to elucidate variability in food choices that is related to reference point effects⁹.

The data for this study were collected in a Canada survey in 2003 which was implemented with a stated preference choice experiment and employed a pre-packaged sliced bread that possibly contained GM ingredients as the vehicle product. The reference point effects were captured using dummy variables representing gains and losses related to price change and to whether G.M. organisms are present or not. Researchers used the M.L. model to account for heterogeneity in the sample population. Their results suggested strong reference point effects, especially for the price of bread as well as for the G.M. characteristic of the product. However, the latter was mitigated due to the inclusion of individual-specific consideration of reference states.

Teratanavat and Hooker (2006) used a discrete choice experiment to explore consumer preferences and valuations for a new product (tomato juice) containing soya, which may help in the reduction of risks of certain cancers and heart disease. An attribute-screening pre-test was performed in order to collect

⁹ A reference point refers to the benchmark of a person's wealth, emphasized by a hypothetical-implicit value function, based on which changes of wealth (gains or losses) may bring in diverse impacts on the value function. The reference point effects were introduced into the model by the use of four dummy variables representing gains or losses, captured with the price change and the existence or not of G.M. ingredients.

information about the key characteristics, which were used in the choice experiment. Eventually, the four attributes used in the choice experiment were health benefits, organic ingredients, source of nutrients and price. The standard multinomial logit (conditional logit) model and the mixed logit model were used for the estimation of the utility function. The results from the M.L. model revealed considerable differences in consumer preferences for this new health promoting food. Specifically, more than half of the sample placed an interest in the product and were willing to pay a price premium to experience its benefits. Additionally, organic ingredients did not appear to have any influence on the estimates. What is more, people showed a preference for the single health benefit option compare to the multiple benefits. Analysis of the socio-demographics showed that higher educated people and with increased income levels have a preference for this product. Surprisingly, females and younger population are in favour of this new functional product. An interesting finding is that people who had bought in the past products that belong in categories such as organic food, natural food tend to be very positive towards the medicinal tomato juice.

In a recent Canadian study, Chase et al. (2007) investigated the market performance of four chosen products (milk, yoghurt, margarine and eggs) containing omega-3 fatty acids and tried to understand the motives of consumers' purchasing behaviour for functional foods in general and omega-3 products in particular and finally measure the effect of consumers' attitudes on purchase behaviour. For this purpose they employed a stated preference survey. Investigators used four ordered probit models so as to rationalize consumers' preferences and purchase intentions for omega-3 products. The authors concluded that an aging population is the most frequent buyer of omega-3 products and that the presence of children in the household has a positive influence to purchasing behaviour of omega-3 products. Also, knowledge and use of the nutritional label increases consumption.

Hu et al. (2004) employed a survey instrument that presented respondents with a sliced, pre-packaged loaf of bread as the vehicle product for the choice experiment. Prior the survey, a number of focus groups were conducted and they helped in identifying the most important attributes that were included in the C.E. Moreover, the initiation of focus groups helped in identifying and correcting ambiguous issues of the questionnaire. Respondents were also asked to provide their insight as to whether they had problems in understanding the choice tasks and weigh up the easiness in dealing with a computer-base survey. The survey itself included 26 questions in total. Firstly, the respondents were asked to “create” the bread of their choice, based on the attributes and attribute levels available to them. These are brand name (national/store), type of flour (white/partly whole/whole/mixed grain) and price. A series of modified switching tasks followed (C.E.s), where consumers had to choose between three options, each of which differed depending upon the several levels of the various characteristics selected by the investigators. A major contribution of this study is the results from the interaction between health and environmental attributes with a characteristic describing genetic modification.

In another study by Hailu et al. (2009) looked at consumer preferences for functional foods and nutraceuticals that contain probiotics. This research was conducted by employing a conjoint methodology, whose design incorporated attributes such as price, health claim and the institutional source of it. For the analysis of the data collected the authors used cluster analysis. The results reported showed that the price coefficient is negative and consistent with the theory. However, the weight of the results is mostly placed on the socio-economic attributes used and less on the willingness to pay estimates. Interestingly, the results support previous studies as it was found that the type of product used to deliver the functional benefits does matter for the consumer.

On the whole, based on the literature in this area, consumers perceive food products that convey functional benefits with confidence. Despite the positive

opinions of the public, there is a number of issues that remain to be clarified. These are related to how the functional ingredient is produced and how this in combination with the final product will affect consumers mind. Additionally, there are studies that have tried to give an answer on the trade-offs made by consumers in relation to production technologies that employ genetic engineering. Yet, the effect that the inclusion of a health message has in relation to the functional ingredient remains to be examined. In general, consumers have a very positive response to health messages that appear on food products' labels. Nevertheless, and despite the fact that they seem to understand the information provided on food labels, they still follow their own nutritional habits or the adjustment they make is only slight or for a short period of time.

Consequently, it is worth trying to investigate the above mentioned points and see whether consumer response is affected and to what extent by the inclusion of the functional ingredient and health message attributes. This can take the form of question or research hypothesis, as follows:

- How survey respondents valued products that might offer a health benefit as well as a functional ingredient.
- Does the method of production have an effect on people's behaviour? Is it more or less important than the health benefit and functional ingredient for the consumer?

A couple of questions that would be interesting to investigate are the following: a) does the inclusion of a status quo option in the choice card have any effect on the results? And b) does the inclusion of an opt-out option have any effect on the results?

5.6 C.E. Survey Instrument Design

We now present in detail the development and design of our survey instrument. As we have previously explained the results generated by the M.E.C. have been used to help construct the choice sets used in the survey instrument.

Furthermore, we were able to draw on the experience and views of bread industry experts who were involved with the SLOWCARB Project.

5.6.1 Attributes and Attribute Levels

The design of the C.E. was undertaken with the main research objective in mind. That is, the survey instrument was designed to reveal W.T.P. estimates associated with the health benefits people gain from the consumption of bread products that contain functional ingredients. As with all C.E., the main issues to be considered in the design of the C.E. were the need to make the C.E. realistic whilst trying to keep the number of attributes to a minimum.

The first decision that needed to be made was the choice of the product to be employed. Given the focus of our research on bread we decided that our C.E. would be designed to estimate the public's W.T.P. for a bread product with health-enhancing properties. To do this we followed the approach adopted in Chalak et al. (2008) and employed a standard 800gr loaf of bread. The choice of a loaf of bread automatically provided the price attribute for our choice experiment, which conveniently was the cost for buying that loaf. In terms of determining the payment levels in the C.E. these were chosen to be typical of current bread prices in the U.K. Thus, we assumed that the status quo option in the C.E. would be the price of a white loaf. The appropriate price range for the loaf of bread was decided after several visits were paid to the main U.K. retailers as well as online providers. Prices were checked for both in-store and premium brands.

We then determined the remaining set of attributes to employ in the C.E. Most of the attributes we employed were adopted from the range of attributes that were identified by the M.E.C. model and Laddering employed at an earlier stage (this is discussed in the previous chapter). More specifically, these were the attribute codes that scored higher in Laddering. Thus, we employed an attribute to

describe the type of bread. This attribute had five levels. It has already been identified that the consumers appear to make bread purchases based on the type of bread and as such we considered this to be an essential attribute to include in the C.E.

Next we decided to include an attribute describing the bread as being sliced or unsliced as this was identified as being important in our earlier research. We also included an attribute describing bread texture as our M.E.C./Laddering research had revealed that this is an important characteristic in shaping consumers bread purchases. Both of these attributes were employed as categorical variables with three and four levels respectively.

Our next choice of attribute was the method of production used to produce the grain that is used in the bread making process. This was selected because of the importance a large segment of consumers place on the impact of agricultural production on the environment as well as on the perceived healthiness and credence characteristics of food products and functional foods in particular. Lessons from the literature support this. As van Wezemael et al. (2010) emphasize, the majority of many previous consumer studies that have assessed consumer perceptions of food products, conclude that food, which is organically produced is perceived safer and more healthful than the conventionally produced counterpart. Health and safety are even perceived as the most important quality attributes by organic food consumers. Also, along the same line, Kole et al. (2009) argue many consumers hold strong beliefs with regard to the effects of production method on fish product characteristics, both sensory and credential. Finally, in a study with regard to consumer perceptions of healthy cereal products and methods of production, Dean et al. (2007) claimed that the susceptibility to particular diseases and the method of production are important indicators for the acceptability and consumption of functional foods.

Finally, we introduced two attributes to examine issues related to health. We already know from the literature that consumers respond positively to health

messages on food products. Thus, we employed an attribute to capture this aspect of food choice. We also incorporated an attribute that could possibly differentiate people’s choices and this was whether the final bread product included a functional ingredient or not. The reason for including both attributes relates to the fact that it may well be the case that health messages dominate consumer food choice relative to functional ingredient attributes. There are many products like bread that can confer a health benefit without them including a functional ingredient in their composition. This can be substantiated by the fact that there exist scientific evidence supporting the inclusion of whole grains in a healthy diet and there is a wide range of bread products in the market that include whole grains. Consequently, by including both of the above mentioned attributes in the C.E. we could examine and test this conjecture. The complete set of attributes and their respective levels are presented in table 5.1. A small description of each of the attributes is also provided.

Table 5.1. Attribute and attribute levels used in the Choice Experiment

Attribute	Description	Levels
Type of bread	The different types of bread available in the hypothetical market	White Wholemeal Brown 50% white - 50% Rye
Production method of grain	The method of production for the main ingredient of bread	Conventionally Organically
Functional ingredient	A component that could potentially deliver nutritional benefits, if added	Yes, it is contained No, there is none
Sliced/Un sliced	The attribute indicates whether the bread is sold sliced or not	Medium sliced Thick sliced Un sliced
Texture	The attribute shows the consistency of bread	Soft Firm Crunchy Springy
Health benefit	The attribute indicates whether the product promotes health	Yes No
Price	The cost (in £) for buying a standard 800gr loaf of bread	0.7 1 1.3 1.6 1.9 2.2

5.6.2 Construction of alternative options and choice sets

After the selection of attributes and attribute levels, the alternative options and choice sets were subsequently produced. A “main effects” orthogonal design was adopted. S.P.S.S. Version 14 was initially used to construct the alternatives. Given the seven attributes with various levels each one of them (three attributes with two levels and another four attributes with three, four, five and six levels respectively), a complete factorial set of combinations would have yielded a profile of 2880 alternatives. This number was then reduced to 24 alternative sets making sure that there is balance in the attribute levels.

Choice sets were then constructed by combining the alternatives along with the status quo option and adding also the opt-out alternative in all choice sets. Status quo option has fixed levels in all attributes and consequently it does not increase the complexity of the choice set construction. The status quo option was included so as to reflect the fact that there are consumers who still buy lower value sliced white bread, while the opt-out option was available to respondents as there are people that still may not wish to make a choice (forced choice). Therefore, in total, the choice cards had five options: a status-quo, three more variations and the opt-out option.

At the end the 24 choice cards were used in the design of the survey questionnaire. Having said that, the choice sets were blocked in groups of six randomly selected cards, with some care taken so as each individual faces almost the same number of different alternatives. This was done in order to avoid the fatigue effect, which appears on respondents during the completion of the choice task. The questionnaire, finally, had four versions of the choice experiment.

An example of the choice cards as well as the description of the hypothetical choice scenario can be found in the appendix.

A final detail that needs to be stressed is that the choice sets in each choice card were presented to consumers unlabelled. The reason for that is that it was preferred for the subjects to think of bread as a single alternative, which can be composed of several characteristics.

5.6.3 Socio-Economic and Attitudinal Variables

Data on individual specific characteristics, such as socio-economic, behavioural and attitudinal data were collected too. A list with all these variables used for the model to be estimated can be viewed in table 5.2.

In addition, the survey instrument also included the Dutch Eating Behaviour Questionnaire (D.E.B.Q.) van Strien et al. (1986) was included. The D.E.B.Q. was integrated into the survey instrument in order to collect information about participants underlying eating behaviours. This was considered an important component of the survey as it provides useful enlightenment into the causal factors that might be driving the responses to the C.E. The D.E.B.Q. provides an understanding in relation to eating patterns in three contexts: emotional, external and restrained eating.

Emotional eating refers to *excessive eating resulting from a state of confusion between internal arousal states, such as anger, fear and anxiety, for which the normal response is loss of appetite, and hunger.*

External eating refers to

“a response to food related stimuli, regardless of the internal status of hunger and satiety” (van Strien et al., 1986).

Finally, Restrained Eating, states that the conscious restrictive control associated with suppressed eating behaviour – restrained eating, may be

disrupted by des-inhibition factors, such as alcohol or depression, resulting in counter regulation and overeating.

Also, questions related to the respondent's bread consumption patterns and knowledge about bread nutrients and their relation to health were included in the survey instrument.

A full list of these variables and their levels can be found in the attached C.E. questionnaire sample in the Appendices section. However, for the purpose of the analysis, some attributes were left out of the analysis, while others were reduced to a manageable set of variables.

Table 5.2. Socio-economic and attitudinal variables

Variable	Description
Gender	Dummy variable, which takes the value "0" if the respondent is male and the value "1" if the respondent is female
Age	Respondent's age in years. There were six groups of age categories
Number of people in the household	The number of people living in a household. Respondents could select among three groups: 1-2 people, 3-4 people and 5 or more people
Number of dependent children in the household	The actual number of dependent children in the household
Education	Six levels of education (coded from 0 to 5) were available to respondents: GCSE, A-level, Further education, B.A./B.Sc., M.A./M.Sc., Doctorate degree
Income	Dummy variable that takes the value "1" if income > 27500 and "0" otherwise
Occupation	<i>Working</i> : Dummy variable that takes the value "1" if the participant is working either full-time or part-time and "0" otherwise
	<i>Not working</i> : Dummy variable that takes the value "1" if the participant is home keeper, student, retired or unemployed and "0" otherwise
Exercise	Dummy variable that takes the value "1" if the participant is exercising regularly and "0" otherwise
Health conscious	Dummy variable that takes the value "1" if the participant is health conscious when buying food and "0" otherwise
Gluten intolerance	Dummy variable that takes the value "1" if the participant is gluten intolerant and "0" otherwise

5.6.4 Structure and dissemination of the survey instrument

It was decided that the survey instrument would be a single mail shot postal survey. For this reason no follow up reminder was sent to respondents. To make

the whole task of completing the questionnaire easier to respondents, the final design of the survey instrument was divided in various sections:

In section A, after welcoming the participant and explaining the purpose of the research in the cover letter accompanying the questionnaire, information was provided about functional foods.

In section B, a number of “warm up” questions were asked.

In section C, the choice task was explained. Specific instructions were given and an example of how the choice cards should be treated was given, using an imaginary choice card (see appendix).

In section D respondents were asked to answer the choice cards and, after the completion of choice cards, to indicate the attributes they took into account when completing the cards in sequence of importance.

Section E included the questions related to the D.E.B.Q. Participants were asked to indicate their responses in a scale from “never” to “very often”.

Finally, section F collected individual-specific information (e.g. socio-economic, attitudinal questions) as well as information on people’s feeling about the survey instrument (such as the readiness and clarity of the questionnaire).

As an incentive to fill in and return questionnaires, recipients were informed that doing so would qualify them for a prize draw, the results of which would hand four respondents £25 worth of Marks & Spencer gift vouchers each. It was also explained that several scientific papers arising from the survey data analysis will be submitted to academic journals and that this type of research is likely to influence various policies in a way to accommodate their concerns about healthy food.

A first draft of the survey was presented to a number of individuals, in February 2009. The participants were selected from and given the questionnaire in Wye

College, Kent. The interviewees were offered various refreshments and confectionaries as an incentive to participate. The number of people participated in the pilot was slightly biased towards females. Respondents were mostly employees and students of Wye College. All participants were aged eighteen and above. They were instructed to complete the questionnaire and provide the researcher with their comments for each of the sections of it. In general, participants were asked to provide their suggestions for improvement on whether the guidelines on how to answer choice cards, the definitions and the scientific background were both clear and useful. They were also asked whether the choice sets were complicated to answer and whether the attributes included in the choice experiment as well as their levels made sense to them. Finally, interviewees were asked to suggest changes that, according to them, would improve the whole survey.

After the completion of this part, the survey was piloted with 30 respondents, again selected among residents of Wye College as well as partners from the SLOWCARB Project. The responses were inspected to make sure that all options and attribute levels are being chosen, as a requirement for better estimation. Once this requirement was met, questionnaires were then prepared to be posted.

5.7. Results of the bread CE

5.7.1 Survey Returns

The sample of the research at hand was a segment of the British population, aged 18 years or above. It was purchased from a commercial company (Marketing File), the largest on-line source of direct marketing data in Europe. The mailing list contained the names and postal addresses of 3000 British households. Questionnaires were sent by second-class postal mail in beginning of May 2009. As the survey had four different versions the mailing list was randomly divided into four subgroups and each survey version was sent to 750

households. The envelope contained the survey instrument along with a cover letter attached to it (in the form of a booklet). It also contained prepaid return envelopes, in which participants should enclose and send back to the researcher the filled-in questionnaires. No reminder postcards were sent out. The last questionnaire was received about three months after the survey was posted. However, the biggest part of the returned questionnaires was sent back just over a month since the day the survey was sent to the public. The total number of respondents was 444. This corresponds to response rate of 14.8%. However, the final sample size (fully completed surveys that used for the analysis) consisted of 404 questionnaires. The remaining forty were either partly, incorrectly or non-completed questionnaires.

5.7.2 Survey Descriptive Statistics

A summary of descriptive statistics is presented in table 5.3. This table illustrates that the sample of the research comprises of more female than male respondents (perhaps because most women are those responsible for the food shopping in the household).

Table 5.3. Descriptive statistics of the sample

Variable label	Mean	SD	Min	Max
Gender	0.64	0.481	0	1
Age	52.63	13.969	20	70
Number of people in the household	1.94	1.297	1	5
Number of dependent children in the household	0.48	0.870	0	4
Education	-1.061	52.815	-1000	5
Income	0.373	0.483	0	1
Work	0.54	0.498	0	1
Exercise	0.62	0.485	0	1
Health conscious	0.69	0.461	0	1
Gluten intolerant	0.05	0.220	0	1

Note that gender attribute is a dummy variable that takes the value “1” if the respondent is female. The actual proportion of females in the U.K. is just under 51 percent. Additionally, the sample of the research, in terms of age, is above average when compared to the U.K. average, which is 39. The average income of people participated in the survey is just over 31,000, which is the average income for the U.K. population. On the whole, is reasonably representative, although there is a slight higher average in age.

One more thing that needs to be stressed is the interaction of respondents with the questionnaire. Completion of a choice experiment task is a complex exercise in general, especially for people that are not familiar with. This is because individuals are asked to evaluate different options presented to them. Each of these options represents a synthesis of a mixture of information. This is something that often results in respondents’ burden or misunderstanding of the task they are expected to complete. When this research was conducted, consumers were asked to express their feelings on the easiness of the questionnaire, on the usefulness of scientific information as well as on the clarity of the options available to them. The percentage of people, who found the completion of the questionnaire not so difficult equalled to 82.68, while the provision of scientific information was appreciated by the three quarters of the sample, namely 75.50%. Finally, respondents’ positive comments on the clarity of the options available to them reached 87.13%.

5.7.3 Estimation of models

a) The M.N.L. model

Following data entry, the model was estimated. This was done using three different methods of specification: M.N.L., M.L. and L.C.M. models. First, we begin by examining the results for the basic M.N.L. model that was estimated including the attribute (non-monetary) and the price (monetary) levels, as well as

a number of interaction terms. The utility function for any given respondent n , for any alternative i and for any occasion t that was estimated can be seen below (equation 5.26):

$$U_{nit} = \beta_{wholemeal} \cdot wholemeal_{nit} + \beta_{brown} \cdot brown_{nit} + \beta_{half} \cdot half_{nit} + \beta_{rye} \cdot rye_{nit} + \beta_{mop} \cdot mop_{nit} + \beta_{fi} \cdot fi_{nit} + \beta_{(un)sliced} \cdot (un)sliced_{nit} + \beta_{texture} \cdot texture_{nit} + \beta_{hb} \cdot hb_{nit} + \beta_{price} \cdot price_{nit} \quad (5.26)$$

The parameter estimates using the M.N.L. model are presented in Table 5.4.

Table 5.4. Parameter estimates from M.N.L. model

Variables	M.N.L.	
	Coeff	P Value
ASC (Status Quo)	0.395	0.026
Rye	-0.648	0.000
Whole	0.996	0.000
Brown	0.213	0.000
50/50	-0.052	0.408
Method of Production (MOP)	-0.165	0.261
Functional Ingredient (FI)	0.129	0.381
Slice Unsliced	-0.118	0.006
Slice Thick	0.061	0.159
Texture Springy	0.049	0.318
Texture Firm	0.089	0.134
Texture Crumbly	-0.011	0.803
Health Benefit (HB)	0.701	0.000
Price	-0.845	0.000
FI*HB	-0.434	0.019
MOP*HB	-0.057	0.751
MOP*FI	0.397	0.033
ASC (No Choice)	-2.444	0.000

The results of the M.N.L. model will not be discussed in length at this point. This will be done in the next pages when the latent class model is also specified. This is because it will be easier to compare the results between the two models and draw conclusions. However, a few things need to be emphasized.

Almost all the preference parameters in the M.N.L. model turn out to be significant. Overall, the model yielded the expected parameter signs. The

parameter for *Price* is negative. As to the parameters for the *health benefit and the functional ingredient*, they turn out to be positive, in concordance with the literature on the topic (Burton & Pearse, 2002, West et al., 2002). This literature establishes public preference and W.T.P. for food products that have been produced with the assistance of genetic engineering in order to deliver health benefits or reduce the risk of people developing a disease. Interestingly, the health benefit coefficient is significant while the respective one for the functional ingredient attribute is not. The coefficient for the status quo option is positive and statistically significant. This means that respondents have a preference for the standard option. The results for wholemeal bread and brown bread show that the public holds a preference for these two types of bread. Both coefficients are positive and statistically significant. On the contrary, the public does not seem to like rye bread and people should get paid in order to consume this bread type.

b) The L.C.M. model

As M.N.L. model is the basic one used in similar analyses and because M.L. model poses constraints in terms of the time required to solve the utility functions (while sometimes fails to solve the model, as it does not converge), various Latent Class Models were also estimated.

We begin our analysis by examining how our model performs as the number of segments (classes) increases. Although specifications with parameter estimates for the L.C.M. with more than two classes were attempted, these will not be reported here as at least one of the resulting segments in each model represented a very low proportion of the sample. Therefore, the analysis is constrained to the two class model. The results in table 5.5 show that L.C.M. represents a much better fit of the data compared to the M.N.L.

For the preferred model specification (two classes) a limited number of interaction terms have been included. This is done in order to highlight important

trade-offs being made in the C.E. Specifically, we are interested to understand how survey respondents valued products that might offer a health benefit as well as a functional ingredient. We are also interested to see if the method of production is more or less important than the health benefit and functional ingredient for the consumer. Moreover, alternative specific constants (A.S.C.) have been used during the model specification, in order to capture any effects from the status quo and the No Choice (opt-out) option. All these can be seen in the table 5.5 that follows. Below the results from the estimation of the L.C.M. model are presented and the key characteristics are highlighted.

The first observation that can be made in our results is that the coefficient of price attribute is with the right sign and statistically significant in both MNL and L.C.M. models.

As far as the A.S.C. are concerned, in the M.N.L. model the status quo A.S.C. indicates a degree of bias towards the status quo option. Conversely, when the A.S.C. coefficients of the L.C.M. model are examined, one can observe that the sign is negative in class one. This indicates that there is no bias towards the status quo option. In the second class, the A.S.C. coefficient is positive but not statistically significant. Regarding the A.S.C. coefficients for the opt-out option of the choice cards, one can observe that all of them are negative and statistically significant. This suggests a positive preference for the alternative options provided in each choice card of the C.E.

Next, the various attributes included in the model are examined. The signs for the “type of bread” attribute are a mixture of positive and negative values. What can be stressed is that there is a strong preference for the wholegrain type of bread in all cases, followed by a preference for the brown bread. The results, also, indicate a general dislike for rye bread and mixed evidence for the bread type made from fifty percent wholegrain and fifty percent white flour. Overall, the results suggest that respondents are willing to consume wholegrain, as this is their first option by far.

Table 5.5 Parameter estimates for the M.N.L. and L.C.M. models

Variables	M.N.L.		Segment 1		Segment 2	
	Coeff	P Value	Coeff	P Value	Coeff	P Value
ASC (Status Quo)	0.395	0.026	-1.601	0.000	0.175	0.444
Rye	-0.648	0.000	-0.424	0.000	-1.413	0.000
Whole	0.996	0.000	1.261	0.000	0.541	0.000
Brown	0.213	0.000	0.324	0.000	0.044	0.580
50/50	-0.052	0.408	-0.152	0.088	0.454	0.000
Method of Production (MOP)	-0.165	0.261	0.257	0.343	-0.509	0.002
Functional Ingredient (FI)	0.129	0.381	0.120	0.673	0.418	0.017
Slice Unsliced	-0.118	0.006	-0.103	0.063	-0.206	0.003
Slice Thick	0.061	0.159	0.028	0.623	0.156	0.009
Texture Springy	0.049	0.318	0.096	0.121	-0.071	0.393
Texture Firm	0.089	0.134	0.087	0.274	0.084	0.291
Texture Crumbly	-0.011	0.803	-0.054	0.383	-0.063	0.395
Health Benefit (HB)	0.701	0.000	0.837	0.001	0.455	0.004
Price	-0.845	0.000	-0.684	0.000	-1.612	0.000
FI*HB	-0.434	0.019	-0.312	0.428	-0.509	0.021
MOP*HB	-0.057	0.751	-0.384	0.291	0.292	0.142
MOP*FI	0.397	0.033	0.086	0.824	0.423	0.033
ASC (No Choice)	-2.444	0.000	-1.778	0.000	-4.949	0.000
LL	-3340.8		-2870.5			
AIC	2.77		2.41			
BIC	2.81		2.52			
Segment Probabilities			0.588		0.412	
Segment Variables			Coeff	P Value		
Constant			-1.346	0.051		
Age			0.013	0.195		
Gender			-0.023	0.261		
Children			0.001	0.432		
Education			0.001	0.664		
Work			0.093	0.762		
Exercise			-0.055	0.844		
Health Conscious			1.597	0.000		
Glutton Intolerant			-0.001	0.610		
Restrained Eating			0.290	0.048		
External Eating			-0.675	0.000		
Emotional Eating			0.385	0.050		
Income			0.561	0.059		

Note: Values in **Bold** and *Italic* represent statistically significant parameters the 10 percent level.

The next bread attribute to be examined is the method of production. In the M.N.L. model, this attribute is statistically insignificant. The same can be seen for the first class of the L.C.M. model. It is only for the second segment of L.C.M. model that this attribute appears to be significant, but the coefficient in this case carries negative sign. This could be interpreted as that respondents are not interested in the method of production and satisfied with the conventional methods of farming.

Moving onto the next bread characteristic included in the choice experiment, the presence of a functional ingredient in bread, one can note that consumers that responded to the survey viewed this characteristic positively. Nevertheless, it is only in segment two of the L.C.M. model that the respective coefficient is statistically significant. Clearly, this implies that consumers are willing to buy bread that contains a functional ingredient. However, this only occurs to a proportion of the subjects.

Following our analysis, the next attribute to examine is the health benefit. This attribute received a greater attention by the respondents of the survey compared to the attribute of functional ingredient. Additionally, the parameter estimates are higher in relation to the functional ingredient ones. This suggests a stronger preference on behalf of consumers towards a health message associated with the product rather than towards the functional ingredient, which may promote health.

At the beginning of the analysis was mentioned that three interaction terms were included, so as to capture possible relationships among the health benefit, the inclusion of a functional ingredient in the final product and the method of production of the grain used for bread making. Interestingly, and despite the fact that the corresponding parameter estimates are not statistically significant, there is a negative interaction between health benefit and functional ingredient as well as between health benefit and method of production. It is only when we examine the interaction between functional ingredient and method of production do we

find coefficients carrying a positive sign. The importance of these estimates will be examined in terms of the resulting W.T.P. estimates presented in the next pages.

An additional point that needs to be made in relation to the remaining bread attributes. With respect to whether the bread is thick sliced or not, in both models there exists a dislike for unsliced bread. In fact the second segment of the L.C.M. model holds a preference for bread that is thick sliced. As for the rest of the attributes included in the C.E., it appears that they play a less important role in consumers' buying decision process.

Before we move onto the examination of the W.T.P. estimates, one more final comment must be made, in relation to the segment membership results. Since we only have two segments generated from the L.C.M. model, there is only one set of results produced. The most impressive thing of these results is that the only socio-economic variable that is statistically significant is income. As far as the other variables are concerned, "being health conscious" is positive and statistically significant for segment one. Finally, when it comes to the D.E.B.Q. variables, the "restrained eating" and the "emotional eating" are positive and statistically significant. In contrast, "external eating" is negative but still significant.

5.7.4 Estimates of parthworhts – W.T.P. and health benefit

Starting the discussion of the W.T.P. estimates, which are presented in table 5.6, one important note that needs to be made, is that a positive value indicates W.T.P., while a negative value indicates willingness to accept (W.T.A.).

Table 5.6 W.T.P. estimates (point estimates and standard errors)

W.T.P. Estimates	MNL	LCM 1	LCM 2
Rye	-0.76 (0.08)**	-0.62 (0.12)***	-0.87 (0.07)***
Whole	1.18 (0.09)***	1.84 (0.22)***	0.33 (0.05)***
Brown	0.25 (0.07)***	0.47 (0.13)***	0.03 (0.05)
50/50	-0.06 (0.07)	-0.22 (0.13)*	0.28 (0.05)***
Method of Production	-0.19 (0.17)	0.37 (0.40)	-0.32 (0.10)***
Functional Ingredient	0.15 (0.17)	0.17 (0.41)	0.26 (0.11)**
Slice Unsliced	-0.14 (0.05)***	-0.15 (0.08)*	-0.13 (0.04)***
Slice Thick	0.07 (0.05)	0.04 (0.08)	0.09 (0.03)***
Texture Springy	0.05 (0.05)	0.14 (0.09)	-0.04 (0.04)
Texture Firm	0.11 (0.07)	0.12 (0.11)	0.05 (0.04)
Texture Crumbly	-0.01 (0.05)	-0.08 (0.08)	-0.04 (0.04)
Health Benefit	0.83 (0.17)***	1.22 (0.41)**	0.28 (0.10)***
FI*HB	0.47 (0.19)***	0.94 (0.43)**	0.23 (0.11)**
MOP*HB	0.57 (0.19)***	1.03 (0.45)**	0.15 (0.12)***
MOP*FI	0.43 (0.18)***	0.67 (0.40)*	0.21 (0.12)*

Note: the values in parenthesis represent the standard errors of W.T.P. estimates. *, ** and *** indicate statistically significant parameters at 10%, 5% and 1% level of significance.

The first thing that has to be stressed is that the highest W.T.P. estimates are reported for the type of bread attribute and particularly for wholegrain bread. This result is in line with the results from the laddering interviews presented in

the previous chapter. Also, rye bread has a negative sign estimate highlighting a W.T.A. on behalf of consumers.

In terms of magnitude, the W.T.P. results show that the wholegrain estimate in class one (LCM 1), which is £1.84, is slightly large, while the respective one for class two (LCM 2), which is £0.33, is very credible. For the first segment, this implies that the price of a loaf of wholegrain bread is approximately £2.50. This price is higher than most available types of wholegrain bread in the market. Nevertheless, various specialist wholegrain products can be found in the market. For the second segment of the sample, however, this means that the price of a loaf is approximately £1.00 and constitutes a value that can be found in the market. As far as the estimates for the brown and 50-50 types of bread are concerned, these are realistic.

The second important has to do with the values of the estimates for the health benefit, functional ingredient and method of production attributes. If the focus is placed on the results for functional ingredients and comparing them to the health benefit claim, one can conclude that respondents are willing to pay for both. However, there is a stronger preference for a straightforward health claim compared to a health benefit that might come as a result of eating bread that contains a functional ingredient.

Interestingly, the effect of having both of these characteristics in the product returned a positive W.T.P. response. Furthermore, a product with only a health claim on its label is higher valued by consumers compared to a product offering both. In an attempt to interpret this finding, one can argue that buyers are indeed willing to pay more for a product with a certain health claim. However, claiming that a product is healthy and that at the same time offering further potential benefits resulting from the inclusion of a functional ingredient will not necessarily result in a higher valued product.

The joint effect of informing respondents for the method of production and the health claim or the functional ingredient yielded statistically significant willingness to pay results. Despite that, these W.T.P. estimates are lower than the respective one for a health claim alone.

A final point to be made is that by comparing the results of W.T.P. estimates for segments one and two resulting from the L.C.M. model, one can observe that the first segment holds a much higher W.T.P. for wholegrain bread compared to the second segment. Overall, segment two has a lower W.T.P. for all the attributes used in the C.E. Segment two, also, captures a negative preference with reference to the method of production. This result, taking into account that the C.E. was framed in a healthy eating context, is rather not surprising. Having that in mind, this result highlights the fact that the apparent importance of a product characteristic can become far less important than initially was assumed, when a question is asked to consumers.

5.8 Summary of the chapter and discussion of the results

In this chapter issues pertaining to the description, design and implementation of the C.E. employed to reveal consumer preferences towards bread with the potential to deliver health benefits have been discussed. At the early stages of this chapter, the methodology was explained and the relevant literature with regard to consumer preferences for functional and healthy foods was reviewed. Also, the various models for the estimation of the utility function were described and finally the results from the analysis reported.

As it has been stated earlier, this research employed a dual-mode approach. In chapter 5, the second part of this approach, namely C.E., has been discussed. The design of the survey instrument followed a slightly different way than what is usually done. Although focus groups take place prior to the implementation of the C.E., this research employed a Laddering task to generate the output (i.e.

attributes) to be used in the C.E. Although there is no previous research that has employed laddering to generate the attributes to be used in the C.E., this process enabled the author to gain significant knowledge on how consumers relate bread attributes with personal values, allowing a robust C.E. analysis to be designed and tested.

Additionally, both a status quo and an opt-out option along with another three alternatives were provided to respondents to choose from. This design allowed the respondents to make a selection as close as possible to a real buying decision situation. Also, the inclusion of the D.E.B.Q. constitutes a rather novel characteristic in C.E. studies investigating food preferences, as it takes into account the psychological factor related to food.

Regarding the models used for the generation of the results, a number of models were estimated. However, the latent class model gave the best results and these were reported here. The results of a M.N.L. model were reported and compared to those from the L.C.M.

The most important finding from the C.E. is that respondents typically select bread based upon the bread type (i.e. Wholegrain, Brown, Rye etc). This finding supports the results of the Laddering/M.E.C. research, which revealed that consumers do consider bread type or in other words the type of flour used to produce the bread to be an important attribute when buying bread. The results from both M.N.L. and L.C.M. models also show that consumers are willing to pay a premium for bread that may deliver a direct health benefit. They are also willing to do so for products that contain a functional ingredient, although the inclusion of a functional ingredient attracts a much lower level of interest. Thus, our CE results indicate that consumers are W.T.P. for a bread product that contains functional ingredients but they have stronger preference for bread that offers a simple but clear health benefit.

Furthermore, alongside with existing research on consumer choice we do find evidence of heterogeneous preferences, but additionally provide an insight into segments or classes look to consequence and values related to product attribute. Nevertheless, the prediction of consumer preferences seems to be better explained by attitudinal variables rather than the conventional socio-economic variables normally employed in statistical estimation. In the results of the C.E. presented in here, it seems that the explanatory power of the attitudinal variables is far greater than variables such as age, gender or education. Perhaps this might not be a surprise but it is something that should be considered in the future regarding the type of data a researcher needs to collect with the implementation of choice modelling tasks.

The L.C. model identified two consumer segments in the sample. The alternative specific constants used in the estimation showed that there is no bias towards the status quo option. As far as the opt-out option is concerned, one can see that the relevant A.S.C. is negative and significant for both segments, indicating that respondents strongly prefer the alternative options presented to them in the choice cards. Wholegrain bread appears to be the preferred type of bread, while brown bread presents the second option. The method of production seems to play a role in the first segment's buying process. However, it is not significant. On the other hand, although this attribute appears to be significant for the second segment, its coefficient is with a negative sign. This implies that respondents are happy with conventional farming methods. The results also revealed that the attitudinal variables "restrained" and "emotional" eating influence respondents buying behaviour. Finally, as it was expected, income represents a decisive factor affecting preferences. Interestingly, income is the only socioeconomic variable that is statistically significant.

With regard to W.T.P. results, the wholegrain estimate for segment one appears to be higher than most available types of wholegrain available. However, speciality wholegrain breads can be found in the market at high prices. The

respective estimate for segment two is credible and within the range of prices available in the market. Furthermore, as mentioned earlier a product with a health claim on its label is valued higher than one which offers the benefit as a result of the inclusion of the functional ingredient. The result is the same when people were informed about the joint effect of health claim or functional ingredient and method of production.

In conclusion and with regard to segments, the results show that the first segment has a much higher willingness to pay for wholegrain bread compared to the second segment. The latter holds a generally low willingness to pay for all attributes included in the bread C.E.

CHAPTER 6

CONCLUSIONS AND LIMITATIONS OF THE STUDY AND RECOMMENDATIONS FOR FUTURE RESEARCH

6.1 Summary and main findings

6.1.1 Research problem, general implications and research methods

People have always been aware of the relationship between food and health. In Greece, around 2500 years ago, Hippocrates – the father of medicine – had identified the role of food in people’s lives, when he said: *“Let thy food be your medicine”*. Hippocrates’ proverb becomes a reality, as it expressively captures the importance of eating healthily. Nowadays, the provision of information has contributed in a consumer who is even more cognizant of food safety and quality and health issues. The reasons, however, differ. People still acknowledge the association between diet and health. Appropriate eating patterns can increase life expectancy and elevate quality of people’s life.

Nevertheless, people do worry about externalities related to the ingredients used for the production of the good as well as the methods of production and processes employed for the production of the raw materials and how all these could affect their health in the future. Additionally, there are food quality credence characteristics as well as environmental concerns that can influence consumers’ decision making.

“Functional foods” is a relatively new concept that has gained significant attention in the academic world as well as in the food industry and among policy makers. As a food that could potentially deliver health benefits has become a topic of increasing importance. The society has recognized that despite of the advantages from the consumption of functional foods, there are also possible

risks that stem mainly from the use of genetic engineering in food production. Moreover, little is known about the consumers' perception of health properties and interaction between them and other food related characteristics. Understanding the strength of consumer attitudes on this issue as well as people's willingness-to-pay to enjoy safe food products with health enhancing properties, one can start identifying the appropriate level of policy response. Economic research plays an important role in gaining valuable information, identifying the key parameters on this issue and helping policy makers to design and put into practice strategies that would improve people's welfare. It is this line, which this research is moving on.

This research has attempted to investigate consumer understanding of health messages on food products and in particular on bread and to examine the role of health information as a driver for the evolution of demand for bread.

In addition, this research has endeavoured to explore U.K. consumers' perception of bread with functional properties and to understand the values they place on bread attributes, how these attributes are linked with more abstract elements up to the point they translate to personal values. This could lead to increased understanding of how health information needs to be used to impact consumer product, and more specifically, bread choice. Our methodological approach is motivated by the fact that the food characteristics we wish to examine and evaluate in this study are not typically accounted for in the price of a good.

To the best of author's knowledge, there has not been previous research in the context of U.K. for products delivering health benefits, especially for bread. However, there is similar research done in the U.S.A. by Teratanavat and Hooker (2006) (regarding Choice Modelling) and in Finland by Urala and Lahteenmaki (2003) (regarding M.E.C.).

To undertake our examination of consumer attitudes towards bread functional ingredients we employ a new two-stage, dual-mode, approach. First we use Laddering interviews and M.E.C. analysis to reveal key attributes consumers attach to bread. The use of M.E.C. analysis in understanding consumer choice in relation to food is well established in the literature (Barrena & Sánchez, 2009, Boecker, Hartl & Nocella, 2008, Urala & Lahteenmaki, 2003, Grunert, K. G. & Grunert, 1995). M.E.C. is a research method used to reveal how a consumer values product characteristics in terms of the motivation to purchase a specific product, based on personal construct theory, linking product characteristics to consequences as well as an individual's values to motivate a purchase decision. Second, many of the attributes revealed by the M.E.C. analysis were employed in the C.E. that followed to examine how consumers trade-off attributes of bread when making a purchase. The implementation of the C.E. adds to the literature examining consumer choice in relation to food, nutrition, health labels and product selection, by the mixture of attributes employed (Balcombe, Fraser & di Falco, 2010, Teratanavat & Hooker, 2006, Hu et al., 2004). The C.E. also highlights the potential health benefits from the consumption of a bread product with health promoting properties and examines how much of a price premium consumers are willing to pay to consume the enhanced products.

With regard to how the two methodologies were applied, two separate surveys were designed and conducted. The first one aimed at identifying consumers' buying motives using Laddering interviews in small groups of participants with the assistance of a paper-and-pencil questionnaire. This formed a small-scale but adequate for such techniques survey that took place at the University of Kent with the participation of members of the institution, either students or staff. These interviews yielded 68 usable questionnaires. The data were content- and frequency-analysed and resulted in the production of a number of hierarchical value maps that illustrated the differences between various groups of respondents. In addition, the abstractness and centrality scores were calculated in order to account for the most important attributes identified in the analysis.

The second and rather more complex survey used in this piece of research utilized a Choice Experiment. This formed part of a large-scale nationwide survey conducted with the postal method. A total of three thousand (3000) questionnaires were delivered in U.K. households by post and approximately one sixth of them were returned enclosed in the pre-paid envelopes that were provided. This yielded to four hundred and four (404) analyzable responses. Participants answered a sequence of six (6) choice cards. This helped to reveal their W.T.P. to enjoy bread products with health-enhancing properties and the importance they placed on each of the product's characteristics. A variety of different models was employed for the estimation of the data from the C.E. Apart from the standard M.N.L. model, a random parameter model (or mixed logit) and a L.C.M. model were used as well for the estimation of the data collected and investigation of the effects of individual-specific attributes on W.T.P. However, only results from the L.C.M. model are reported in this thesis. The latter model was employed to reveal heterogeneity in preferences that exist between homogeneous segments of the population.

6.1.2 The results from Laddering

Results from the Laddering interviews revealed the most important product characteristics people take into account when they consider buying bread. On top of the list one can find the type of flour used to produce the bread (and therefore the type of product, eg. Wholemeal, white, brown or other bread) as being the most important criterion for people's bread selection, followed by bread's taste and aroma, the product's price, its texture and the perceived healthiness. It is important to stress that in occasions the respondents' phrasing for the perceived healthiness characteristic rather referred to and interpreted as the type of flour attribute and hence it was content-analysed as such.

The hierarchical value maps generated at the end of the process of data analysis revealed remarkable information about people's bread preferences. Using a cut-off value of 12, the H.V.M. for the sample population, interestingly, unveiled the perception of participants about the relationship between the type of flour and good health. In fact 71% of the sample declared the strong association between the two. In turn, the gift of good health helps people maintain an active lifestyle, which was identified as an important factor so as respondents can enjoy their lives, element valued quite high by almost the sum of the sample. In other words, the concept of good health provides links to almost all constituents at the higher psychosocial level. The last concept is strongly associated with the value fun and enjoyment in life. Also, the "quality product" concept is strongly affiliated with the concepts of "quality of life" and "satisfaction – happiness".

Another important issue related to how consumers make their bread selections, which was identified during the analysis of the data, was the one referred to price. The elements that form the chain, which price is the source of, are present only in this chain and not in any other, like for example quality. This happens because often individuals associate quality with price. This drives us to the conclusion that consumers, primarily, give attention to product-related characteristics and to a lesser extent to the good's price.

6.1.3 The results from the bread Choice Experiment

As we have explained, the market for functional foods is growing rapidly and bakery products appear to offer an obvious source of market, as well as social welfare, opportunities. The results presented here point out that consumers are willing to pay for a bread product that contains functional ingredients. Nevertheless, they appear to strongly prefer bread that claims to offer a straightforward health benefit.

More specifically, the most significant result is that consumers choose bread based on the bread type, such as wholegrain, brown etc. This finding is aligned with the results from the Laddering technique, presented earlier in chapter 4. An interesting discovery is that although consumers appear to be willing to pay, in order to enjoy a bread product that may offer a health benefit or products that contain functional ingredients, these attributes are less important to them.

Moreover, in line with existing research on consumer choice we do find evidence of heterogeneous preferences. However, the results also provide an insight into segments (or classes) that look to consequences and values related to product attributes. Yet, when we consider what explains preferences we find that attitudinal variables have far greater power than the more conventional socio-economic variables typically employed in empirical analysis. Maybe we should not be surprised by this finding but it does raise questions about what type of data we need to collect if we are to better understand what determines choice in stated preference research.

6.2 Contribution of the research academic and managerial implications

The main contribution of the research stems from the amalgamation of the two methodologies, M.E.C. and C.E.. The dual-mode approach we present in this paper has enabled a C.E. to be developed which is informed by insights from behavioural research. Normally focus groups would be used to develop a consensual list of attributes for C.E. However, the use of the M.E.C. analysis and specifically the use of Laddering interviews enabled us to develop a richer understanding of values and motivations underlying attribute selection. Laddering interviews in combination with M.E.C. analysis provide a robust research method to link actual product attributes with perceived consequences that result from the consumption of the product. This approach allows us to understand whether or not it is simply the attributes of a product or deeper consumer motives and values that drive choice. Therefore, the adoption of

Laddering and M.E.C. provides a more structured approach than focus groups (that are usually conducted in a more ad hoc manner) to the identification of attributes to be employed in the C.E. As a result of this dual-mode approach, this research provides an extension to the typical C.E. approach of employing focus groups to reveal key attributes.

Also, the product which has been the subject of the research, bread, appears to lend itself to this dual-mode of analysis. This is because during the Laddering phase of the research consumers identified a reasonable coherent set of attributes, indicated by the high elicitation frequencies. This need not be the case for all subjects which are the focus of a C.E. However, the fact that the Laddering did yield results of this kind does help to provide confidence in the set of attributes employed.

An additional contribution this research makes is that the C.E. survey instrument includes the D.E.B.Q. The D.E.B.Q. allows the researcher to collect information on all participants underlying eating behaviours. Given the focus of the C.E. is food consumption, the author considers it an important design feature to understand underlying respondent eating habits. The importance of the inclusion of the D.E.B.Q. in our survey instrument is demonstrated by the results we present for the C.E.

Similarly, the incorporation of sensory attributes, such as texture and whether the bread is sliced or not, in the C.E. is something that the author came across only once in the literature. However, this was in a research that employed the contingent valuation method. Although they did not play a crucial role in people's choices, some of them had an impact on one of the two segments of the L.C.M. model.

Finally, in terms of the C.E. we examine how health messages in combination with the inclusion of a functional ingredient and the method of production

influence consumer preferences. The reason for adopting this approach is so that we can better understand the relationship between the health benefits of a product generally defined, as opposed to the implied benefits that are derived from the inclusion of functional ingredients. This enables the investigator to understand the importance consumers attach to particular messages about the product.

One more thing that it is worth noting is that the results of all models, at least those that relate to the health-related attributes support each other. This stresses even more the fact that consumers show a strong preference to health claim that can be read easily on the food label rather than being informed that bread contains a functional ingredient that might be beneficial to them.

Understanding the factors that consumers consider when selecting food is important in forming optimal strategies to encourage improvement in consumer eating habits. More precise forecasts of the demand for bread with functional properties will also help food manufacturers decide whether further research and development is justified. Food manufacturers need to understand the underlying decision making processes of consumers to most effectively position the products and divide the market in segments. This research demonstrates that consumers place significant importance on health attributes of functional foods and they are willing to pay a price premium for bread products with such characteristics.

The results provide an incentive for food manufacturers to develop and introduce healthy products into the market despite the challenges in developing products in order to meet consumer needs. This research also reveals the characteristics of consumers who are more likely to buy and consume this particular bread product.

Additionally, it creates the grounds for further exploration of the dual-mode of research, either with the intention to improve it or to apply it to similar functional products and compare the results.

6.3 Limitations and future research

6.3.1 Limitations and recommendations from the application of Laddering Technique

A number of limitations seem to accompany the type of work presented in this thesis. As the methodologies used were two distinct, although complementary ones, these limitations will be presented separately for each of them.

As far as the Laddering technique is concerned, the main shortcoming that arises from the use of this methodology is the fact that data were coded by only one researcher. For this type of research, it was difficult to overcome this obstacle. However, as the nature of Laddering technique is rather qualitative (despite the fact that provides quantifiable results), this researcher bias (due to subjective coding) can, up to a certain extent, be justified. This weakness, nevertheless, can be mitigated when the data are handled by multiple coders.

From a methodological point of view, a limitation of the Laddering technique used in this study is the confusion with the chart employed for the collection of data, as reported by few participants. Although, the paper-and-pencil method used in this research allowed respondents to provide a wider range of responses compared to what is the case usually with soft laddering. Some respondents found it difficult to relate bread and its attributes to personal, higher order values. One possible reason is that the hard laddering type of survey (paper-and-pencil) selected for the group interviews, with the use of a structured, tree-like chart, made it difficult for the subjects to articulate easier their responses, because they were faced with all ladders while answering the questionnaire. This is not the case with the soft laddering (face-to-face interviews), where people concentrate only on one ladder at a time. Soft laddering can be considered the gold standard (Russell, Busson et al., 2004). Another reasonable explanation as to why this might have happened is that the selection of bread is rather a low involvement process, as opposed to when one

is buying a product (eg. a car) that requires a higher degree of involvement. Claeys et al. (1995) claimed that one's motivation to buy a certain product stems from and depends upon the meaning the good conveys to them. Something that it is worth trying in the future is the implementation of this type of research with a computer assisted questionnaire. This is because with the computerised form of the questionnaire the respondent faces only one ladder per time, as is the case in soft laddering.

6.3.2 Limitations and recommendation from the application of the bread C.E.

A possible limitation of this C.E. could be the inclusion of the status quo and the opt-out options along with the three further variations on the type of bread. This is because completing a choice task is a complicated exercise and could create fatigue effects to respondents. This problem could have possibly been mitigated, if the C.E. was a labelled experiment. Then the option provided to respondents would have a "name". Taking into account that bread is not a complicated product and, in general, people are familiar with bread products, the options would be cleared to them. Also, another problem of this C.E. can be considered to be the number of attributes and their associated levels that were included in the design of the C.E. Indeed, the C.E. is a difficult exercise to carry out, especially if one is not familiar. Having to deal with seven attributes, as in this case, increases the difficulty and the cognitive burden associated with completing the choice task (although the attributes used in the C.E. were informed by the application of Laddering Technique). Therefore, this is likely to produce several incorrect responses, as the interviewer is not present. Note that this research was conducted using a postal survey. In the opposite scenario this would have been extenuated and possibly the response rate would higher, as the researcher would be present and have made sure that all complicated aspects of the survey are clarified. Consequently, this face-to-face method of collecting the data is something to be considered for future research as, additionally, increases the control the researcher has over the collection of data.

Finally, two more aspects that relate to the analysis of data need to be discussed. The L.C.M. model is detects preference heterogeneity and separates the sample of respondents into segments, based on differences among the segments. In this research, however, the estimation of a model with more than two latent segments was giving results that at least one of the segments represented a very low proportion of the sample. Perhaps, transformation of the data could help mitigate this issue.

Overall, the methodology used in this research has enabled a much more powerful and in depth understanding of consumer values relating to product attributes, enabling a robust C.E. analysis to be designed and tested. The links provided by using the mixed-mode M.E.C. and C.E. approach have allowed the researcher to gain insights into W.T.P. estimates of the bread attributes used. Also this approach will enable more informed promotional messages to be developed for the product's target market.

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APPENDICES

APPENDIX I: A Sample Questionnaire from the Laddering Technique



Faculty of Social Sciences
Kent Business School
Applied Economics & Business Management Group
Imperial College London, Wye campus
TN25 5AH
U.K.

Dear Sir/Madam,

You are one among a number of people from United Kingdom that have voluntarily agreed to provide their views about functional foods (bread in particular) in the U.K. If you know very little about functional foods, don't worry we have provided you a sheet of information that may help you answer the questions. The aim of this survey is to find out the views of the general public.

**THE RESULTS OF THIS SURVEY WILL HELP US TO UNDERSTAND
THE VIEWS OF THE PUBLIC TOWARDS FUNCTIONAL FOODS.
YOUR ANSWERS ARE VERY IMPORTANT.**

This survey is being conducted by the University of Kent and similar surveys are being carried out in several other countries.

We would like the person who usually does the food shopping for the household to answer the questions. The questionnaire should take no more than 40 minutes of your time. Your answers will be kept confidential, and once completed, there will be no way to identify which is your survey. Please make sure that you answer all the questions and most importantly the charts and note that because this survey is about your opinions **there are no right or wrong answers.**

I thank you for your time and appreciate your support by completing this questionnaire. If you have any questions about the survey please contact me at the address above or on the following telephone number: 02075942971.

Yours sincerely,
(hand signed)
Michael Bitzios

***Please read the following information carefully
before answering the questions.***

FUNCTIONAL FOODS IN THE U.K.

Research in the area of nutrition has proven that concepts progress towards emphasising the use of foods to promote better health and to help reduce the risk of disease. In other words, things move from adequate nutrition (satisfaction of physiological needs) to optimal nutrition (improving health).

The emergence of functional foods has raised a lot of interest for this relatively new category of food products. The purpose of this survey is to find out what British consumers think about functional foods and extract the personal meaning people attach to bread.

According to the **definition given for functional foods** by a European research project, *“functional foods are food products that are satisfactorily demonstrated to affect beneficially one or more target functions of the body”*. In other words, they claim to provide benefits to the human body beyond the nutritional value.

There is, however, a distinction between functional foods and healthy foods. Healthy foods are marketed as being beneficial for the general state of health, while functional foods are products that stimulate positively a particular function of the body and therefore help in the prevention and treatment of certain diseases.

Functional foods can be natural or processed products. Processed functional foods can be modified (shifting a gene from one species into another) or fortified (the functional ingredient is added to the product).

Examples of functional foods include foods that contain specific minerals, vitamins, fatty acids or dietary fibre, foods with added biologically active, naturally occurring substances such as phytochemicals or other antioxidants and probiotics that have live beneficial cultures. Table 1 that follows provides some examples of functional foods as well as the way that beneficially affect the human organism.

Table 2. Examples of functional foods

Functional foods/source	Functional component	Potential benefit/target function
Yoghurt	Probiotics and prebiotics	May improve gastrointestinal function
Fish oil, walnuts	Omega-3	Maintain heart health and may reduce risk of heart disease
Table spreads	Added stanols and sterols	May reduce cholesterol levels and so reduce risk of heart disease

THE DESIGN OF THIS SURVEY

The survey has been designed in order to gain some insight into consumers' buying motivations for choosing functional foods, bread in particular.

The survey consists of 4 sections. Please complete all of them and return the survey in the pre-paid envelope provided.

How to complete the questionnaire:

Sections 1 and 2 are simple questions in which you have to either tick or circle what better describes yourself.

Section 3 is the main part of this questionnaire consists of 3 charts. We ask you to complete these charts expressing the personal meanings you assign to bread. To do that, you must choose the three most important attributes you take into account when you buy bread and develop them in the way they are linked in you mind. To assist you with this task, we provide a number of attributes as well as a number of physical consequences, psychological consequences and values, in the form of "bubbles". This is also the sequence in which the elements are linked between each other. However, this does not mean that you have to, necessarily, follow that way of linking. You may find that attributes are linked in your mind directly with psychological consequences or even with values. The same may apply with physical consequences, which may be

directly linked in your mind with values. Therefore you are able to skip levels and connect the elements from each bubble that you feel are better connected in your mind. You are not bounded to use elements that only exist in the “bubbles”. You have the right to use your own words to describe your feelings. You can use the dash in the boxes where there is no attribute, consequence or value you may consider important. The example that follows will take you through the completing process.

Again, **there are no wrong or right answers. This is to describe the personal meanings you assign to bread.**

In section 4, we would like to collect some information about you. This will help us understand how household characteristics affect attitudes to food with functional attributes. **All your answers will remain strictly confidential.**

SECTION 1: PURCHASE BEHAVIOUR

Qu.1 How often do you purchase food?

- Once a week
- More than once a week
- Less than once a week

Qu.2 How often do you purchase bread? (Please either tick or circle one)

- Never
- Once or twice per week
- Three to five times per week
- Every day

Qu.3 How often do you eat bread? (Please either tick or circle one)

- Three or more times a day
- Once or twice a day
- Five or six times a week
- Two to four times a week
- Once a week
- Do not eat bread

Qu.4 When do you usually eat bread? (Please either tick or circle one)

- Breakfast
- Lunch
- Dinner
- Snack
- Night-time snack

Qu.5 Where do you usually buy bread?

- In local stores
- In supermarkets
- In bakery
- In speciality shops
- In open markets

Qu.6 How often do you purchase food products with functional attributes? (Please either tick or circle one)

- Never
- Rarely
- Sometimes
- Often
- Always

Qu.7 If a bread product with functional attributes is scientifically proven to promote health, would you be willing to buy it? (Please circle the number that best describes your preference)

I would definitely not buy it 1 2 3 4 5 6 7 I would definitely buy it

Qu.8 If you were at risk of getting a health disease (like heart disease, diabetes or obesity), would you be willing to buy bread with functional attributes? (Please circle the number that best describes your preference)

I would definitely not buy 1 2 3 4 5 6 7 I would definitely buy

Qu.9 Had you heard about functional food products before completing this survey? (Please either tick or circle)

- Yes
- No

If yes, where did you get most of your information? (If more than one source of information, please either tick or circle the three most important sources of information)

- Newspapers/magazines
- Television – general news
- Environmental groups
- Health care professional (doctor, dietician, etc.)
- Consumer groups
- Government sources (e.g. fact sheets, leaflets)
- Friends
- Internet

Please state which Internet sites (e.g. environmental groups, government etc.)

SECTION 2: ATTITUDES TO BREAD WITH FUNCTIONAL ATTRIBUTES

Qu.10 My attitude on the whole towards buying bread is generally

extremely unfavourable	1	2	3	4	5	6	7	extremely favourable
------------------------	---	---	---	---	---	---	---	----------------------

Qu.11 My attitude on the whole towards buying bread with functional attributes is generally

extremely unfavourable	1	2	3	4	5	6	7	extremely favourable
------------------------	---	---	---	---	---	---	---	----------------------

Qu.12 People who are important to me (e.g. family, friends, colleagues) think that I

Should not	1	2	3	4	5	6	7	should
------------	---	---	---	---	---	---	---	--------

buy bread.

Qu.13 I buy bread because I believe other people think I should buy it

strongly disagree	1	2	3	4	5	6	7	strongly agree
-------------------	---	---	---	---	---	---	---	----------------

Qu.14 If I wanted to, I have the abilities and it would be easy for me to alter my eating habits and buy bread with functional attributes.

strongly disagree	1	2	3	4	5	6	7	strongly agree
-------------------	---	---	---	---	---	---	---	----------------

Qu.15 To what extent do you see yourself capable of altering eating habits and buying bread with functional attributes?

not at all capable	1	2	3	4	5	6	7	extremely capable
--------------------	---	---	---	---	---	---	---	-------------------

Qu.16 Buying bread with functional attributes will help me promote my state of health

strongly disagree	1	2	3	4	5	6	7	strongly agree
-------------------	---	---	---	---	---	---	---	----------------

Qu.17 Buying bread with functional attributes will help me keep my figure

strongly disagree	1	2	3	4	5	6	7	strongly agree
-------------------	---	---	---	---	---	---	---	----------------

Qu.18 Generally speaking, how much do you care what important others think you should do?

not at all	1	2	3	4	5	6	7	Very much
------------	---	---	---	---	---	---	---	-----------

Qu.19 Whether or not I consume bread with functional attributes is entirely up to me

strongly disagree	1	2	3	4	5	6	7	strongly agree
-------------------	---	---	---	---	---	---	---	----------------

Qu20. How much personal control do you feel you have over altering your eating habits?

no control at all	1	2	3	4	5	6	7	Totally in control
-------------------	---	---	---	---	---	---	---	--------------------

Qu.21 I feel obliged to buy bread with functional attributes, because as the food buyer I feel I promote myself and family's state of health.

strongly disagree	1	2	3	4	5	6	7	strongly agree
-------------------	---	---	---	---	---	---	---	----------------

Bread Attributes

Brightness, Porosity, Hardness, Stickiness, Sweetness, Astringency, Volume, Weight, Density, Symmetry of form, Uniformity of baking, Texture, Colour of crumb, Colour of crust, Grain, Aroma, Character of crust, Taste, Shape, Internal texture, Brand, Package, Crumb flavour, Crust flavour, Price, Health claim, Seedless, Sliced, Added functional ingredient,

Values

Self-fulfilment, Sense of accomplishment, Sense of belonging, Fun and enjoyment in life, Excitement, Self-respect, Sense of security, Will have respect, Warm relationships, Happiness,

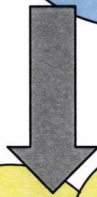


Physical consequences

Good health, More energy, Have good metabolism, Freshness, High quality, Sustain blood sugar level, Be satiated, Maintain normal body weight, Quality product, Diabetes risk reduction, CHD (coronary heart disease) reduction, Brand lovaltv.....

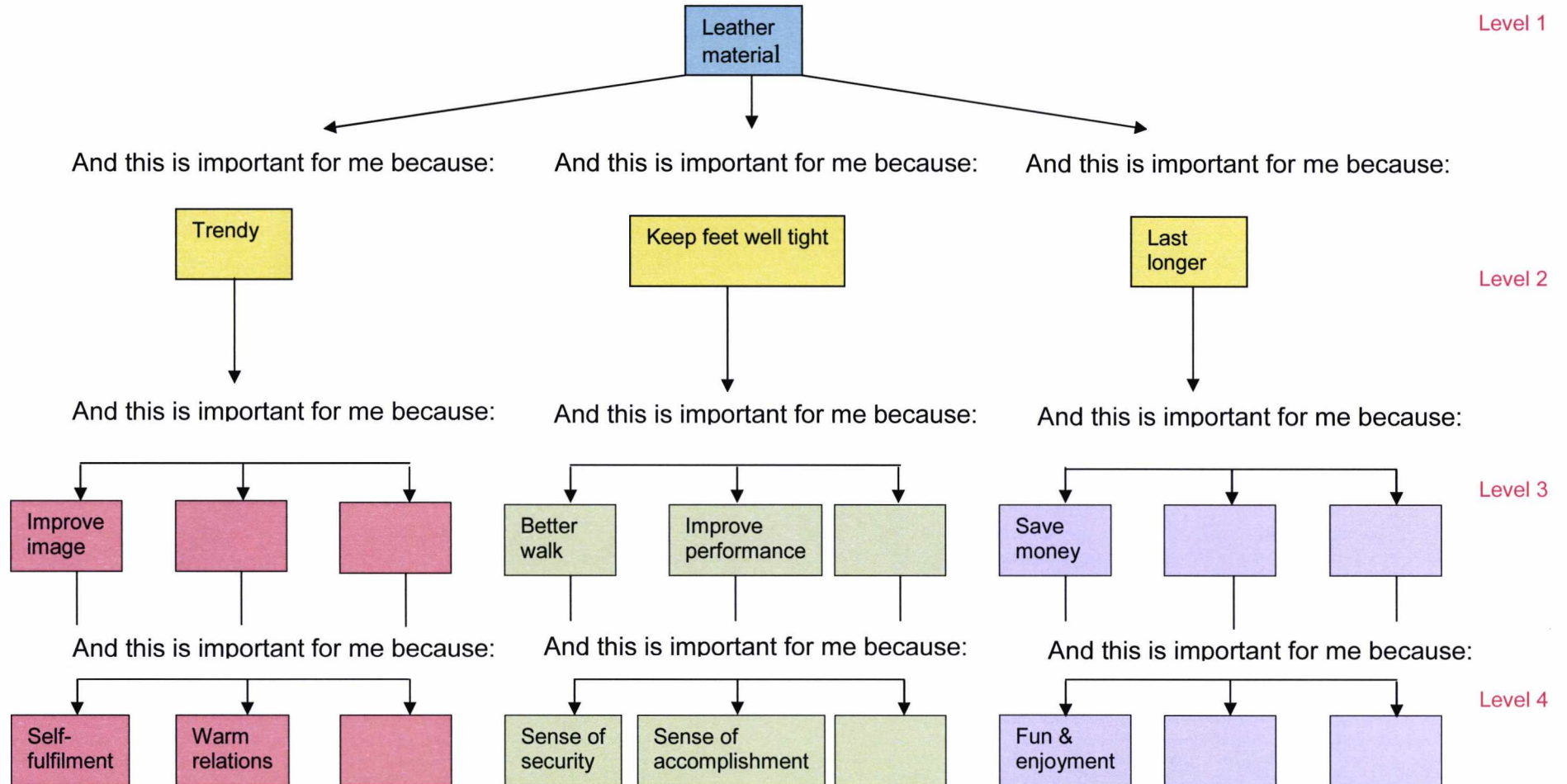
Psychological consequences

Feel relaxed, Keep active, Keep figure, Quality of life, Improved performance, Be environmental conscious, Be confident,

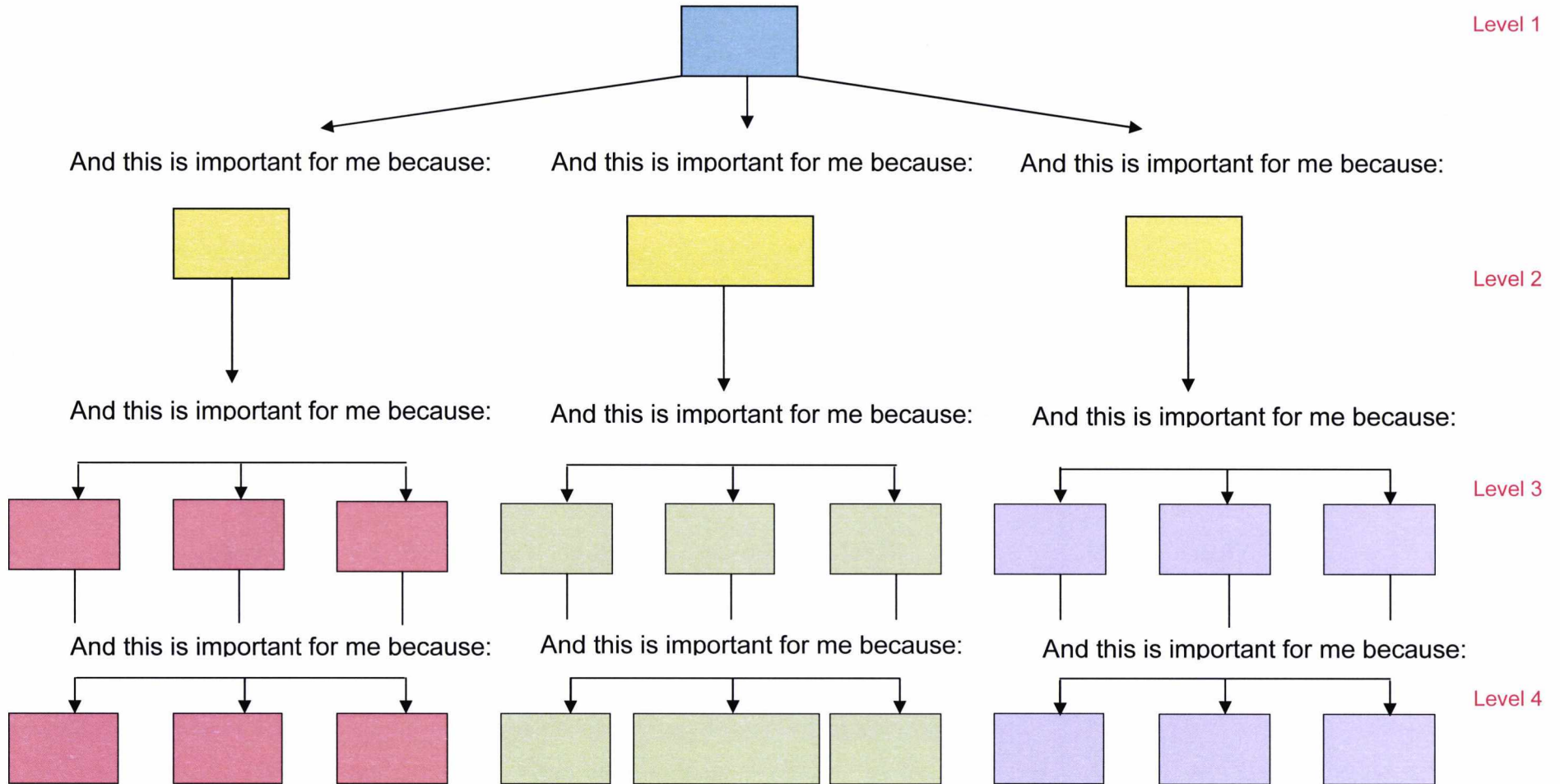


EXAMPLE

When I buy bread, one of the most important things I take into account is:

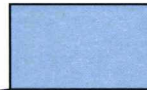


When I buy bread, one of the most important things I take into account is:



When I buy bread, one of the most important things I take into account is:

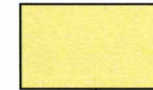
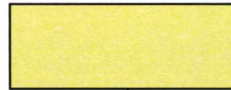
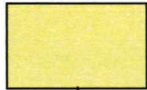
Level 1



And this is important for me because:

And this is important for me because:

And this is important for me because:



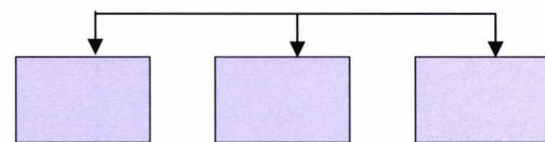
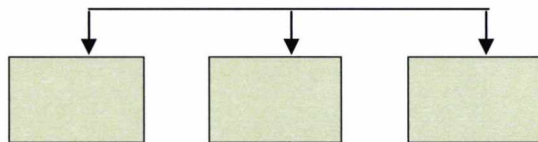
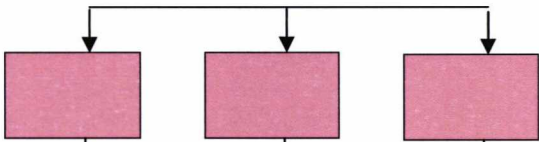
Level 2



And this is important for me because:

And this is important for me because:

And this is important for me because:



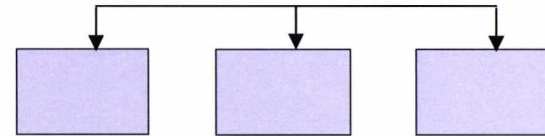
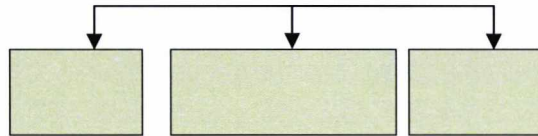
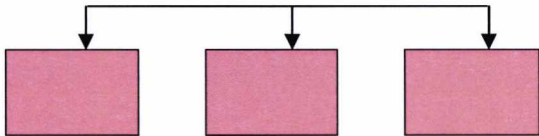
Level 3



And this is important for me because:

And this is important for me because:

And this is important for me because:



Level 4

Section 4: BACKGROUND INFORMATION

The final set of questions in this section will allow us to ensure the people we are surveying come from a wide range of backgrounds. This will help us understand how individual (or household) characteristics affect attitudes and purchase behaviour towards functional foods.

Your answers will be treated in complete anonymity!

Qu.22 What is your gender? (Please either tick or circle one)

- Male
- Female

Qu.23 What is your age group? (Please either tick or circle one)

- 11-20 yrs
- 21-30 yrs
- 31-40 yrs
- 41-50 yrs
- 51-60 yrs
- 61-70 yrs
- 71+

Qu.24 What is your marital status? (Please either tick or circle one)

- Single
- Married/living with partner
- Widowed/Divorced/Separated

Qu.25 What is the number of people currently living in your household (including yourself)?

Qu.26 How many dependent children do you have in your household?

Qu.27 What is the highest level of education that you have completed? (Please either tick or circle one)

- | | |
|---|---|
| <input type="checkbox"/> Basic school education | <input type="checkbox"/> Bachelor degree |
| <input type="checkbox"/> A-level or equivalent | <input type="checkbox"/> Master's degree |
| <input type="checkbox"/> College education | <input type="checkbox"/> Doctorate degree (Ph.D.) |

Qu.28 What is your estimated annual household pre-tax income? (Please either tick or circle one)

(For example if you earned £30,000 per year before income tax is taken out and your partner earns £15,000 per year before income tax is taken out then your annual household pre-tax income is £45,000.)

- | | |
|--|--|
| <input type="checkbox"/> £0-£10,000 | <input type="checkbox"/> £30,001-£40,000 |
| <input type="checkbox"/> £10,001-£20,000 | <input type="checkbox"/> £40,001-£50,000 |
| <input type="checkbox"/> £20,001-£30,000 | <input type="checkbox"/> £50,001+ |

Qu.29 On average, what is the estimated weekly food expenditure in your household (including food eaten outside of the home, such as takeaway or restaurant meals for lunches and diner)? (Please either tick or circle one)

- | | |
|------------------------------------|---|
| <input type="checkbox"/> Up to £30 | <input type="checkbox"/> £80 – £100 |
| <input type="checkbox"/> £30 - £50 | <input type="checkbox"/> More than £100 |
| <input type="checkbox"/> £51 - £80 | |

Qu.30 Which of the following best describes your current main daily activities and/or responsibilities? (Please either tick or circle one)

- Home keeper
- Employed full-time
- Employed part-time
- Student
- Retired
- Unemployed

Qu.31 Do you exercise regularly?

- Yes
- No

Finally, we would like to get some feedback on your feelings about this survey (please where appropriate):

	Yes	No	Maybe
I needed more information Than what was provided			
The information was confusing			
The options were confusing			
Other food-related issues are more important to me than those used here			

If other food related issues are more important than those used here, please outline what these are.

If you have any further comments to make about this survey, please write them below.

**Thank you for your patience!!
Once again your feedback is much appreciated.**

APPENDIX II: A Sample Questionnaire from the CE on Bread Choice

Yxxx



Michael Bitzios
Imperial College London
Wye campus
Wye, Ashford, Kent
TN25 5AH

Bread Choice & Health Promoting Behaviour

Dear Participant,

You have been selected to provide your views about bread. This survey is being conducted as part of my Ph.D. degree in food choice and health. My results will be used to help understand the relationship between bread choice and health.

We would like the person who usually does the food shopping for the household to answer the questionnaire. The questionnaire will take no more than 15 minutes of your time. It is composed of several "warm up" questions, a set of hypothetical shopping tasks, questions examining attitudes toward food, and finally some questions about you.

Please make sure that you answer all questions.

Your answers will be kept confidential. No reference will be made to specific information provided by individual respondents.

After completing the questionnaire please place it in the pre-paid envelope provided and post it back to us **as soon as possible.**

All questionnaires returned will be entered into a draw and four lucky winners will win Marks and Spencer's Gift Vouchers worth £25 each.

I thank you for your time and appreciate your support by completing this questionnaire. If you have any questions about the survey please feel free to contact me.

Yours sincerely,

Michael Bitzios

(e-mail: mb329@kent.ac.uk)

Section A: Background Information

Research in the area of nutrition has emphasised the importance of food to promote better health and help reduce the risk of various diseases. An important advance in this area of study has been the increased use of so called, “functional ingredients”.

Functional ingredients are food components that naturally occur in food products (eg. Lycopene in tomatoes) or they can be added to make the food functional.

Scientifically, functional foods are defined as “*food products that are satisfactorily demonstrated to affect beneficially one or more target functions of the body*”.

In plain English, functional foods can provide benefits to the human body in addition to nutritional value.

Distinction between functional foods and healthy foods:

Healthy foods are beneficial for the general state of your health.

Functional foods are products that, as part of a healthy diet, promote health and help reduce the risk of certain diseases.

Some examples of functional foods

Functional foods	Functional component	Potential benefit/target function
Yoghurt	Probiotics and prebiotics	May improve gastrointestinal function
Fish oil, walnuts	Omega-3	Maintain heart health and may reduce risk of heart disease
Table spreads	Added stanols and sterols	May reduce cholesterol levels and so reduce risk of heart disease

Section B: Preliminary questions

1) In a typical week, how often do you eat

	Once	Twice	Three times	Four or more	Never
a) White bread					
b) Wholemeal bread					
c) 50% white–50% wholemeal					
d) Brown					
e) Rye					
f) Any foods with health promoting properties					

2) Rank the four meals from 1 (most often) to 4 (least often), based on when you most eat bread. Each number can be used only once. If you don't eat bread at all, simply tick the "never eat bread" option.

- | | | |
|------------------------------------|---------------------------------|--|
| <input type="checkbox"/> Breakfast | <input type="checkbox"/> Dinner | <input type="checkbox"/> Never eat bread |
| <input type="checkbox"/> Lunch | <input type="checkbox"/> Snack | |

3) Do you prefer to eat different types of bread during different meals?

- Yes (Go to question 4)
 No (Go to question 5)

4) Which type of breads do you prefer eating during each meal? Please tick one or more boxes as required.

	Breakfast	Lunch	Dinner	Snack
White				
Wholemeal				
50% white – 50% wholemeal				
Brown				
Rye				

5) For which of the following nutrients is white bread an excellent source? Please tick those that apply.

- | | |
|--|----------------------------------|
| <input type="checkbox"/> Carbohydrates | <input type="checkbox"/> Protein |
| <input type="checkbox"/> Calcium | <input type="checkbox"/> Iron |
| <input type="checkbox"/> Vitamins B | <input type="checkbox"/> Fibre |

Hypothetical scenario

You are shopping and ready to buy a loaf of bread. This is a standard 800 gram loaf of bread. The bread is sold in a package that presents information describing the product.

The relevant information describing the bread is highlighted in bold and each piece of information is explained as follows:

Type of bread: There are five different types of bread available in the store: White bread, Wholemeal bread, Brown bread, Bread containing 50% white & 50% wholemeal flour and Rye bread.

Production method of grain: The flour used for bread making has been produced by wheat or rye that is grown conventionally or organically (with fewer chemicals).

Functional ingredient: If the bread product contains a functional ingredient, it is indicated simply by recording “Yes” on the packaging. If it is absent, a “No” is recorded.

Sliced/Un sliced: The bread can either be unsliced, medium sliced or thick sliced.

Texture: This characteristic describes the consistency of bread. That is, the bread can be soft, firm, crunchy and springy.

Health benefit: If the bread product claims to potentially deliver a health benefit, it is indicated simply by recording “Yes”. If no health benefit is claimed, “No” is recorded.

Price: Indicates the cost for a particular type of bread.

An example of how information contained on the package is summarized on the **choice card** is shown below.

Loaf of bread	Option 1	Option 2	Option 3	Option 4	Option 5
Type of bread	White	50% - 50%	Brown	Rye	I don't know
Grain produced	Conventionally	Conventionally	Organically	Conventionally	
Functional Ingredient	No	No	Yes	No	
Sliced/Un sliced	Medium	Thick	Medium	Un sliced	
Texture	Soft	Firm	Soft	Crunchy	
Health benefit	No	Yes	No	Yes	
Price (in £)	0.70	1.90	2.20	0.70	
Choose one & only one option			✓		

Information about the bread contained on the packaging

Option 5 represents the opt-out option

Options 1, 2, 3 and 4 represent the hypothetical, bread products you will be asked to choose between

Section D: Bread Choice Cards

We would now like you to consider the following 6 unrelated choice cards. Please indicate your choice for each card clearly. Please **choose only one** of the five options.

Choice Card Y1					
Loaf of bread	Option 1	Option 2	Option 3	Option 4	Option 5
Type of bread	White	Brown	Rye	White	I don't know
Grain produced	Conventionally	Conventionally	Organically	Conventionally	
Functional Ingredient	No	No	Yes	No	
Sliced/Unsliced	Medium	Medium	Unsliced	Thick	
Texture	Soft	Firm	Soft	Crunchy	
Health benefit	No	No	Yes	No	
Price	0.70	1.30	1.60	1.90	
Choose one & only one option					

Choice Card Y2					
Loaf of bread	Option 1	Option 2	Option 3	Option 4	Option 5
Type of bread	White	White	Wholemeal	50% - 50%	I don't know
Grain produced	Conventionally	Conventionally	Organically	Conventionally	
Functional Ingredient	No	Yes	No	Yes	
Sliced/Unsliced	Medium	Unsliced	Thick	Medium	
Texture	Soft	Crunchy	Springy	Firm	
Health benefit	No	Yes	No	Yes	
Price	0.70	1.00	1.30	1.60	
Choose one & only one option					

Choice Card Y3					
Loaf of bread	Option 1	Option 2	Option 3	Option 4	Option 5
Type of bread	White	Wholemeal	50% - 50%	Brown	I don't know
Grain produced	Conventionally	Organically	Conventionally	Organically	
Functional Ingredient	No	No	Yes	No	
Sliced/Unsliced	Medium	Unsliced	Thick	Medium	
Texture	Soft	Firm	Soft	Crunchy	
Health benefit	No	No	Yes	No	
Price	0.70	1.90	2.20	0.70	
Choose one & only one option					

Choice Card Y4					
Loaf of bread	Option 1	Option 2	Option 3	Option 4	Option 5
Type of bread	White	Rye	White	Wholemeal	I don't know
Grain produced	Conventionally	Conventionally	Organically	Conventionally	
Functional Ingredient	No	Yes	No	Yes	
Sliced/Unsliced	Medium	Thick	Medium	Unsliced	
Texture	Soft	Soft	Crunchy	Springy	
Health benefit	No	Yes	No	Yes	
Price	0.70	1.90	2.20	0.70	
Choose one & only one option					

Choice Card Y5					
Loaf of bread	Option 1	Option 2	Option 3	Option 4	Option 5
Type of bread	White	50% - 50%	Brown	Rye	I don't know
Grain produced	Conventionally	Conventionally	Organically	Conventionally	
Functional Ingredient	No	Yes	No	Yes	
Sliced/Unsliced	Medium	Medium	Unsliced	Thick	
Texture	Soft	Soft	Crunchy	Springy	
Health benefit	No	No	Yes	No	
Price	0.70	1.90	2.20	0.70	
Choose one & only one option					

Choice Card Y6					
Loaf of bread	Option 1	Option 2	Option 3	Option 4	Option 5
Type of bread	White	Brown	Rye	White	I don't know
Grain produced	Conventionally	Organically	Conventionally	Organically	
Functional Ingredient	No	No	Yes	No	
Sliced/Unsliced	Medium	Medium	Unsliced	Thick	
Texture	Soft	Springy	Firm	Soft	
Health benefit	No	Yes	No	Yes	
Price	0.70	0.70	1.00	1.30	
Choose one & only one option					

9) For your choice card responses please rank from 1 (Most Important) to 7 (Least Important) the attributes which affected your choices. No two attributes should receive the same rank number.

- Type of bread
- Production method of grain
- The presence of functional ingredient
- Whether it is sliced or unsliced
- The texture of bread
- The potential health benefit
- Price of bread

10) When answering the choice cards did you always choose option 1?

- Yes
- No

If yes, please explain why:

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Section E: Attitudes toward food

In this section we would like to ask you about food choices in general and your disposition to food consumption.

Read each question and **simply tick next to them the column which best applies to you.**

	Never	Seldom	Sometimes	Often	Very often	Not relevant
1. If you have put on weight, do you eat less than you usually do?						
2. Do you have a desire to eat when you are irritated?						
3. If food tastes good to you, do you eat more than you usually do?						
4. Do you try to eat less at meal times than you would like to eat?						
5. Do you have a desire to eat when you have nothing to do?						
6. Do you have a desire to eat when you are depressed or discouraged?						
7. If food smells and looks good, do you eat more than you usually eat?						
8. How often do you refuse food or drink offered because you are concerned about your weight?						
9. Do you have a desire to eat when you are feeling lonely?						
10. If you see or smell something delicious, do you have a desire to eat it?						
11. Do you watch exactly what you eat?						
12. Do you have a desire to eat when somebody lets you down?						
13. If you have something delicious to eat, do you eat it straight away?						
14. Do you deliberately eat foods that are slimming?						
15. Do you have a desire to eat when you are cross?						
16. Do you have a desire to eat when you sense something unpleasant is going to happen?						
17. If you walk past the baker do you have a desire to buy something delicious?						
18. When you have eaten too much, do you eat less than usual the following days?						
19. Do you get a desire to eat when you are anxious, worried or tense?						
20. If you walk past a snack bar or café, do you have a desire to buy something delicious?						
21. Do you deliberately eat less in order not to gain any more weight?						
22. Do you have a desire to eat when things are going against you, or things have gone wrong?						
23. If you see others eating, do you also have the desire to eat?						
24. How often do you try not to eat between meals because you are watching your weight?						
25. Do you have a desire to eat when you are frightened?						
26. Can you resist eating delicious food?						
27. How often in the evening do you try not to eat because you are watching your weight?						
28. Do you have a desire to eat when you are disappointed?						
29. Do you eat more than usual when you see others eating?						
30. Do you take your weight into account when you eat?						
31. Do you have a desire to eat when you are emotionally upset?						
32. When preparing a meal are you inclined to eat something?						
33. Do you have a desire to eat when you are bored or restless?						

Section F: Background Information

We now ask you for some information about yourself. This will help us ensure that we survey people from a wide range of backgrounds and understand how household characteristics affect attitudes to food with health promoting properties.

All your answers will be treated in complete anonymity.

11) What is your gender?

- Male
- Female

12) What is your age?

- 18 – 25
- 26 – 35
- 36 – 45
- 46 – 55
- 56 – 65
- 66 plus

13) How many people live in your household?

- 1 - 2
- 3 - 4
- 5 or more

14) How many dependent children are there in your household?

- 0 children
- 1 child
- 2 children
- 3 children
- 4 or more children

15) What is your highest level of educational achievement?

- Basic school education up to 16 years (GCSE)
- A-level or equivalent
- Further education qualification
- University undergraduate (B.Sc., B.A.) degree
- University postgraduate (M.Sc., M.A.) degree
- Higher (Ph.D.) degree
- Undisclosed

16) What is your estimated annual household income before tax?

- Less than £5,000
- £5,000 to £9,999
- £10,000 to £14,999
- £15,000 to £19,999
- £20,000 to £24,999
- £25,000 to £29,999
- £30,000 to £34,999
- £35,000 to £39,999
- £40,000 to £44,999
- £45,000 to £49,999
- £50,000 to £54,999
- £55,000 to £59,999
- £60,000 to £64,999
- £65,000 and over
- Undisclosed

17) Which of the following best describes your main current daily activities and/or responsibilities?

- Home keeper
- Employed full-time
- Employed part-time
- Student
- Retired
- Unemployed

18) Do you exercise regularly?

- Yes
- No

19) Do you consider yourself to be “health conscious” when buying food?

- Yes
- No

20) Are you gluten intolerant?

- Yes
- No

Finally, we would like to get some feedback on your feelings about this survey (please tick where appropriate):

	Yes	No
Was the survey easy to answer?		
Was the scientific background information useful?		
Were the options provided clear?		

If you would like to provide your views and comments on the survey, you are welcome to do so below.

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Thank you for your patience!

Please find details regarding the prize draw on the next page

PRIZE DRAW

Please return this survey **as soon as possible**
in the self-addressed business reply envelope provided.

To identify your response in case you are selected as a winner in the prize draw,
your unique ID is: Yxxx

If you wish to remain anonymous please delete this number.