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Consumer criteria for information quality

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Executive Summary:

From the research, the app needs to be populated with; religious information, allergen information, and for each country:

- Cost

- Nutrition Information

- A comment about Naturalness; fresh ingredients and limited use of additives and preservatives

The most preferred ways of providing the information are

- Traffic Light Labelling

- Information Box

- Quality Assurance Logos

App requirements;

- Allergens

- Religious Dietary Requirements

- Cost

- Nutrition Information/ Information Box

- Traffic Light Labelling

- A comment about Naturalness; fresh ingredients and limited use of additives and preservatives

- Quality Assurance 'Logo' such as Red Tractor, Vegetarian etc.

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Introduction

Compared to meals prepared at home, meals eaten out tend to contain more calories, total fat and saturated fat and it is here where the consumer has very little control or knowledge of the nutrient profile of the food they are eating (Bohm and Quartuccio, 2008). The positive association between the rise in consumption of food prepared outside the home and the increasing prevalence of obesity has been described as a major health and wellbeing societal challenge. Attempts to increase public awareness of appropriate ways to eat more healthily unfortunately do not seem to have led to significant changes in patterns of food purchase and consumption especially from an eating 'out-of-home' situation. It has become obvious that the development of effective measures for improvement requires further systematic research and a radical approach. **The aim of FoodSMART is to develop an innovative technical (ICT) menu solution that enables informed consumer choice when eating out that takes into account individual characteristics (such as culture, dietary requirements and age group) as well as product (specification) and environmental cues (choice architecture and consumption setting)**.

This aim will be achieved through the evaluation of consumer orientated intelligence (what information consumers require/trust i.e. information quality); the assessment of industry orientated intelligence (impact of customisation) and the subsequent development of data analytics and Quick Recognition (QR) coding for personalised food recommendation; thereby, facilitating the consumption of healthy and appropriate dishes. Results will be gathered and modelled to provide strategic intelligence for menu design and decision-making (by Industry) and for policy purposes (by the EU). Increasing the pace and scale of innovation within out-of-home eating is fundamental to this proposal.

This report disseminates Work Package 2 – Consumer criteria for information quality (BU): The objective of WP2 is to identify the information valued by consumers to ensure trust of food provision. This will be achieved by a consumer survey performed in 4 EU countries (Denmark, France, Greece and UK), focusing on the actual use (habitual) of "on package information", and also attitudes, knowledge, values or social norms towards such information when eating out. To gain a better understanding of the relevant consumer perspective a user centric approach will be adopted. Elicitation of categorisations from individuals has the potential to provide a very important perspective in this arena and one that has high salience for consumers. The study will include a first phase with focus group discussions, followed by a quantitative online questionnaire sent to a large

sample of the population. Providing tailored information will facilitate adoption of healthier nutrition practices and such a concept has been supported empirically in retail situations. Research has found that consumer's appreciate messages tailored to their own needs, signposting specific values of interest will enable consumers to utilize labels more effectively without being overwhelmed by the abundance of information given.

Methodology

Empirical Study 1: Focus groups

Focus groups were selected as the methodology for the exploratory study to aid questionnaire development due to their ability to elicit discussion of participants` perceptions that can provide a rich description of viewpoints and experiences from many angles. Structured focus groups (n=8) were conducted with participants who regularly, at least twice a week, use a canteen for their main meal. Email invitations were sent out to participants in the UK, France, Greece and Denmark to build a sample of these 4 countries. The study and questions were approved by the local Ethics Committee. In total, 40 participants took part, 29 female and 11 male, with an age range of 31-64 years. In order to ensure continuity across the four focus groups, specific questions were designed rather than relying on a topic guide. This decision was also made to improve the analysis of data. Questions used for the discussions were influenced by the literature and focussed on factors affecting meal choice when eating in a canteen. These questions were also discussed with key industry stakeholders and included open-ended comment on the influences of food choice in canteen foodservice.

Procedure

Following its development, the question guide was tested and revised in discussion with industry stakeholders. Data were directly transcribed at the conclusion. Discussion was led by the same researcher and moderated with a colleague at transcription stage.

Data analysis

Data was transcribed verbatim and analysed using the qualitative data analysis programme NVivo 10 (Bergin 2011) as well as researcher experience. A thematic analysis approach was taken and common themes, differences and relationships identified. Data were coded deductively into themes and subthemes based on a coding frame derived from literature on factors influencing food choice in a real life setting. Themes were iteratively reviewed so that coding categories were adapted according to the data to achieve rigour.

Empirical Study 2: Questionnaires

This second empirical study will analyse criteria that have been identified through the focus groups and the literature in order to test what criteria are most important to consumers when making food choices in a canteen. The questionnaire was administered via an online survey tool to participants in the UK, France, Greece and Denmark.

Best-worst Scaling

Data from the first empirical study was used to inform the design of the best-worst questionnaire falling under conjoint analysis. Conjoint analysis has the underlying principle that choices are not based on one single factor but are influenced by a multitude of factors which are conjointly considered (Adamsen et al. 2013). This questionnaire was developed on best-worst scaling as part of choice based measurement as proposed by Finn and Louviere (1992). Best-worst scaling is constructed on the random utility theory developed by McFadden (1980) who concludes that a preference for one object over another is a function of the relative frequency of which this object has been chosen over the other. One of the benefits of using best-worst scaling is that it gives information about the top and bottom rated object in each choice set which provides more information about the rating of objects in each set. Consequently, as the most and least preferred option is chosen, this method does not suffer from the scale bias associated with rating based scales (Loose and Lockshin 2013). Therefore, it is specifically useful in cross-national research as undertaken in this study as previous research has found that participants from different countries make different use of verbal rating scales (Harzing et al. 2009). In the design of this questionnaire, participants were presented with different scenarios, where they had to select the best and worst option.

Questionnaire

The questionnaire consisted of three parts: food criteria of importance (Value for Money, Nutrition, Naturalness, Organic, Environmental Impact, Fair Trade, Provenance and Animal Welfare) derived from the focus groups; information provision (Traffic Light labelling, Information box, Quality Assurance, Brands, Footnotes and Interactive Information) derived from the literature and demographics. Participants were presented with various choice sets, which comprise of a set of food values or types of information provision. For each set the most preferred and the least preferred option must be chosen. Therefore, participants are required to make trade-offs between different values, which reflects purchase intentions and can predict consumer behaviour more accurately than the use of rating scales. Choice sets were developed and participants had to select the best and worst option out of sets each containing four food criteria of importance matched against each of

the eight identified from the focus groups. Thereby, the design was generated in a way that each criteria appeared equally often and was combined equally often with another criteria.

Data analysis

Data analysis was undertaken in two steps; attribute importance was calculated on an individual level and this data was subject to latent class cluster analysis. Latent class analysis can identify homogenous sub-groups of the sample population in respect to consumer preferences shown towards the tested attributes (Casini and Corsi 2008). Furthermore, latent class analysis can be estimated with data obtained from different scale types, which allows clustering of individual choice data in combination with socio-demographic data without changing the format of this data. Different to a traditional cluster analysis, latent class cluster analysis, does not assume that the data is linear and normally distributed (Chrysochou et al. 2012).

Results

Empirical Study 1;

Preceding Factors for Making Food Choice

Participants of the study shared their experience from different styles of canteen. There was a common consent that there is less expectation of the food sold in this setting than food consumed at home or when eating out in a restaurant, especially in regards to taste and quality. Particularly dish description; taste and visual appearance of dishes have led to this expectation of inferior quality which was common amongst participants in all countries.

Given participants` low quality expectations it was clear that there are preceding factors that act as barriers or facilitators to the use of canteens as illustrated in Table 1.

Table 1 - Factors influencing the decision to eat in the workplace canteen

Factors	Definition
Taking a break	- Having a rest - Socialise with colleagues
Convenience	- Time constraint - Lack of alternatives - Not having to cook at home
Food Scandals	- Food fraud scandal: horsemeat - Food safety issues

Factors Directly Affecting Food Choice

Factors influencing food choice in canteens differ from factors affecting food choice made when preparing food at home or shopping for food. It is directed by the setting where consumers are presented with a whole meal and do not think about individual ingredients in the way they do when shopping for food. There were 11 different criteria that were of importance when making food choice in a canteen which was similar across all countries as outlined in Table 2; the criteria important to participants are: value for money, variety, naturalness, nutrition, portion size, taste and visual appearance, origin, animal welfare, environmental impact, fair trade and organic, presented as themes identified.

Table 2 - Criteria of importance influencing food choice made in canteens.

Criteria	Participants` Definition of the Value
Value for Money	Affordability, Criticism of healthy food at high cost Different views on paying premium for higher quality (DK, UK, Gr, F)
Variety	Variety of options suitable for different physical needs Flexibility to change condiments Frequent Menu Rotation Incorporation of ethnic foods into menu (DK, UK, Gr, F)
Naturalness	Fresh ingredients, Less heavily processed foods Limited use of additives and preservatives (DK, UK, Gr, F)
Nutrition	Range of healthy foods, Lighter Options Preparation of food that preserves nutrients (DK, UK, Gr, F)
Portion Size	Sufficient portion size reflecting value for money Criticism of healthy options being a smaller size (DK, UK, Gr, F)
Taste & Visual Appearance	Heavy reliance on experience; choice of dishes that are tried and tested and therefore participants were less inclined to try new dishes Visual Appearance does often not reflect dish description (DK, UK, Gr, F)
Origin	Provenance of food Like to support the local community (DK, UK, F)
Animal Welfare	Food that is produced in a way that respects the fair treatment of animals; especially important for meat products and eggs Avoidance of dishes containing meat that are cheap or heavily processed (DK, UK)

Environmental Impact	Carbon footprint
	Support of local food and short supply chains
	Use of seasonal ingredients (DK, UK, Gr, F)
Fair Trade	Welcome of the use of the Fair Trade logo on some food items (UK)
Organic	Use of organic ingredients (DK, UK, F)

Food Information Guiding Choice

Participants welcomed the idea of greater information provision and perceived it as their right to be provided with food information when eating in a canteen. Whilst it was seen as an aid for decision making for some, the use and the ability to understand the information was criticised as being too difficult and inconvenient by others. Information on ingredients, especially provenance is welcomed but views about nutrition information, particularly calorie information were mixed with some consumers welcoming help towards a healthier lifestyle whilst other participants perceiving it as an overload of information impairing their enjoyment of food.

Empirical Study 2

Consumer Criteria of Importance

This study, based on the results of empirical study 1, focus groups, aimed to get a better understanding of the importance consumers attach to the identified criteria per country but also classifying different clusters within the sample population. For the purpose of this study, an online administered survey was carried out in the UK, Greece, Denmark and France throughout the autumn of 2015. The survey consisted of three parts; the first part assessed the importance of eight criteria that influence food choices made in canteens derived from focus group results, whilst the second part evaluated the preference for six different ways of providing food information which were selected based on a review of the literature. Additionally, socio-demographic data was collected in order to gain a better understanding of the sample and to segment participants based on choices made in earlier parts of the survey. Prior to presenting the results of both part one and two of the survey, the socio-demographic characteristics of the sample are described. Following this, the results of the first part of the survey are presented separately to the results of the second part in favour of a clearer structure.

Data were collected from 452 employees who had access to a canteen at their place of work. Most of the employees worked full time at their place of work (60.4%) and their employment falls under the occupations classification of Technicians and Associate Professionals (74.1%). The majority of the sample was female (61.1%), aged between 20-29 (51.3%) and had completed some form of higher

tertiary education (74.1%). Further socio-demographic characteristics of the sample are presented in Table 3.

Table 3 - Socio-demographic characteristics of sample

	Overall Sample (452)	
	N	%
Gender		
Male	176	38.9
Female	276	61.1
Age groups		
Below 20	15	3.3
20-29	232	51.3
30-39	96	21.2
40-49	47	10.5
50-59	43	9.5
Over 60	19	4.2
Country of birth		
Within country of residence	351	77.7
In another EU member state	53	11.8
Outside the EU	48	10.6
Dietary requirements		
Religious	14	3.1
Allergies	28	6.2
Health related	11	2.4
None	366	81
Other	33	7.3
Household type		
Single person household	103	22.8
Multi person household	86	19
Lone parent children <25	18	4
Lone parent children >25	5	1.1
Couple without children <25	64	14.2
Couple with children <25	128	28.3
Other type of household	48	10.6
Household size		
One person household	77	17
Two person household	132	29.2

Three person household	81	17.9
Four person household	103	22.8
More than four person household	59	13.1
Employment status		
Full time	273	60.4
Part time	179	39.6
Occupation		
ISCO-08 Category 1 Managers	52	11.5
ISCO-08 Category 2 Professionals	125	28.3
ISCO-08Category 3 Associate Professionals, Technicians, Students	181	40
ISCO-08 Category 4 Clerical Support	15	3.3
ISCO-08 Category 5 Service and Sales	44	9.7
ISCO-08 Category 6 Agriculture, Forestry, Fishery	1	0.2
ISCO-08 Category 7 Craft and related trades	4	0.9
Missing value	27	6
Highest level of Education		
Intermediate general qualification	11	2.4
Gen maturity certificate and/or vocational qualifications	84	18.6
Higher tertiary education	335	74.1

A variety of techniques were used to analyse the data. Best-worst scores were calculated through a Hierarchical Bayes estimation using Sawtooth Software. Thereby, utility scores were estimated on an individual level for each participant and averaged within each country for the different consumer criteria of importance tested for. Country specific results are presented in Table 4.

Table 4 - Average best-worst utility scores for criteria of importance (ranked in importance per country in bold)

	UK n=152	Greece n=100	Denmark n=100	France n=100
Value for Money	**24.26**	**27.6**	**16.96**	**15**
Naturalness	**15.75**	**18.3**	**17.3**	**19.85**
Nutrition	**27.76**	**22.84**	**24.76**	**20.07**
Organic	6.42	5.65	11.14	13.05
Environmental Impact	5.63	4.56	8.33	8.21
Fair Trade	4.97	3.81	4.99	3.4
Provenance	3.07	11.66	5.44	14.7
Animal Welfare	12.13	5.58	11.08	5.72

The results are fairly consistent across the sample, in that Value for Money ie. cost, Nutrition and Naturalness are ranked in the top three for all four countries. However, in the UK, there is a high importance on Nutrition and Value for Money. In Greece, Value for Money is the most important aspect. For Denmark, Nutrition is by far the criteria with the highest importance. France distinguishes from the other countries through a higher value of Provenance.

Latent class analysis was used to detect relationships between observed variables on the basis of a smaller number of latent variables (Rindskopf 2009). In this study the Best-worst utility scores were subject to latent class analysis to identify the degree of importance the sample gives to the eight food criteria of importance (focus groups) and six different information provision types (literature) when making food choices in a university/workplace canteen. Latent class analysis can identify homogenous sub-groups of the sample population in respect to consumer preferences shown towards the tested attributes (Casini and Corsi 2008).

Latent class analysis was performed using Latent Gold 3.0 (Vermunt and Magidson 2003) to estimate a latent class cluster model based on the individual Best-worst scores. Models were estimated from two to five clusters and the log-likelihoods (LL) and Bayesian Information Criterion (BIC) of each model compared. Hereby, the most parsimonious model that provides an adequate fit was selected. Therefore, in both cases the model with five clusters was chosen based on the smallest BIC_{LL} and the lowest classification error as indicated in Table 5 (Chrysochou et al. 2012).

Table 5 - Latent class cluster models fitted to individual-level best-worst scores of the eight food criteria of importance

Model	LL	BIC_{LL}	Classification Error
Criteria of importance			
One-cluster model	-8679.7833	17457.385	0.0000
Two-cluster model	-8422.6597	17047.071	0.0697
Three-cluster model	-8332.1259	16969.936	0.0999
Four-cluster model	-8248.5769	16906.770	0.1273
Five cluster model*	**-8193.6150**	**16900.779**	**0.1129**

Notes: LL=Log-likelihood; BIC_{LL} =Bayesian Information Criterion based on the log-likelihood

Hence, a decision was made to go with a five cluster model (Table 6). All clusters were defined based on the revealed importance of each attribute that has been identified by the individual-level best-worst scores and are shown in Table 6. Cluster 1 was tagged 'Value Driven' (33%) as these respondents acknowledged value as important. Cluster 2 was tagged 'Conventionalists' (23.2%) as

these respondents were not so concerned about 'new ideas' such as organic and valued most criteria. Cluster 3 was tagged 'Socially Responsible' (19.2%) and these respondents were driven by socially responsible factors. Cluster 4 was tagged 'Health Conscious' (14.2%) and as the name suggests these respondents were interested in Naturalness, Organic and Nutrition. Lastly, Cluster 5 was tagged 'Locavores' (10.4%), a term coined from a French participant who described an importance in local sustainable development. The utility scores shown in Table 6 are a preference judgement presenting the holistic value or path-worth for each of the tested criteria in this study. Hereby, negative weights are not negative influences but an indication that the attribute is less important. All attributes tested for in the survey are significantly different between the clusters (p-values<0.05), and are therefore useful in segmenting the participants into five clusters. There are some socio-demographic differences between the clusters as measured by chi-square. Gender, age, employment status and participant country are significant ($p < 0.05$) whilst country of birth, dietary requirements, household type, household size, occupation and highest level of education are not significant ($p > 0.05$).

Table 6 - Latent class cluster parameter values for all participating countries

	Value Driven (33%)	Conventionalists (23.2%)	Socially Responsible (19.2%)	Health Conscious (14.2%)	Locavores (10.4%)	p-value	R^2
Value for Money	4.44	2.92	-4.71	-2.14	-0.51	<0.01	0.59
Organic	-0.82	-2.17	1.85	2	-0.86	<0.01	0.42
Environmental Impact	-2.52	0.26	2.55	-0.86	0.57	<0.01	0.59
Naturalness	0.05	-1.42	-1.3	2.4	0.27	<0.01	0.27
Nutrition	1.65	1.13	-1.8	1.30	-2.28	<0.01	0.32
Fair Trade	-1.12	0.77	2	-1.16	-0.49	<0.01	0.39
Provenance	-0.30	-2.24	-0.15	-0.96	3.65	<0.01	0.33
Animal Welfare	-1.38	0.75	1.56	-0.58	-0.35	<0.01	0.20
Socio-Demographic Variables							
Gender							
Male	46.3	45.7	29.9	28.1	31.9	0.014	
Female	53.7	54.3	70.1	71.9	68.1		
Age groups							
Below 20	4.7	4.8	1.1	3.1	0	0.000	
20-29	61.1	58.1	40.2	42.2	38.3		
30-39	23.5	19	19.5	23.4	19.1		
40-49	6.7	10.5	9.2	17.2	14.9		
50-59	2.7	5.7	21.8	12.5	12.8		
Over 60	1.3	1.9	8	1.6	14.9		

Country of birth						
Within country of residence	78.5	77.1	72.4	75	89.4	0.442
In another EU member state	10.1	14.3	16.1	10.9	4.3	
Outside the EU	11.4	8.6	11.5	14.1	6.4	
Dietary requirements						
Religious	4.7	2.9	2.3	3.1	0	0.297
Allergies	8.1	3.8	10.3	1.6	4.3	
Health related	2.7	1.9	2.3	3.1	2.1	
None	78.5	84.8	73.6	84.4	87.2	
Other	6	6.7	11.5	7.8	6.4	
Household type						
Single person	24.2	25.7	21.8	15.6	23.4	0.143
Multi person	24.1	19	21.8	18.8	8.5	
Lone parent children <25	4.7	3.8	5.7	1.6	2.1	
Couple without children <25	16.8	10.5	8	17.2	21.3	
Couple with children <25	22.8	28.6	26.4	39.1	34	
Other	7.4	12.4	16.1	7.8	10.6	
Household size						
One person	15.4	19	19.5	17.2	12.8	0.808
Two person	29.5	24.8	37.9	20.3	34	
Three person	18.1	19	16.1	23.4	10.6	
Four person	22.1	21.9	18.4	26.6	29.8	
More than four person	14.7	15.3	8	12.5	12.8	
Employment status						
Full time	55.7	63.8	59.8	78.1	44.7	0.004
Part time	44.3	36.2	40.2	21.9	55.3	
Occupation						
ISCO-08 Category 1 Managers	8.7	11.4	17.2	9.4	12.8	
ISCO-08 Category 2 Professionals	24.2	27.6	32.2	35.9	25.5	0.383
ISCO-08 Category 3 Associate Professionals, Technicians, Students	44.3	41	31	39.1	42.6	
ISCO-08 Category 4 Clerical Support	3.4	2.9	2.3	3.1	6.4	
ISCO-08 Category 5 Service and Sales	8.1	13.2	10.3	10.9	4.3	

ISCO-08 Category 6 Agriculture, Forestry, Fishery	-	-	1.1	-	-	
ISCO-08 Category 7 Craft and related Trades	2	1	-	-	-	
ISCO-08 missing value	9.4	2.9	5.7	1.6	8.5	
Highest level of Education						
Intermediate general qualification	1.3	1	3.4	4.7	4.3	0.142
Gen maturity certificate, vocational qualifications	18.8	21.9	21.8	7.8	19.1	
Higher tertiary education	73.2	73.3	72.4	85.9	66	
Missing	6.7	3.8	2.3	1.6	10.6	
Participant Country						
UK	38.9	47.6	31	18.8	10.6	0.000
Greece	34.2	17.1	9.2	14.1	29.8	
Denmark	16.8	21	29.9	35.9	8.5	
France	10.1	14.3	29.9	31.3	51.5	

Cluster 1: Value Driven

The first cluster was tagged Value Driven due to the high importance of selecting a dish that provided good value for money (4.4). Furthermore, Nutrition (1.64) and Naturalness (0.05) are also of importance. However, employees in this cluster are the least concerned about Environmental Impact (-2.52). Additionally, there is low importance given to Animal Welfare (-1.38), Fair Trade (-1.12), Organic (-0.81) and Provenance (-0.3). This cluster is the largest segment containing 33% of the sample population. In the group, there is a fairly even distribution between males (46.7 %) and females (53.7%). Furthermore, this cluster compared to the other groups contains the highest proportion of participants' aged 20-29 (61.1%). The UK (38.9%) and Greece (34.2%) have the largest membership in the Value Driven cluster. One of the Danish participants described the reasoning behind his selection of high importance of Value for Money and Nutrition as follows: "*First I'm interested in myself, do I get good value for money and is the food a good source of nutrition? The environment and the people who produce the food aren't something I think about when I eat in the canteen.*" (Denmark, male participant)

Cluster 2: Conventionalists

This is the second largest cluster, encompassing 23.2 % of participants. Similar to the first cluster, Value for Money (2.92) and Nutrition (1.13) are still of high importance, although the differences

between criteria are smaller and therefore these respondents have an appreciation of most. The UK is over-represented in this cluster with 47.6% participants. Out of the employees in this cluster, 45.7% are male and 54.3% are female and 63.8% worked in full time positions. One employee from the UK belonging to this cluster described his process of decision making as: "*I selected value for money, fair trade and animal welfare as most important as I am on a budget, but not to the extent that I can't afford a few extra pence to ensure farmers get value for their product and maintain support of animal welfare. Things that are less important are provenance and organic … and I believe that growing some produce in the UK out of season is more harmful to the environment than shipping it in from overseas. In terms of organic produce, this is not something noticeably different for the consumer.*" (UK, male participant)

Cluster 3: Socially Responsible

In this cluster criteria that are related to socially responsible factors of food production are of higher importance than the cost or nutritional composition of the dish. Consequently, Environmental Impact (2.55) scores the highest in this cluster followed by Fair Trade (2), Organic (1.85) and Animal Welfare (1.56). Value for Money (-4.71) for this group is the least important criteria when selecting a dish. Furthermore, there is also a lower emphasis on Nutrition (-1.8), Naturalness (-1.3) and Provenance (-0.15). This cluster consists of 70.1% female employees and whilst the majority of participants in this cluster are aged between 20-29 (40.2%) there is also a higher proportion of participants in their fifties (21.8%) compared to other clusters. This group is equally distributed between the UK (31%), France (29.9%) and Denmark (29.9%) with fewer participants from Greece (9.2%). A Danish participant from this cluster described her reasoning behind choosing criteria that are classed as Socially Responsible: "*For me being healthy goes beyond nutrition. I prefer organic and if I know that the animal had a bad life, I prefer not to eat it … I prefer it if food is natural without artificial ingredients. I assume that I will be more healthy if I eat that way rather than thinking about calories. I also think about the environmental impact of my food choice.*" (Denmark, female participant)

Cluster 4: Health Conscious

Cluster 4, is tagged as Health Conscious due the highest proportion of Naturalness (2.4) and Organic (2) compared to the other clusters. Additionally, Nutrition (1.3) is also of higher relevance than other criteria. There is less emphasis on criteria such as Value for Money (-2.14), Fair Trade (-1.16), Provenance (-0.96), Environmental Impact (-0.86) and Animal Welfare (-0.58). There are 14.2% of employees included in this cluster and are mostly driven by naturalness, has larger memberships from Denmark (35.9%) and France (31.3%). In contrast to the other groups, this cluster contains the highest amount of parent households (39.1%) and the least amount of single households (15.6%).

Furthermore, this cluster is predominantly female (71.9%) and consists of employees working full time (78.1%). Participants located in this cluster have occupations that can be classed as professionals (35.9%) or associate professionals (39.1%) and have a high proportion of employees who have completed higher tertiary education (85.9%). An employee from the UK described why she puts a high emphasis on healthy meals: "*I'm very aware of what I eat yet not in the respect of where it comes from or who made it. I guess that isn't good but I would rather concentrate on healthy meals and the nutritional value I'm getting from my meal.*" (UK, female participant)

Cluster 5: Locavores

The smallest cluster with 10.4 % is cluster 5, tagged Locavores. In this cluster there is a high consumer importance of Provenance (3.65), Environmental Impact (0.57) and Naturalness (0.27). Whereas, Nutrition (-2.28), Organic (-0.86), Value for Money (-0.51), Fair Trade (-0.49) and Animal Welfare (-0.35) were of less importance. France has got the highest cluster membership (51.5%) followed by Greece (29.8%) with low memberships from the UK (10.6%) and Denmark (8.5%). This group includes smallest percentage of 20-29 year olds (38.3) and the highest amount of over 60s (14.9%) compared to other groups. Furthermore, it is the only cluster that consists of more employees working part time (55.3%) than full time (44.7%). One of the French Participants described his reasoning for attributing a high importance to provenance as: *''being a locavore contributes to sustainable development and trade… and is empowering for consumers''*. (France, male participant)

Clusters are illustrated in Figure 1. Cluster 1, 'Value Driven', and Cluster 5, 'Locavores', stand out with their high importance for Value for Money and Provenance respectively, whilst Cluster 3, 'Socially Responsible' distinctively shows that Value for Money is not an important criterion to influence food decision. The difference between clusters for the other criteria, Organic, Naturalness, Nutrition, Fair Trade and Animal Welfare, are apparent but not as strong.

Figure 1 - Overview of the different clusters
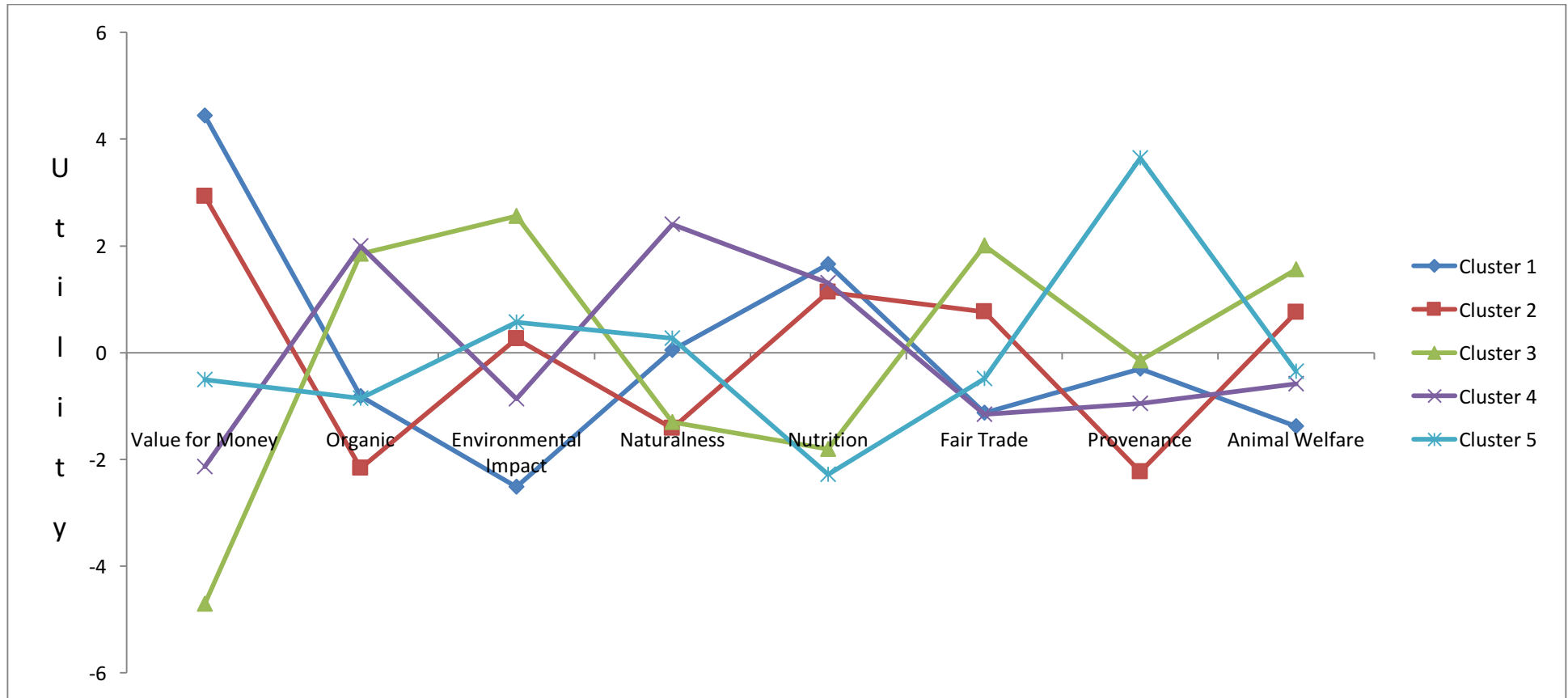
Food Information Provision

This part of the questionnaire was designed to establish, what types of information provision are relevant to consumers. Therefore, a best-worst experiment was designed using attributes that were obtained from both a review of the literature and the analysis of the focus groups. It is important to get an insight into the preference of information provision, as information provided in the right form is only meaningful to consumers if it is understandable and relevant (Van Rijswijk and Frewer 2012). Consumers have a greater interest in food information to enable them to increase their control over the food they eat and make informed choices (Van Rijswijk and Frewer 2012). The same methodology used for the consumer criteria of importance was applied to this part of the survey. Utility scores were estimated on an individual level through Hierarchical Bayes estimation. Hereby, the individual utility scores were also averaged within each country as presented in Table 7.

Table 7 - Average best-worst utility scores for all four participating countries (ranked in importance per country in bold)**.**

	UK n=152	Greece n=100	Denmark n=100	France n=100
Traffic Light Information	**32.11**	**25.61**	**24.45**	**30.16**
Information box (eg. Ingredients, Allergens and Nutrition)	**27.06**	**20.04**	**29.35**	**23.86**
Quality Assurance (eg. Red Tractor Logos, Vegetarian and Vegan	**18.81**	**27.39**	**21.68**	**21.51**
Brand	9.79	8.81	8.92	9.88
Interactive Information (eg. QR code)	4.63	12.94	2.47	9.32
Footnotes (eg. on the menu)	7.6	5.21	13.13	5.27

The results are fairly consistent across the sample, in that Traffic Light Labelling, Information box and Quality Assurance are ranked in the top three for all four countries. The results are similar between the different countries with the UK, Denmark and France all preferring Traffic Light Information, followed by a strong preference for Quality Assurance. In Greece, interestingly, there is a higher preference for Interactive Information compared to the other countries.

The individual-level best-worst utility scores were subject to latent class analysis in order to identify the preference of the sample towards the six different ways of providing food information (Table 8). Latent class cluster models were estimated from two to five clusters and the log-likelihoods (LL) and Bayesian Information Criterion (BIC) of each model compared. The most parsimonious model providing an adequate fit in this case was the model with five clusters.

Table 8 - Latent class cluster models fitted to individual-level best-worst scores

Model	LL	BIC$_{LL}$	Classification Error
Food information provision			
One-cluster model	-6263.8816	12601.127	0.0000
Two-cluster model	-6075.2040	12303.250	0.0266
Three-cluster model	-5958.1431	12148.606	0.0656
Four-cluster model	-5870.4295	12052.656	0.0747
Five-cluster model *	**-5821.0982**	**120.33.472**	**0.0763**

Notes: LL=Log-likelihood; BIC$_{LL}$ =Bayesian Information Criterion based on the log-likelihood

The clusters for the second experiment of the survey relating to the preference of different ways of providing food information to consumers are shown in Table 9. All clusters were defined based on the revealed importance of each attribute that has been identified by the individual-level Best-worst scores. Cluster 1 was tagged 'Heuristic Processors' (33%) as these respondents' value easy to find data and like to make sense of this. Cluster 2 was tagged 'Brand orientated' (25%) as these respondents are persuaded by Brand authority. Cluster 3 was tagged 'Systematic Processors' (17.3%) as these respondents' favour Footnotes, Information boxes and Interactive Information. Cluster 4 was tagged 'Independent Processors' (16.1%) and is a mixture of where heuristic and systematic processes occur simultaneously. Lastly, cluster 5 was tagged 'Tech-savvy' (8.6%), and as the name implies these are respondents who indicate a high preference for Interactive Information. Table 9 shows the utility coefficients for the different information provision formats, which are zero-centred. Within each criteria and cluster the utility coefficients sum to 0. The p-value associated with the Wald statistic for all of the six information provision formats is lower than 0.05, therefore all six variables are useful in segmenting the sample into five different clusters. Socio-demographic differences between the clusters were measured by chi-square. Dietary requirements, employment status and participant country are significant (p <0.05) whereas gender, age, country of birth, household type, household size, occupation and highest level of education were not significant (p> 0.05).

Table 9 - Latent class cluster parameter values for all participating countries

	Heuristic Processors (33%)	Brand Orientated (25%)	Systematic Processors (17.3%)	Independent Processors (16.1%)	Tech-savvy (8.6%)	*p*-value	R^2
Traffic Light Labelling	3.27	-1.39	-0.41	0.23	-1.7	<0.01	0.51
Information Box	-1.31	-1.01	1.56	2.09	-1.33	<0.01	0.37
Brand	0.48	2.96	-2.86	0.15	-0.73	<0.01	0.52
Quality Assurance	-0.65	1.01	-0.44	-0.29	0.38	<0.01	0.09
Interactive Information	-0.57	-0.73	0.4	-3.61	4.51	<0.01	0.50
Footnotes	-1.22	-0.84	1.74	1.45	-1.13	<0.01	0.42
Socio-Demographic Parameters							
Gender							
Male	35.6	39.8	42.3	34.2	51.3	0.367	
Female	64.4	60.2	57.7	65.8	48.7		
Age groups							
Below 20	3.4	1.8	2.6	5.5	5.1	0.658	
20-29	50.3	59.3	57.7	35.6	48.7		
30-39	22.1	16.8	19.2	31.5	15.4		
40-49	11.4	8	6.4	12.3	17.9		
50-59	8.7	9.7	10.3	11	7.7		
Over 60	4.1	4.4	3.8	4.1	5.1		
Country of birth							
Within country of residence	85.9	72.6	74.4	75.3	71.8	0.114	
Other EU country	6.7	10.6	18	16.5	15.4		
Outside the EU	7.4	16.8	7.7	8.2	12.8		
Dietary requirements							
Religious	0.6	5.3	3.8	2.7	5.1	0.009	
Allergies	3.4	2.7	10.3	12.3	7.7		
Health related	2.7	2.7	3.8	1.4	0		
None	87.9	85	66.7	74	84.7		
Other	5.4	4.4	15.4	9.6	2.6		
Household type							
Single person	17.5	23.9	26.9	34.2	10.3	0.374	
Multi person	19.5	20.3	19.3	20.5	23.1		
Lone parent children <25	2	6.2	3.8	4.1	5.1		

Couple without children <25	17.4	14.2	14.1	8.2	12.8	
Couple with children <25	32.9	25.7	26.9	24.7	28.2	
Other type	10.7	9.7	9	8.2	20.5	
Household size						
One person	12.1	17.7	20.5	24.7	12.9	0.329
Two person	32.9	27.4	32.1	24.7	23.1	
Three person	18.1	19.5	15.4	17.8	17.9	
Four person	24.8	22.1	15.4	19.2	38.5	
More than four person household	12.1	13.2	16.7	13.8	7.7	
Employment status						
Full time	69.1	54	50	67.1	53.8	0.049
Part time	30.9	46	50	32.9	46.2	
Occupation						
ISCO-08 Category 1 Managers	15.4	6.2	15.4	11	5.1	0.170
ISCO-08 Category 2 Professionals	24.8	30.1	23.1	32.9	38.5	
ISCO-08 Category 3 Associate Professionals, Technicians,	43.6	35.4	43.6	39.7	33.3	
ISCO-08 Category 4 Clerical Support	3.4	6.2	0	0	7.7	
ISCO-08 Category 5 Service and Sales	6.7	11.5	10.3	12.3	10.3	
ISCO-08 Category 6 Agriculture	0	1	0	0	0	
ISCO-08 Category 7 Craft and related Trades	2	0.9	0	0	0	
missing value	4	8.8	7.7	4.1	5.1	
Highest level of Education						
Intermediate general qualification	2.7	3.6	0	0	7.7	0.059
Maturity /vocational qualifications	24.8	9.8	23.1	20.5	7.7	

Higher tertiary education	72.5	86.7	76.9	79.4	84.6	
Participant Country						
UK	45	23	26.9	42.5	17.9	0.000
Greece	18.8	27.4	25.7	-	53.8	
Denmark	8.1	24.8	34.6	43.8	2.6	
France	28.2	24.8	12.8	13.7	25.6	

Cluster 1: Heuristic Processors

The first cluster is the largest with 33% of participants and characterised by a high preference for Traffic Light Labelling (3.27) and Brands (0.48). Traffic light labelling gives quick at-a-glance nutrition information, whilst brands are a proxy for information about other quality aspects. Additionally, traffic light labelling is generally well received and many consumers are accustomed to this type of labelling. This cluster was named heuristic processors, as easy to find data is considered and processed. Information Boxes (-1.31), Footnotes (-1.22), Quality Assurance (-0.65) and Interactive provision (-0.57) were less preferred ways of receiving food information. Employees from the UK form the biggest part of this cluster (45.1%) whilst Danish employees form the smallest part (8.1%). This cluster is predominantly female (64.4%) and has got the highest proportion of employees that do not have any dietary requirements (87.9%) for whom quick, semi-directive information is sufficient.

Cluster 2: Brand Orientated

Cluster 2, tagged, as Brand Orientated is with 25% the second largest cluster and defined through participants' choice of Brands (2.96) and Quality Assurance (1.01). In this cluster Traffic Light Labelling (-1.39), Information Boxes (-1.01), Footnotes (-0.84) and Interactive Information (-0.73) were least preferred. All countries are similarly represented in this cluster. Most employees in this cluster are aged between 20 and 29 (59.3%) and have completed higher tertiary education (86.7%). This cluster has got the highest percentage of employees with religious dietary requirement (5.3), which might make use of quality assurance to establish the suitability of food products. Food brands are prominent in consumers' everyday lives and act as a heuristic signal when making food decisions and are recognised for their effectiveness of highlighting credence quality attributes. As a salient decisional factor, perceived quality influences consumer's behavioural intention through attitudes to a positive brand image.

Cluster 3: Systematic Processors

The third cluster containing 17.3% of the participants, termed Systematic Processors, favour Footnotes on menus (1.74), Information Boxes (1.56) and Interactive Information (0.4). Systematic Processing tends to be applied when there is a greater ability and willingness to process more information. There is less preference for more directive ways of providing food information such as Brands (-2.86), Quality Assurance (-0.44) and Traffic Light Information (-0.4) as these might not provide the amount or relevance of information desired. Whilst Denmark has got the largest membership of cluster 3 (34.6%), France is the least present (12.8%). This cluster is evenly split into employees working full time (50%) and part time (50%). It has also got the highest membership of participants that have special dietary requirement such as following a particular diet not because of allergies or health reasons but out of choice (15.4%) compared to the other clusters.

Cluster 4: Independent Processors

Cluster 4, tagged Independent Processors, and encompasses 16.1% of the participants. This is the only group where four of the tested attributes have positive utility scores. In this cluster, there is a high preference for Information Boxes (2.09), Footnotes (1.45), Traffic Light Information (0.23) and Brands (0.15). Whilst in cluster 1 and 3 a distinction is made between heuristic and systematic processors, it is possible for both to occur simultaneously. A preference for information that is processed systematically is driven by motivation but this motivation can be overruled by other factors such as time pressure. Therefore, non-directive formats might be preferred, but semi-directive systems are also appreciated. Interactive Information (-3.61) and Quality Assurance (-0.29) were less popular ways of providing food information. This cluster is mainly female (65.8%) and although a high amount of employees in this cluster have not got any special dietary requirements (74%), it is the cluster with the highest amount of employees suffering from allergies (12.3%). There is a similar proportion of Danish (43.8%) and UK employees (42.5%) in this cluster, whilst there are no employees from Greece.

Cluster 5: Tech-savvy

The last cluster is with 8.6% the smallest cluster and indicates high preferences for Interactive Information (4.51) and Quality Assurance (0.38). Therefore, this cluster is termed Tech-savvy. Hereby, Traffic Light Labelling (-1.7), Information Boxes (-1.33), Footnotes (-1.13) and Brands (-0.73) where less preferred. The Tech-savvys are the only group that has got a higher proportion of men (51.3%) compared to women (48.7%). Although this cluster has got a high proportion of employees aged 20-29 (48.7%), there are also more people aged over 60 (5.1%) in this cluster compared to the other groups. This cluster has got a high Greek membership (53.8%) but a low membership of Danish

employees (2.6%). Smartphone applications and technology are hugely present in consumers' everyday lives. This different approach to information provision opens new channels of communication between food producers and consumers. One of the possible benefits consumers see in this type of information provision is a greater opportunity for personalisation.

The different Clusters are illustrated in Figure 2 describing the segments of identified food information provision. Cluster 1, 2 and 5 stand out through their high preference towards Traffic Light Labelling, Brands and Interactive Information. The differences between Clusters for Information boxes, Quality Assurance Logos and Footnotes on menus however, are slight.

FIGURE 2 - ILLUSTRATION OF THE DIFFERENT CLUSTERS
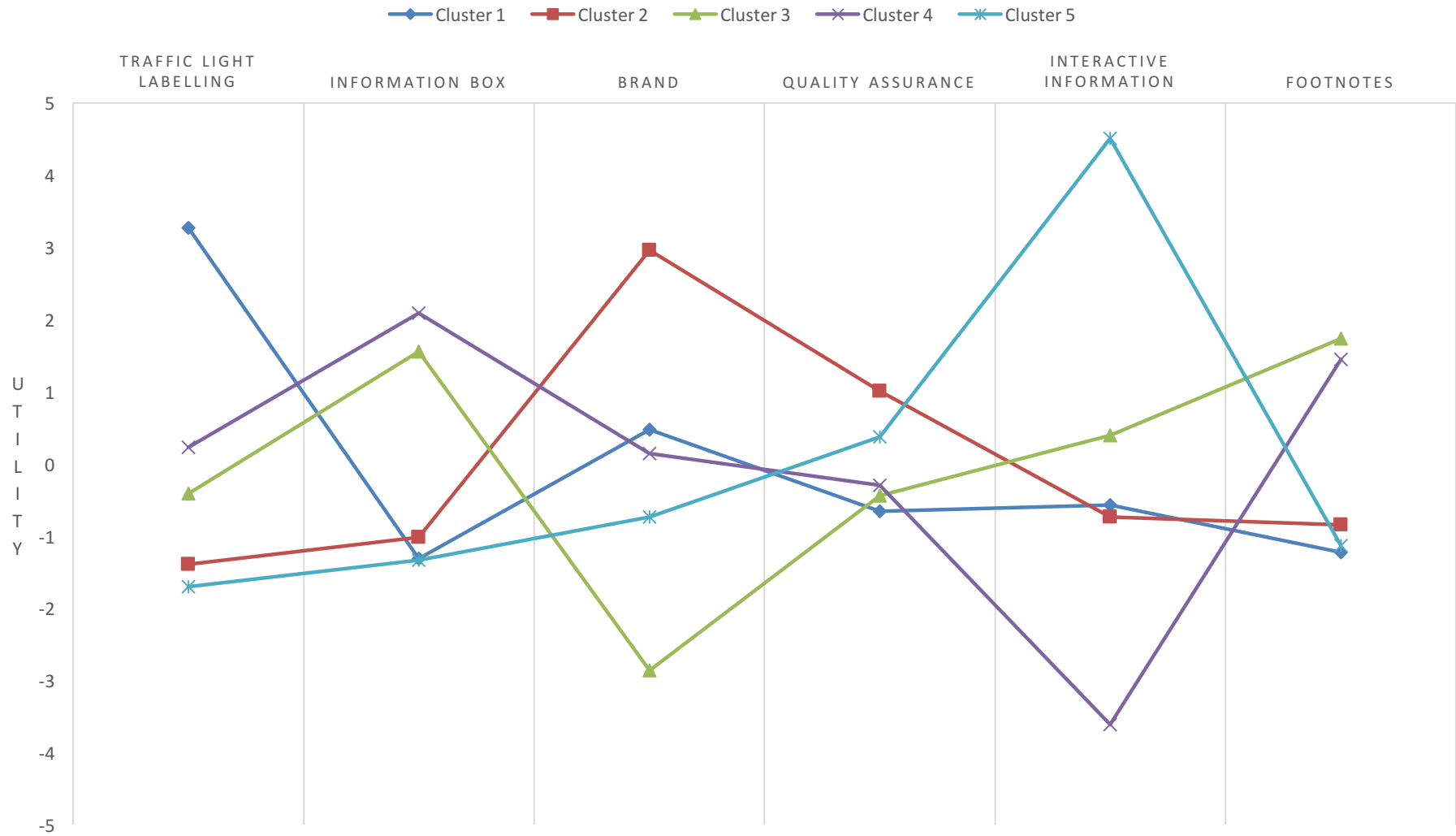
Discussion

Food choice is a complex phenomenon, influenced by the characteristics of the chosen food, characteristics of the consumer making the choice and the context in which the choice is made (Machín et al. 2014). Results of this study show that food choice in a canteen is not only influenced by underlying criteria of importance and characteristics of the food itself but also context dependent. Participants expect inferior quality of food based on their previous experiences but accept this is due to time constraints and the convenience of eating onsite. Nevertheless, the canteen is valued by employees because it provides a basis for interaction with other colleagues and the opportunity to take a break. The influence of convenience over other factors directing food choice has previously been recognised and plays an important role in the selection of food at work (Kamphuis et al. 2015). Notwithstanding, depending on the context, salient values such as taste and nutritional content are also compared and negotiated. Food choice in public sector foodservice relates to a meal rather than to individual ingredients, which differs from food choice made in a retail setting. Therefore, there is a stronger reliance on experience and visual appearance of the meal compared to choice made in a retail environment where full information is provided on the label.

Food scandals can have an effect on food choice; the horsemeat incident and outbreaks of bacterial contamination of food are on consumers` minds for the duration of media coverage (Premanandh 2013). Although this influence is short-lived, there is a temporary cessation of certain food groups such as processed meats. Food choice therefore tends to be based around the avoidance of certain products and influenced by habit, especially choosing dishes that have been tasted before and are perceived as safe. However, this decision currently is not based on an informed evaluation of foods on offer. Consequently, foods high in salt and saturated fats such as chips and fried foods are chosen based on the assumption that they are safe to eat and additionally will taste good. Although people may be looking for healthy dishes, having adopted a strategy to avoid foods that are perceived to be of an inferior quality adds to the conflict of making a decision between healthy and indulgent food (Mai and Hoffmann 2015). In the absence of available information, making an informed choice is difficult and takes effort on the side of the consumer. It is easier to select dishes that are known, tried and tested.

Greater information provision is welcomed and even if this information is not being utilised it provides transparency and reassurance for the consumer. From a public health perspective, providing nutritional information at the point of purchase can provide the framework for measured food choice decisions (Geaney et al. 2013). However, nutrition information does not always lead to a

major change in actual behaviour (Swinburn et al. 2011) and often only receives limited attention (Drichoutis et al. 2005).

From the results, it is evident that, Value for Money ie. cost, Nutrition and Naturalness are key elements of information that consumers require to be able to make a conscious decision about dish selection and this is the same across the UK, Greece, Denmark and France. Within the criteria identified from the focus groups, it is possible to align consumers to cluster groups such as Value Driven, Conventionalists, Socially Responsible, Health Conscious and Locavores. In the UK, the biggest cluster was aligned to Conventionalists, suggesting that most criteria are valued and this population are conventional in their approach. In Greece, consumers are driven by Value for Money, which may reflect the economic situation that is currently prevalent within that country. In Denmark, respondents showed a high alignment with health consciousness again reflecting the philosophy of a consumer who values a balanced diet. Lastly, in France, local sustainability featured as important.

With regard to food information provision, all respondents identified Traffic Light labelling, Information box and Quality Assurance as key elements used for optimal dissemination and again this is the same across the UK, Greece, Denmark and France. Within the criteria identified from the literature, it is possible to align consumers to cluster groups such as Heuristic Processors, Brand orientated, Systematic Processors, Independent Processors and Tech-savvy. In the UK, the biggest cluster was aligned to Heuristic Processors, those that value easy to find data and like to make sense of it. In Greece, respondents indicated a high preference for Interactive Information, while none could be classified as Independent Processors (a mixture of heuristic and systematic processing). Alternatively, in Denmark, there was a high alignment by consumers to the Independent Processor cluster. Lastly, in France the cluster Heuristic Processors manifested itself as the most populated.

Consumers are ambivalent; whilst some welcome the provision of nutrition information, others are either not making use of it due to a lack of understanding or a lack of interest (Visschers et al. 2013). The profile of consumers using labels varies greatly between a preference for directive, simple and graduated labels such as quality assurance logos and non-directive labels, such as Information boxes as well as chromaticity, ie. colour coded Traffic Light system (Bialkova and van Trijp 2011). Nevertheless, improving understanding of information through the use of clear labels can have an effect on the dietary behaviour of those consumers who show an interest although tend not to influence those with little interest in food information (Visschers et al. 2013).

Even so, food labelling is not only a tool to communicate factual information but also acts as a representative of the food system (Bildtgard 2008). Consequently, consumers make inferences from labels about the foodservice operator that it is trustworthy through transparency and their willingness to share information.

Menu labelling not only portrays food information but can also act as a key communication tool between operator and consumer and is important for the establishment of a relationship to foster trust. Therefore, as well as the literal message which is of relevance, it can also be used as a vehicle to make judgements about the food operators (Tonkin 2015) in the absence of face to face contact (Giddens 1994).

Although consumers are guided towards making healthier choices, the right to choose is not withheld. Enriching menus in canteens achieves a greater acceptability compared to restricting choice and removing unhealthy dishes completely (Jørgensen et al. 2010). Policies incorporating information provision not only enable consumers to make healthier choices but also allow caterers to demonstrate transparency and foster consumer trust. Furthermore, using the canteen as a setting for health promotion can offer a more economical option compared to interventions targeting individuals (Trogdon et al. 2009). Consequently, from a food operator point adapting strategies that foster a good relationship with their customers can also lead to a competitive advantage through its impact on promoting healthier behaviours.

Conclusion

Food purchasing habits have changed in a retail setting and when eating out commercially, leading to pressure on public sector foodservice to keep up with current consumer demands and expectations. Furthermore, the food service sector is in principle connected to both food producers and consumers which enables an influence in supply as well as a need to satisfy. Contemporary trends and this research demonstrate that consumers put a high emphasis on Value for Money, Nutrition and Naturalness communicated through the medium of Traffic Light Labelling, Information Box and Quality Assurance logos. However, these trends are not always reflected when eating at work and there is currently very little information provided to the consumer despite a growing demand for more transparency. Consumers have the right to be provided with information about what they eat especially in light of the new EU regulation 1169/2011 where information on allergens has to be available through either labelling on the menu or availability on request. Understanding key drivers of food choice can allow food operators to align their service with consumer preferences across different market segments. Results from this study begin to fill a gap in the current knowledge of consumer requirements in canteens. Information provision in the food retail industry

makes people believe that they are being given important evidence and currently there is a consumer demand for this information to be translated into eating out of home. Although consumers may not make use of all information provided, they are reassured by its presence. It is also a way for foodservice operators to demonstrate transparency and strengthen the relationship with their customers. This relationship can be encouraged through various forms of providing food information which when combined can enable operators to reach out to different segments of their consumers. The challenge for the foodservice industry is to provide products and services that facilitate and enhance positive food choice in all population segments especially in a canteen where meals are taken on a consistent basis.

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