



Marie Skłodowska-Curie Actions (MSCA)
Research and Innovation Staff Exchange (RISE)
H2020-MSCA-RISE-2014

DELIVERABLE Work Package 6

D6.2 Synthesising and benchmarking the attributes of a successful human-smartphone/tablet interface in preparation for commercialisation.

Lead Contractor for the D6.2
University of Copenhagen

Final Report

June 2018

ACKNOWLEDGEMENT

The authors gratefully acknowledge the European Community's financial support under the RISE Programme for Support for training and career development of researchers (Marie Curie).

DISCLAIMER

The views expressed in this publication are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use that might be made of the information. The information in this document is provided as it is and no guarantee or warranty is given that the information is fit for any particular purpose. The user thereof uses the information at its sole risk and liability.

Investigators (FoodSMART Team)

- Denmark (DK) - WP Leader: Armando Pérez-Cueto, Yang Chen
- France (FR): Agnès Giboreau, Laure Saulais
- Greece (GR): Ioannis Mavridis
- United Kingdom (UK): Heather Hartwell, Jeff Bray
- Austria (AT): Manfred Ronge

Partners in alphabetic order

- Bournemouth University (Bournemouth – UK)
- Institut Paul Bocuse (Lyon – FR)
- Ronge & Partner GmbH (Badan – AT)
- University of Copenhagen (Copenhagen – DK)
- University of Macedonia (Thessaloniki – GR)

Contents

PREFACE	5
Executive summary	6
INTRODUCTION	7
MATERIALS AND METHODS	8
RESULTS	10
Discussion	18
CONCLUSIONS	19
REFERENCES	20
Appendix 1	21
Appendix 2	26
Appendix 3	33

PREFACE

The research reported here was supported by Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE) programme which aims to promote international and inter-sector collaboration through research and innovation staff exchanges and advance science and the development of innovation through sharing knowledge and ideas from research to market and vice versa – FoodSMART Project ID: 643999. The objective of this project is to develop an innovative technical (ICT) menu solution that enables informed consumer food choice while dining out that takes into account individual characteristics, product cues as well as environmental cues. This report disseminates Work Package 6 – Field Study (KU). The objective of WP6 is to conduct a field study across age groups and organisational settings (i.e. universities and workplace canteens) in Denmark, France, Greece and the UK so as to obtain consumer insights through data mining and relevant measured/analytical approaches as well as synthesising and benchmarking the attributes of a successful human-smartphone/tablet interface in preparation for commercialisation. The content of this report refers specifically to the commercialisation aspect of the work package. University of Copenhagen (KU) coordinated the work, which is supported by Bournemouth University, Institut Paul Bocuse, Ronge & Partner GmbH and University of Macedonia. Correspondence should be addressed to Federico J. Armando Perez-Cueto, University of Copenhagen, Department of Food Science, Rolighedsvej 26, 1958, Frederiksberg C, Denmark. Tel. +45 60 74 33 90. Email: apce@food.ku.dk.

Copenhagen, June 2018

Executive summary

This report aims to translate the latest results from academic research into a greater understanding of human-computer interaction in real life settings and inform a compelling commercial opportunity. A study was designed to address the target questions in WP6 by comparing participants who have never used the FoodSMART app with those having used the app. A total number of 1031 adults from Denmark, France, Greece and the UK participated in the study. The study was conducted in two organisation settings (university canteen and workplace canteen) in four countries. During the study, a questionnaire designed to capture specific consumer insights was given to both the test and control groups, where the test group also experienced the FoodSMART app in a real-life setting. A ranking of specific attributes of app interface across groups and countries was produced through factor analysis, and subsequent investigation of general attributes was performed based on the previous results. The findings show that consumers value the quality of the canteen food more than other attributes such as app functions, information provision and food-related ethical issues. This provides future direction for app commercialisation that emphasises food quality, especially in food hygiene, sustainability, safety and freshness. Other specific attributes were highly country dependent. The commercialisation strategy in the four countries should be adjusted according to local consumers' preferences.

INTRODUCTION

Since the introduction of the internet to people's homes and the rapid rise in the number of people owning internet-enabled smartphones and tablets, there has been increased interest in using this technology as a method of delivering behavioural change such as dietary behavioural change (Webb et al. 2010). This technology is mainly experimental and has shown both promise and potential pitfalls (Murray 2012), but it seems inevitable that with the continuing proliferation of technology in our everyday lives, tablets and smartphones will form an essential part of the clinical behavioural research for the foreseeable future. The potential for using phones and tablets for behavioural change is significant. Devices such as smartphones and tablets have become rapidly integrated into everyday life, and the latest figures in the UK indicate that more than 90% of 16-24-year-olds own a smartphone (Ofcom 2015). With such high levels of smartphone use, especially among the young, and the potential for automated, instant and free tracking of behaviours as opposed to other expensive interventions, it is clear why the smartphone and tablets have proven to be such an accessible means of applying behavioural interventions in the scientific literature in recent years. Smartphone and tablet interventions are increasingly popular due to the increase in coverage and have been proven to be extremely effective in health behaviour changes in various areas (Muessig et al. 2015; Donker et al. 2013; Ehrenreich et al. 2011).

A study has shown that fat and calorie intakes are significantly higher when dining out compared to eating at home, which can potentially lead to a rise in the prevalence of obesity (Bohm and Quartuccio, 2008). The use of smartphone and tablet technology such as developing an innovative technical (ICT) menu solution that enables informed consumer choice when eating out that takes into account different individual characteristics, as well as product and environmental specific cues, can be a potential method of reducing the economic and sociable costs of unhealthy food choices. This also provides further insights into potential commercialisation opportunity (Lowe et al., 2013).

Based on the findings from the previous work packages and other relevant evidence, the prototype of an ICT menu solution (FoodSMART) was developed. WP6 aims to investigate whether the current prototype is genuinely effective by testing it in the field across age groups and organisational settings (i.e. universities and workplace canteens) in Denmark, France, Greece and the UK. The results of WP6 provide further inputs in consumer insights in four countries as well as benchmarking of attributes for potential commercialisation in the future which can be a starting point for guiding consumers into healthier and more sustainable food choices in canteens through mobile technologies.

MATERIALS AND METHODS

A study was developed to address the target questions in WP6 by comparing respondents who have never used the FoodSMART app with those who have used the app. The primary aim of the study is to evaluate consumer acceptance and potential use of the app in the field in Denmark, France, Greece and the UK. A questionnaire was designed and then introduced into the study to capture consumer responses in both control and test groups. The intention of using a control group is to present the app concept in a theoretical way (or with a video) and thereafter ask what aspects of the app would be relevant to the participants for further development via questionnaire. In contrast, consumers were able to use the app in real-time during test situations. The survey evaluates whether consumers find it useful and express their intention to use the app. After that, data collected from the study was analysed by various statistical methods to synthesise and benchmark the attributes for successful commercialisation.

Questionnaire Design

The questionnaire was first conceptualised based on the findings from WP2 that identified consumers' preferences and needs for information and decision making in canteen situations. After which, it was further modified based on expert opinions as well as in-depth interviews with consumers to form the initial structures and core questions to assess the target objectives. It then went through a pre-test phase to evaluate its viability and reliability for further revisions. The final questionnaire was formalised to investigate consumer behaviour with the following questions in order to target specific consumer insights (Appendix 1 & 2):

- Questions 1-11 are a consumer evaluation of the app after use.
- Questions 12 – 15 are basic sociodemographic information plus subjective health statement.
- Questions 16 – 20 are the frequency of use of the canteen for different purposes.
- Questions 21 – 31 are personal importance given to specific features of the food provided by the canteen.
- Questions 32 – 38 are the needs of information from the foodservice provider.
- Questions 39 – 43 are overall concerns on food issues.
- Question 44 is self-identification as omnivore, vegetarian, vegan or pescatarian.

Except for the questions on basic sociodemographic information, health statement, the frequency of canteen usage and self-identification (question 12-15, 16-29, 44), the other 34 questions were adapted to the Likert 5-point scale: 1. Strongly disagree, 2. Disagree, 3. Neither agree nor disagree, 4. Agree, 5. Strongly agree. The Likert scale allows more precise capture of consumer insights with continuous variables. The control variables are the same in both test and control situations, allowing the comparison of segments.

Logistics and Data Collection

The study was conducted in either university or workplace settings of all four countries with the following timelines and instruments:

Country	Timeline (Control groups)	Timeline (Test Groups)	ICT used (Smartphone/tablet)	Organization settings
Denmark	29/1/2018-30/1/2018	21/3/2018-23/3/2018	Tablet	University Canteen
France	20/2/2018	20/2/2018	Tablet	Workplace Canteen
Greece	26/1/2018-30/1/2018	9/1/2018-12/1/2018	Tablet	University Canteen
UK	9/10/2017 16/10/2017 23/10/2017	9/10/2017 16/10/2017 23/10/2017	Tablet	University Canteen

Table. 1 Timeline, instruments and organisation settings in four countries

Each FoodSMART centre contacted catering providers for the study explanation and they decided whether they were interested in participating. Afterwards, dish information from each participating canteen was obtained and incorporated into the app layout for the later field tests. A standardised protocol was applied to the data collection in all countries with minor adjustments to adapt to real-time situations. On the control day, the app was introduced to consumers in the canteens either verbally or using the video, followed by the completion of control questionnaires by consumers to provide information regarding their views related to the app and canteen food with the target of the collection of the minimum total sample of 100 observations per country. On the test day, consumers completed the test questionnaires after using the application that was modified in accordance to the canteen menu of that day with the target of the collection of the minimum total sample of 100 observations per country. The recruitment of participants occurred randomly on campus or within corporate settings. Only the participants from field test countries were recruited to reduce bias from different cultural backgrounds.

Data Analysis

Principle component analysis (PCA) was used to examine the factors that concern consumers the most in both test groups and control groups of four countries. SPSS 22.0 was used for analysis of 8 datasets (4 control groups and 4 test groups). The 34 questions (question 1-11, 21-31, 32-38 and 39-43) related to the app, and canteen food and the questionnaire was analysed by PCA to obtain multiple component sets (some condensed into 8, 9 and 10). The cumulative variance contribution rate of each component set was obtained which represents the degree of interpretation of the original dataset. Every factor has a corresponding variance contribution rate that corresponds to the

original dataset. It can then be divided by the cumulative variance contribution rate to obtain the weight of each factor, which is also the weight of the corresponding question of that factor. The higher the weight of a factor, the more importance/influence that question has on a specific group of individuals in a particular country, to explain the differences in food choices across groups and nations.

For more precise visualisation of the data and better characterisation of the attributes, the 34 questions associated with the app and canteen food were re-ordered into questions 1 to 34 according to the previous sequence. They were divided into 4 clusters according to the targeting of consumer information: Cluster 1 (question 1-11) represents the general app functions and interface; Cluster 2 (question 12-22) represents the properties and qualities of the canteen food; Cluster 3 (question 23-29) describes the information provided regarding canteen food; Cluster 4 (question 30-34) describes the ethical issues related to food. The degree of agreement of each question (Individual DoA) was determined by the average of numerical response (from scale 1 to 5) of each question transformed into a centesimal system. After that, the degree of agreement for each cluster (Cluster DoA) was calculated by averaging the weight of that question obtained from the previous PCA times degree of acceptance of all the questions in that cluster. The higher the value, the more importance it has on consumers' preferences. This method illustrates a more holistic picture of the attributes that consumers value the most and provides more explicit directions for future commercialisation.

RESULTS

The sociodemographic characteristics and health status of the sample population are presented in Table 2 below. A total number of 1031 consumers participated in the study across four countries with ages ranging from 18 to 61 years. The percentage of females in all countries is generally higher than that of males. In Denmark, Greece and the UK, the mean age is around 21 years because the study was conducted on campus and most of the participants are from the student communities. In France, the mean age is a lot higher (38.4 years) because the study was conducted in a company canteen. The educational level in all countries are generally secondary, or university level and most of the participants considered themselves having a Good or above health status. The majority of participants are omnivores, while Denmark has the highest proportion of non-omnivore (i.e. vegetarian, vegan, pescetarian and flexitarian) among four countries. The vegetarian population is also significantly higher in Denmark and UK than France and Greece.

	Denmark (n=305)	France (n=99)	Greece (n=343)	United Kingdom (n=284)
Gender (%)	Female-63.6 Male-36.4	Female-58.6 Male-41.4	Female-58.9 Male-41.1	Female-61.3 Male-38.7
Age (years)	23.49 (SD=0.32) (Range 18-55)	38.4 (SD=1.38) (Range 20-61)	20.47 (SD=0.13) (Range 18-36)	20.36 (SD=0.21) (Range 18-46)
Education Level (%)	Secondary- 40.3 University-59.7	Elementary-11.1 Secondary-43.4 University-45.5	Elementary-0.9 Secondary- 88.0 University-11.1	Secondary-60.2 University-39.8
Health Status (%)	Poor-2.6 Fair-15.1 Good-53.1 Very good-29.2	Poor-5.1 Fair-23.8 Good-45.5 Very good-21.2	Poor-1.7 Fair-12.0 Good-54.5 Very good-31.8	Poor-4.2 Fair-19.4 Good-52.5 Very good-23.9
Dietary preference(%)	Omnivore-77.4 Vegetarian-6.6 Vegan-2.9 Pescetarian-4.9 Flexitarian-8.2	Omnivore-87.9 Vegetarian-1.0 Vegan-2.0 Pescetarian-0.0 Flexitarian-9.1	Omnivore-87.8 Vegetarian-1.6 Vegan-0.0 Pescetarian-1.1 Flexitarian-9.6	Omnivore-83.1 Vegetarian-5.6 Vegan-2.5 Pescetarian-4.9 Flexitarian-3.9

Table. 2 Sociodemographic information and dietary preference of participants in the study across countries.

The frequency of canteen usage was captured in the survey with a scale from 1 (lowest usage) to 5 (highest usage). In the survey (Appendix 1 & 2), the frequency for breakfast and the hot meal in the canteen was measured per working week, with scale 1 representing one day or less per week and scale 2 to 5 representing an ascending frequency of usage from 2 days a week to 5 days a week. The frequency for the different beverages and pastry was measured per day, with scale 1 representing rarely or never and scale 2 to 5 representing an ascending frequency from 1 time per day to 4 times per day. The results show that most of the participants only have 1 to 2 breakfasts or hot meals in the canteen per working week and the frequency for daily purchases for beverages and pastry is also very low among all participants (less than 1 time per day).

	Denmark (n=305)	France (n=99)	Greece (n=343)	United Kingdom (n=284)
Breakfast	1.30 (SD=0.04)	1.65 (SD=0.12)	1.16 (SD=0.04)	1.30 (SD=0.04)
Hot meal	1.76 (SD=0.06)	1.16 (SD=0.06)	1.96 (SD=0.10)	1.62 (SD=0.52)
Coffee & pastry	1.71 (SD=0.05)	1.00 (SD=0.00)	1.37 (SD=0.05)	1.79 (SD=0.05)

<i>Sugary beverages</i>	1.34 (SD=0.04)	1.62 (SD=0.07)	1.10 (SD=0.03)	1.51 (SD=0.05)
<i>Water & fresh juice</i>	1.57 (SD=0.05)	1.71 (SD=0.07)	1.60 (SD=0.07)	1.8 (SD=0.06)

Table. 3 The mean frequency for canteen usage across four countries (scale 1-5)

Individual Factors – Specific Attributes

In the results showing the influence of individual factors on consumers' decision making, the higher the weighting of the question, the higher its rank and the more influence it has on consumers' behaviour. For example, an individual factor that is ranked 1 (marked in red colour) means it has the highest weighting and influence among all the factors. The weightings are then ranked and summarised in Table 4 below (full results available in Appendix 3).

Denmark

Most of the top individual factors of the Danish participants in both control and test groups are related to the properties and qualities of the food, such as the safety, freshness, hygiene and sustainability of the canteen food. Ethical issues related to food also concerns Danish consumers hugely. Questions containing information such as animal and human rights, water shortage, sustainability and healthy eating were all ranked 1 in the test group and 2 in the control group. The subtle difference in ranking is possibly due to the change in environment. However, we can observe from the results that ethical issues are significant to Danish consumers in general. On the other side, confidence and training regarding app usage, information about allergens are the least important factors.

France

In the results, there is an interesting shift of the most critical factors (rank 1) from the app functions in the control group and interface to the canteen food properties and qualities in the test group that can be explained by various possible causes. Questions regarding app functions and interface such as a system that is simple, easy to use/learn and consistent as well as integrated functions were ranked top in the control group, but 2 in the test group. Meanwhile, questions regarding canteen food qualities and properties such as healthiness, taste, sustainability, hygiene, freshness and personal preference fits were ranked 1 in the test group but ranked 2 to 4 in the control group. Nevertheless, the ranks of the other groups are still relatively consistent, especially regarding app functions and interface. The factors that French consumers have the least concern are about scientific accuracy, personalised information and training for app usage. The information provided regarding canteen food has less influence in general on consumers than other factors.

Greece

Similar to the results in Denmark, the factors that concern Greek participants the most are concentrated in the questions focusing on canteen food qualities and properties. In particular on the healthiness, taste, hygiene, sustainability and freshness. Furthermore, easily understandable information regarding canteen food was also ranked top in both control and test groups. There are some variations in the results comparing both groups. For example, the test group cares more about the accuracy and personalised information as well as the variety and personalised canteen food (rank 1) more than the control group (rank 4-6). The factors that have the least influences varies between two groups. The chef recommendation, discount and app learning have the least impact on the control group while chef recommendations, availability of plant-based dish and integrated app functions have the least impact on the test group.

United Kingdom

The results for the ranking of top factors for UK participants are mostly consistent in both groups, which consists of safety, taste, sustainability, freshness and the variation of food provided. The subtle difference in ranking of easily understandable information is still somewhat consistent (rank 1 in control group and 2 in test group). However, the test group participants are more aware of the environmentally friendly aspect of the food (rank 1) compared to the control group participants (rank 6). Both groups do not think the confidence of using the app is an essential factor while the control group considered the healthiness of the food and healthy eating lifestyle are the least important factor and the test group considered locally sourced food and global warming the least important factor.

Question No.	Acronym	Question	UK Control	UK Test	DK Control	DK Test	GR Control	GR Test	FR Control	FR Test
1	appfreq	I think that I would like to use a system like this frequently	7	5	5	4	3	7	9	2
2	appsim	The FoodSMART app system should be simple	5	3	6	2	7	2	1	2
3	appeasu	The FoodSMART app system should be easy to use	5	3	6	2	7	2	1	2
4	appfunc	The FoodSMART app's functions should be well integrated	2	7	3	2	6	8	1	2
5	apptech	I would not want the need of a technical person to be able to use this system	2	6	3	2	1	6	1	2
6	appcons	The FoodSMART app system should be consistent	2	3	3	2	6	6	1	2
7	appeasl	The FoodSMART app system is easy to learn	2	3	3	2	9	7	1	2
8	appmanu	The FoodSMART app system should be widely (manageable) to use	2	3	3	2	6	2	1	2
9	appconf	I would need to feel confident about using the FoodSMART app for actually using it	8	8	8	9	6	2	6	7
10	applearn	I would prefer not to learn a lot of things before I could get going with the FoodSMART	2	2	8	7	9	2	7	8
11	appuse	I believe the FoodSMART App will be useful to customers in a canteen setting to help them to get informed about dishes offered	7	7	6	4	3	7	4	4
12	safe	It is important for me that the food provided by the canteen is safe	1	1	1	1	1	3	2	1
13	healthy	It is important for me that the food provided by the canteen is healthy	8	5	9	5	1	1	2	1
14	fasty	It is important for me that the food provided by the canteen is tasty	1	1	1	4	1	1	4	1
15	fenvfr	It is important for me that the food provided by the canteen is environmentally friendly	6	1	2	1	5	1	3	1
16	hygie	It is important for me that the food provided by the canteen is prepared with care for hygiene	1	1	1	1	1	1	2	1
17	fsust	It is important for me that the food provided by the canteen is sustainable	1	1	2	1	1	1	3	1
18	ffresh	It is important for me that the food provided by the canteen is fresh	1	1	1	1	1	1	2	1
19	flocal	It is important for me that the food provided by the canteen is locally sourced/produced	4	8	4	6	5	6	3	1
20	fpersneed	It is important for me that the food provided by the canteen responds to my personal needs and preferences	4	1	4	8	4	1	4	1
21	pdish	It is important for me that the canteen provides at least one plant-based dish option	4	2	4	1	5	10	4	4
22	fvaried	It is important for me that the food provided by the canteen is varied	1	1	1	3	4	1	7	4
23	infacc	It is important for me that the information provided by the canteen is scientifically accurate	4	2	4	9	6	1	8	5
24	infpers	It is important for me that the information provided by the canteen is personalised to my needs	4	2	4	3	4	1	9	5
25	infeasunc	It is important for me that the information provided by the canteen is easy to understand	1	2	1	3	1	1	8	5
26	infchefrec	It is important for me that the canteen informs me about the day's or chef's recommendations	7	2	5	3	8	9	5	5
27	infdisc	It is important for me that the canteen informs me about special offers and discounts	7	2	5	7	8	4	5	5
28	infcalor	It is important for me that the canteen informs me about the calories in the dishes	6	2	5	2	3	4	5	6
29	infallerg	It is important for me that the canteen informs me about allergens	6	2	7	10	5	5	5	3
30	genheahea	I am usually concerned about health and healthy eating	8	5	2	1	2	1	2	3
31	genenv	I am usually concerned about global warming and sustainability	3	9	2	1	2	3	6	3
32	genanright	I am usually concerned about animal rights	3	4	2	1	2	3	3	3
33	genhumirig	I am usually concerned about human rights	3	4	2	1	2	3	6	3
34	genwish	I am usually concerned about water shortages	3	4	2	1	2	3	6	6

Table. 4 Ranking of individual factor's weightings across test and control groups in four countries.

Clustered Factors – General Attributes

To gain a more holistic picture of the attributes, the individual factors/questions were clustered into four separate clusters:

- Cluster 1 (question 1-11): general app functions and interface.
- Cluster 2 (question 12-22): properties and qualities of the canteen food.
- Cluster 3 (question 23-29): information provided regarding canteen food.
- Cluster 4 (question 30-34): ethical issues related to food.

The degree of agreement of each cluster (Cluster DoA) was determined by the average of the weight of each question times the degree of agreement for individual questions (Individual DoA) in that cluster (see Methods). The higher the value of cluster DoA, the more importance of that cluster as a whole mean to the consumers. The highest cluster DoA was marked in yellow colour for each group of each country, representing the highest weighting relative to other clusters and the potential for most significant impact on the subsequent consumer's behaviours. The individual country results presented in Table 5 below are nicely coherent with the previous results on the importance of individual factors and provide a more precise representation of attributes for future commercialisation of the FoodSMART app.

Denmark

The most significant cluster DoA for both control and test group in Denmark, 76.46 and 86.17 respectively, sit in cluster 2, which means the consumer in Denmark value the properties and qualities of the canteen food the most. This is followed by cluster 4 which represents the awareness of ethical issues related to food. Cluster 3 for canteen food information came third in the control group and fourth in the test group while cluster 1 for general app functions and interface came fourth in the control group and third in the test group.

France

The highest cluster DoA for France lies in cluster 2 of the test group and cluster 1 of the control group while the second highest cluster DoA was found in cluster 2 and cluster 4 respectively. Cluster 1 which came third in the test group, has similar DoA as the cluster 4, 42.05 and 45.03 respectively. The third highest cluster DoA for the control group is in cluster 4. Cluster 3 which describes the canteen food information, has the lowest cluster DoA in both control and test groups.

Greece

Cluster 2 for both groups in Greece has the most prominent cluster DoA, which are 76.77 and 73.30 respectively. The DoA for the rest of the control group clusters is relatively similar with 59.28 for cluster 4, 54.40 for cluster 3 and 52.44 for cluster 1, while the DoA for cluster 2 is significantly higher. The second to fourth cluster DoA rankings for the Greek test groups are cluster 3, cluster 4 and cluster 1.

United Kingdom

The rankings of cluster DoA are the same in both control and test groups in the United Kingdom. Similar to the results in Denmark and Greece, highest DoA lies in cluster 2 for both groups in the UK. The second highest DoA was found in cluster 3 while the third highest DoA was found in cluster 1. Lastly, cluster 4 has the lowest cluster DoA in both UK groups.

The overall picture of the clustered factor (Table. 5) shows that most of the consumers in all four countries value the properties and qualities of canteen food the most, as the DoA for cluster 1 of the control groups of Denmark, Greece, UK and all the test groups are the highest among the rest of the clusters. The rankings cluster DoA for the other three clusters varies among four countries. For example, cluster 4 has the second highest DoA in both Danish groups while that of the UK groups was the lowest, which means Danish consumers care about food-related ethical issues more than the consumers in the UK. At the same time, the rankings of the individual factors (Table. 4) shows more specific consumer preferences, so targeting features can be added to the interface to meet consumer needs. For instance, even though cluster 2 was ranked the most significant cluster among consumers, some of the factors within cluster 2 such as food safety, freshness, sustainability and hygiene are generally ranked higher than other factors such as plant-based, personal preference and locally sourced food.

Question No.	Acronym	Question	UK Control	UK Test	DK Control	DK Test	GR Control	GR Test	FR Control	FR Test
			Individual DoA	Individual DoA	Individual DoA	Individual DoA	Individual DoA	Individual DoA	Individual DoA	Individual DoA
1	appref	I think that I would like to use a system like this frequently	72.54	69.86	69.41	59.19	71.55	73.77	72.54	57.81
2	appsim	The FoodSMART app system should be simple	89.72	82.11	89.61	85.05	85.78	82.47	89.72	73.44
3	appasu	The FoodSMART app system should be easy to use	92.68	82.96	91.76	88.48	89.20	84.03	92.68	73.75
4	appinc	The FoodSMART app's functions should be well integrated	88.59	43.52	87.65	84.65	88.99	85.58	88.59	48.44
5	appchd	I would not want the need of a technical person to be able to use this system	88.59	73.80	86.27	82.83	91.44	76.88	88.59	69.06
6	appcon	The FoodSMART app system should be consistent	87.75	76.06	85.78	84.24	85.99	77.40	87.75	70.00
7	appesl	The FoodSMART app system is easy to learn	88.31	81.83	85.59	84.65	78.82	85.84	88.31	72.19
8	appmanu	The FoodSMART app system should be widely (manageable) to use	88.87	78.87	87.75	81.62	87.59	82.86	88.87	71.56
9	appconf	I would need to feel confident about using the FoodSMART app for actually using it	79.72	66.06	77.06	68.08	72.83	78.57	79.72	57.81
10	applearn	I would prefer not to learn a lot of things before I could get going with the FoodSMART	79.44	70.42	77.35	78.59	61.82	83.90	79.44	70.63
11	appuse	I believe the FoodSMART App will be useful to customers in a canteen setting to help them to get informed about dishes offered	85.35	83.52	83.73	77.78	82.89	88.96	85.35	71.88
12	fsate	It is important for me that the food provided by the canteen is safe	92.68	88.17	92.65	93.13	93.80	95.06	92.68	91.12
13	fhlethy	It is important for me that the food provided by the canteen is healthy	85.21	80.56	84.41	84.04	88.45	93.12	85.21	92.70
14	ftasty	It is important for me that the food provided by the canteen is tasty	90.85	86.20	90.88	90.71	89.52	92.47	90.85	89.52
15	fenfr	It is important for me that the food provided by the canteen is environmentally friendly	85.77	80.00	82.55	80.00	77.86	82.99	85.77	86.35
16	fhgig	It is important for me that the food provided by the canteen is prepared with care for hygiene	94.37	88.73	94.12	91.11	93.58	95.32	94.37	94.29
17	fsust	It is important for me that the food provided by the canteen is sustainable	84.79	80.14	82.65	82.02	82.03	90.00	84.79	84.44
18	ffresh	It is important for me that the food provided by the canteen is fresh	90.56	85.92	89.61	90.30	92.09	94.42	90.56	92.06
19	ffocal	It is important for me that the food provided by the canteen is locally sourced/produced	74.23	71.55	71.08	73.13	72.41	81.82	74.23	86.67
20	fpersneed	It is important for me that the food provided by the canteen responds to my personal needs and preferences	81.83	79.86	80.10	77.98	76.58	81.43	81.83	78.41
21	fpish	It is important for me that the canteen provides at least one plant-based dish option	88.87	85.07	80.98	81.21	75.94	84.94	88.87	89.21
22	fvared	It is important for me that the food provided by the canteen is varied	81.55	77.04	88.67	86.46	84.71	87.14	81.55	79.05
23	fiacc	It is important for me that the information provided by the canteen is scientifically accurate	83.66	77.04	82.86	76.57	81.07	81.95	83.66	72.38
24	fiapers	It is important for me that the information provided by the canteen is personalised to my needs	77.61	73.94	75.17	66.67	72.94	79.35	77.61	86.98
25	fiaseasy	It is important for me that the information provided by the canteen is easy to understand	87.32	82.68	87.19	82.22	84.17	83.25	87.32	77.14
26	fiinferec	It is important for me that the canteen informs me about the day's or chef's recommendations	74.23	71.41	71.53	61.82	69.20	76.62	74.23	73.33
27	fiindisc	It is important for me that the canteen informs me about special offers and discounts	87.18	81.97	84.63	76.77	81.18	82.47	87.18	75.87
28	fiincalor	It is important for me that the canteen informs me about the calories in the dishes	80.42	73.94	76.55	61.21	71.98	81.56	80.42	84.76
29	fiinallerg	It is important for me that the canteen informs me about allergens	88.03	83.38	86.60	81.21	86.63	88.05	88.03	75.87
30	genhealea	I am usually concerned about health and healthy eating	79.44	74.65	80.79	79.80	80.32	81.69	79.44	89.52
31	genenv	I am usually concerned about global warming and sustainability	79.72	82.11	78.92	81.62	71.55	75.19	79.72	86.67
32	genanright	I am usually concerned about animal rights	80.70	79.58	79.01	76.16	69.63	74.29	80.70	84.76
33	genhumright	I am usually concerned about human rights	85.35	82.54	84.04	84.04	81.28	87.14	85.35	88.89
34	genwater	I am usually concerned about water shortages	81.13	79.86	78.33	78.79	79.36	85.19	81.13	88.25

Table. 5 The Degree of Agreement (DoA) for individual factors and four clusters across test and control groups in four countries.

Discussion

The findings of this study addressed the synthetisation of the benchmarks both general and specific attributes of a successful human-smartphone/tablet interface in preparation for commercialisation. For a smooth and successful commercialisation process of the app, one should focus on emphasising the quality and properties of the canteen food, especially for individual factors such as canteen food hygiene, sustainability, safety and freshness, which are the main factors that consumers value. Other attributes such as app functions, food information and ethical issues should be considered as well, depending on the country context. For example, Danish consumers are generally more concerned about food-related ethical issues than the other three countries, possibly due to the high percentage of non-omnivore population compared to other countries (Table.2). Therefore, more information regarding ethical issues such as environmental impact and animal welfare should be added to the app interface and the marketing strategy should be adjusted accordingly in Denmark. Specific features can be targeted too, according to consumers' preference of different country in the obtained results. For instance, personalised food information was highly valued in both control and test groups in Greece, but not in any other country. Thus specific feature targeting this aspect can be potentially attractive towards the Greek consumers. Furthermore, a similar methodology can be used to investigate consumers' preferences of specific features of the app in other EU countries, to provide a more country-specific commercialisation strategy. Lastly, further consumer data can be collected after commercialisation to detect changes in consumers' needs and improve the app through adjusted app functions and marketing strategy.

Apart from the main findings, the reason for inconsistency in results of the French population among four countries and between two groups could be that French participants have reported having trouble understanding the app introduction video used during the control situation due to language barriers, which in turn might cause difficulties in understanding the app functions and interface. Compared to the control group; the test group participants used the app after watching the introduction video. This change in experience could be the potential reason for the shift of attention from the app to the canteen food. However, the results from the opposite group still had relatively consistent results (e.g. the questions ranked 1 in the control group were all ranked 2 in the test group). This is possible because that even after using the app in real-life, the language barrier still exists as the app interface is in the English language. Participants in the French test group still experienced difficulties in navigating the app in English. Moreover, the sample size of France (N=99) is lower than the targeted sample size (100 observations for each group), and results are less consistent in a small smaller population, such that it is hard to determine the real reasons behind the change in attitudes. This could also underlie the ranking DoA of cluster 2 in the French control group,

as it was the second highest instead of the highest like every other group. Further investigations (i.e. obtain a larger sample) are needed to explain this phenomenon. Another limitation of the study is the application used during the field tests were all tablets, which could not truly reflect the consumers' responses using other applications (e.g. smartphone).

CONCLUSIONS

The study successfully benchmarked the general and specific attributes for commercialisation of the FoodSMART app. The main takeaway from the findings is to focus on providing information regarding canteen food quality, especially food sustainability, safety, hygiene and freshness. Specific features regarding app functions, interface, information provision and ethical issues need to be adapted according to the country context. Further consumer insights can be continuously tracked after the app commercialisation to adapt to changes in consumers' needs and design more personalised and country-specific products.

REFERENCES

- Bohm E. and Quartuccio N. 2008. Healthy dining restaurant nutrition program – a winning recipe for consumers, dietitians and restaurants. *Journal of the American Dietetic Association*, 108, A-112.
- Donker, T., Petrie, K., Proudfoot, J., Clarke, J., Birch, M.R. and Christensen, H., 2013. Smartphones for smarter delivery of mental health programs: a systematic review. *Journal of medical Internet research*, 15(11), p.e247.
- Ehrenreich, B., Righter, B., Rocke, D.A., Dixon, L. and Himelhoch, S., 2011. Are mobile phones and handheld computers being used to enhance delivery of psychiatric treatment?: a systematic review. *The Journal of nervous and mental disease*, 199(11), pp.886-891.
- Lowe, B., de Souza-Monteiro, D. M. and Fraser, I. (2013), “Nutritional Labelling Information: Utilisation of New Technologies”, *Journal of Marketing Management*, Vol. 9 No. 11/12, pp. 1337-1366.
- Muessig, K.E., Nekkanti, M., Bauermeister, J., Bull, S. and Hightow-Weidman, L.B., 2015. A systematic review of recent smartphone, Internet and Web 2.0 interventions to address the HIV continuum of care. *Current HIV/AIDS Reports*, 12(1), pp.173-190.
- Murray, E., 2012. Web-based interventions for behavior change and self-management: potential, pitfalls, and progress. *Medicine 2.0*, 1(2), p.e3.
- Ofcom, 2015. *Communications Market Report*. London: Ofcom.
- Webb, T., Joseph, J., Yardley, L. and Michie, S., 2010. Using the internet to promote health behavior change: a systematic review and meta-analysis of the impact of theoretical basis, use of behavior change techniques, and mode of delivery on efficacy. *Journal of medical Internet research*, 12(1), p.e4.

Appendix 1

Questionnaire for Control Groups

Dear participant,

We would be grateful if you could set your thoughts down on this form.

This study aims to critically assess consumer evaluation of the FoodSMART app. FoodSMART is an application to bridge between the consumer and the foodservice operators responsible for this canteen. It will allow you to introduce your own preferences for foods and information, and it will provide you with the dishes matching more closely your stated preferences.

If you want more information about FoodSMART, please watch the video at <https://youtu.be/roLINbLvJMA>

Your contribution to better understand consumer response and use of this app will help us to improve it, and eventually provide a better-targeted system for consumers.

Any answers you give will be kept strictly confidential.

Thank you for your time and help and valuable ideas.



Please provide your level of agreement or disagreement with the following statements before having used the FoodSMART app

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I think that I would like to use a	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
system like this frequently					
The FoodSMART app system should be simple	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
The FoodSMART app system should be easy to use	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
The FoodSMART app's functions should be well integrated	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I would not want the need of a technical person to be able to use this system	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
The FoodSMART app system should be consistent	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
The FoodSMART app system is easy to learn	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
The FoodSMART app system should be wieldy (manageable) to use	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I would need to feel confident about using the FoodSMART app for actually using it	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I would prefer not to learn a lot of things before I could get going with the FoodSMART app	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I believe the FoodSMART App will be useful to customers in a	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

Strongly
disagree

Disagree

Neither agree
nor disagree

Agree

Strongly agree

canteen setting to help them to
get informed about dishes
offered

Please mark the box that corresponds to you

- (1) I am a female
(2) I am a male

Please write your age in years

—

Please provide us with your highest educational achievement (mark the box corresponding to you)

- (1) Elementary School
(2) Secondary School
(3) University degree

I think that my health is (mark the box corresponding to you)

- (1) Poor
(2) Fair
(3) Good
(4) Very Good

On a normal working week (mark the box corresponding to you)

	Once a week or less	Two days in the week	Three days in the week	Four days in the week	Five days in the week
How frequently do you use the canteen to buy your breakfast?	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
How frequently do you use the canteen to buy a hot meal?	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

On a normal working week (mark the box corresponding to you)

	Rarely or never	Once a day or less	Two times in the day	Three times in the day	Four times in the day
How frequently do you use the canteen for a coffee + pastry/cake/cookie	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
How frequently do you use the canteen for a sugary sweetened beverage	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
How frequently do you use the canteen for acquiring drinking water or fresh pressed juice	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

Please provide your level of agreement or disagreement with the following statements (mark the box corresponding to your answer)

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
It is important for me that the food provided by the canteen is	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
safe					
It is important for me that the food provided by the canteen is healthy	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the food provided by the canteen is tasty	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the food provided by the canteen is environmentally friendly	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the food provided by the canteen is prepared with care for hygiene	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the food provided by the canteen is sustainable	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the food provided by the canteen is fresh	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the food provided by the canteen is locally sourced/produced	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the food provided by the canteen responds to my personal needs and preferences	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
It is important for me that the canteen provides at least one plant-based dish option	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the food provided by the canteen is varied	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

Please provide your level of agreement or disagreement with the following statements about your needs for information from the canteen (mark the box corresponding to your answer)

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
It is important for me that the information provided by the canteen is scientifically accurate	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the information provided by the canteen is personalised to my needs	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the information provided by the canteen is easy to understand	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the canteen informs me about the day's or chef's recommendations	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the canteen informs me about	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
special offers and discounts					
It is important for me that the canteen informs me about the calories in the dishes	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the canteen informs me about allergens	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

Please provide your level of agreement or disagreement with the following statements about your general concerns (mark the box corresponding to your answer)

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I am usually concerned about health and healthy eating	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I am usually concerned about global warming and sustainability	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I am usually concerned about animal rights	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I am usually concerned about human rights	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I am usually concerned about water shortages	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

Lastly, could you please let us know how do you see yourself as food consumer?

- (1) I am omnivore (I eat everything)
- (2) I am vegetarian (I eat plant-based and include eggs and dairy in my food)
- (3) I am vegan (I eat only plant-based foods and avoid any animal products)
- (4) I am pescetarian (I eat plant-based like vegetarians and include fish)
- (5) I am flexitarian (I eat mostly plant-based foods, but occasionally I would eat foods of animal origin)

Thank you very much for your participation! You are contributing to the provision of better information to consumers.



Appendix 2

Questionnaire for Test Groups

Dear participant,

We would be grateful if you could set your thoughts down on this form.

You have used the FoodSMART app today, and we would like to hear your opinion about the system and whether we can make improvements.

The aim of this study is to critically assess consumer evaluation of the FoodSMART app.

Your contribution to better understand consumer response and use of this app will help us to improve it, and eventually provide a better targeted system for consumers.

Any answers you give will be kept strictly confidential.

Thank you for your time and help and valuable ideas.



Could you please let us know in which canteen are you located?

- (1) UK - Bournemouth University
- (2) DK - Copenhagen University
- (3) AU- Austria
- (4) HE - Greece

Please provide your level of agreement or disagreement with the following statements before having used the FoodSMART app

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I think that I would like to use a system like this frequently	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The FoodSMART app system should be simple	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
The FoodSMART app system should be easy to use	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
The FoodSMART app's functions should be well integrated	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I would not want the need of a technical person to be able to use this system	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
The FoodSMART app system should be consistent	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
The FoodSMART app system is easy to learn	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
The FoodSMART app system should be wieldy (manageable) to use	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I would need to feel confident about using the FoodSMART app for actually using it	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I would prefer not to learn a lot of things before I could get going with the FoodSMART app	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I believe the FoodSMART App will be useful to customers in a canteen setting to help them to	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree

get informed about dishes
offered

Please mark the box that corresponds to you

- (1) I am a female
(2) I am a male

Please write your age in years

—

Please provide us with your highest educational achievement (mark the box corresponding to you)

- (1) Elementary School
(2) Secondary School
(3) University degree

What is your country of residence?

- (1) Denmark
(2) France
(3) Austria
(4) Greece

I think that my health is (mark the box corresponding to you)

- (1) Poor
- (2) Fair
- (3) Good
- (4) Very Good

On a normal working week (mark the box corresponding to you)

	Once a week or less	Two days in the week	Three days in the week	Four days in the week	Five days in the week
How frequently do you use the canteen to buy your breakfast?	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
How frequently do you use the canteen to buy a hot meal?	(1) <input type="checkbox"/>	(3) <input type="checkbox"/>	(2) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

On a normal working week (mark the box corresponding to you)

	Rarely or never	Once a day or less	Two times in the day	Three times in the day	Four times in the day
How frequently do you use the canteen for a coffee + pastry/cake/cookie	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
How frequently do you use the canteen for a sugary sweetened beverage	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

	Rarely or never	Once a day or less	Two times in the day	Three times in the day	Four times in the day
How frequently do you use the canteen for acquiring drinking water or fresh pressed juice	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

Please provide your level of agreement or disagreement with the following statements (mark the box corresponding to your answer)

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
It is important for me that the food provided by the canteen is safe	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

It is important for me that the food provided by the canteen is healthy	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
-------------------------------------------------------------------------	------------------------------	------------------------------	------------------------------	------------------------------	------------------------------

It is important for me that the food provided by the canteen is tasty	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
-----------------------------------------------------------------------	------------------------------	------------------------------	------------------------------	------------------------------	------------------------------

It is important for me that the food provided by the canteen is environmentally friendly	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
------------------------------------------------------------------------------------------	------------------------------	------------------------------	------------------------------	------------------------------	------------------------------

It is important for me that the food provided by the canteen is prepared with care for hygiene	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
------------------------------------------------------------------------------------------------	------------------------------	------------------------------	------------------------------	------------------------------	------------------------------

It is important for me that the food provided by the canteen is	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
-----------------------------------------------------------------	------------------------------	------------------------------	------------------------------	------------------------------	------------------------------

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
sustainable					
It is important for me that the food provided by the canteen is fresh	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the food provided by the canteen is locally sourced/produced	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the food provided by the canteen responds to my personal needs and preferences	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the canteen provides at least one plant-based dish option	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the food provided by the canteen is varied	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

Please provide your level of agreement or disagreement with the following statements about your needs for information from the canteen (mark the box corresponding to your answer)

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
It is important for me that the information provided by the canteen is scientifically accurate	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
It is important for me that the information provided by the canteen is personalised to my needs	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the information provided by the canteen is easy to understand	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the canteen informs me about the day's or chef's recommendations	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the canteen informs me about special offers and discounts	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the canteen informs me about the calories in the dishes	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
It is important for me that the canteen informs me about allergens	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

Please provide your level of agreement or disagreement with the following statements about your general concerns (mark the box corresponding to your answer)

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I am usually concerned about	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
health and healthy eating					
I am usually concerned about global warming and sustainability	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I am usually concerned about animal rights	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I am usually concerned about human rights	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>
I am usually concerned about water shortages	(1) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>	(5) <input type="checkbox"/>

Lastly, could you please let us know how do you see yourself as food consumer?

- (1) I am omnivore (I eat everything)
- (2) I am vegetarian (I eat plant-based and include eggs and dairy in my food)
- (3) I am vegan (I eat only plant-based foods and avoid any animal products)
- (4) I am pescetarian (I eat plant-based like vegetarians and include fish)
- (5) I am flexitarian (I eat mostly plant-based foods, but occasionally I would eat foods of animal origin)

- (1) Extremely Dissatisfied
- (2) Moderately Dissatisfied
- (3) Slightly Dissatisfied
- (4) Neutral

- (5) Slightly Satisfied
- (6) Moderately Satisfied
- (7) Extremely Satisfied

Thank you very much for your participation! You are contributing to the provision of better information to consumers.



Appendix 3

Data Analysis (Full Results)

DK CONTROL

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Square Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.896	26.164	26.164	8.896	26.164	26.164	3.808	11.200	11.200
2	3.325	9.779	35.943	3.325	9.779	35.943	3.422	10.064	21.265
3	2.293	6.743	42.686	2.293	6.743	42.686	3.286	9.664	30.929
4	1.963	5.775	48.461	1.963	5.775	48.461	2.794	8.217	39.146
5	1.549	4.557	53.018	1.549	4.557	53.018	2.513	7.391	46.536
6	1.275	3.751	56.769	1.275	3.751	56.769	2.007	5.904	52.440
7	1.207	3.551	60.320	1.207	3.551	60.320	1.695	4.985	57.425

8	1.060	3.116	63.436	1.060	3.116	63.436	1.543	4.539	61.964
9	1.001	2.945	66.381	1.001	2.945	66.381	1.502	4.417	66.381
10	.940	2.764	69.145						
11	.786	2.310	71.455						
12	.732	2.152	73.607						
13	.714	2.101	75.707						
14	.657	1.933	77.641						
15	.639	1.878	79.519						
16	.597	1.757	81.276						
17	.587	1.727	83.003						
18	.545	1.603	84.606						
19	.499	1.467	86.072						
20	.486	1.429	87.502						
21	.476	1.400	88.902						
22	.410	1.207	90.109						
23	.409	1.203	91.312						
24	.361	1.061	92.374						
25	.346	1.017	93.390						
26	.332	.976	94.367						
27	.299	.880	95.246						
28	.290	.853	96.100						
29	.269	.790	96.890						
30	.254	.748	97.637						
31	.229	.673	98.311						
32	.213	.627	98.937						
33	.186	.547	99.484						
34	.175	.516	100.000						

Extraction Method: Principle component analysis

Rotation Component Matrix ^a

	Component								
	1	2	3	4	5	6	7	8	9
1					.505	.486			
2			.368			.750			
3			.416			.687			
4			.735			.277			
5			.756						
6			.839						
7			.520					.455	
8			.721			.281			
9								.793	

10	.288		.346	.254			.489	-.305
11	.325				.452	.474	.254	
12	.726							
13	.357			.383				.568
14	.784							
15		.546		.285			.447	
16	.791							
17	.355	.488		.347			.427	
18	.630						.279	
19		.440		.567				
20	.298			.709				.267
21				.615			.440	
22	.614			.306				
23	.302			.488			.272	-.263
24				.703	.388			
25	.464			.318		.269	.288	
26					.746			
27	.253				.686			
28					.659		.345	.267
29	.274				.288		.733	
30								.830
31		.821						
32		.750						
33		.654						
34		.799						

Extraction Method: Principle component analysis

Rotation Method: Vairmax with Kaiser Normalisation

a. Rotation converged in 9 iterations

Component	Question No.	Variance contribution rate	Cumulative variance contribution rate	Weight
1	12\14\16\18\22\25	11.2	11.2	0.168723
2	15\17\31\32\33\34	10.064	21.265	0.15161
3	4\5\6\7\8	9.664	30.929	0.145584
4	19\20\21\23\24	8.217	39.146	0.123785
5	1\26\27\28	7.391	46.536	0.111342
6	2\3\11	5.904	52.44	0.088941
7	29	4.985	57.425	0.075097
8	9\10	4.539	61.964	0.068378
9	13/30	4.417	66.381	0.06654

DK TEST

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.324	18.601	18.601	6.324	18.601	18.601
2	4.371	12.855	31.456	4.371	12.855	31.456
3	2.920	8.590	40.046	2.920	8.590	40.046
4	2.237	6.581	46.626	2.237	6.581	46.626
5	1.618	4.758	51.384	1.618	4.758	51.384
6	1.572	4.624	56.008	1.572	4.624	56.008
7	1.276	3.753	59.761	1.276	3.753	59.761
8	1.146	3.369	63.130	1.146	3.369	63.130
9	1.042	3.064	66.194	1.042	3.064	66.194
10	1.028	3.023	69.217	1.028	3.023	69.217
11	.895	2.631	71.848			
12	.861	2.533	74.381			
13	.816	2.401	76.782			
14	.753	2.216	78.998			
15	.700	2.059	81.056			
16	.623	1.831	82.888			
17	.581	1.709	84.597			
18	.571	1.680	86.276			
19	.535	1.574	87.851			
20	.496	1.458	89.309			
21	.431	1.267	90.576			
22	.408	1.200	91.776			
23	.384	1.129	92.905			
24	.344	1.011	93.916			
25	.339	.996	94.912			
26	.288	.848	95.761			
27	.268	.789	96.550			
28	.238	.700	97.250			
29	.216	.635	97.885			
30	.206	.606	98.490			
31	.158	.466	98.956			
32	.147	.432	99.388			
33	.112	.330	99.718			
34	.096	.282	100.000			

Extraction Method: Principle component analysis

Rotation Component Matrix ^a

	Component									
	1	2	3	4	5	6	7	8	9	10
1	.268		.266	.562			-.369			-.304
2	.327	.643					.275			
3	.333	.719								
4	.285	.706							-.328	
5		.470			-.373					-.363
6	.266	.721		.323						
7	.268	.366	.250	.318		-.289		-.332		
8	.256	.681		.322	.268					
9		.283			.325		.323	.380	.393	.365
10					-.255	.429	.493			
11	.252			.569	.398				.270	
12	.471	.259		-.440		.312				
13	.380		.260	-.327	.514	.279	.275			
14	.407		.306	-.535						
15	.652	-.345	-.270							
16	.401	.291					-.505			
17	.629		-.409							
18	.530		.278	-.377						
19	.496					-.516				
20	.413		.319			-.389		.410		
21	.574	-.259						-.309		
22	.471		.464							
23	.425			.279	-.330			.324	-.380	
24	.333	-.445	.506					.280		
25	.507		.527							
26	.305	-.375	.474	.286				-.320		
27	.385		.433		-.544					
28		-.525	.391	.254		.301				
29						.494	-.362			.420
30	.568	-.302								
31	.639		-.429							
32	.631		-.460							
33	.630		-.499							
34	.700		-.276							.255

Extraction Method: Principle component analysis

Rotation Method: Vairmax with Kaiser Normalisation

a. Rotation converged in 10 iterations

Component	Question No.	Variance contribution rate	Cumulative variance contribution rate	Weight
1	12\15\17\18\21\30\31\32\33\34	18.601	18.601	0.268735
2	2\3\4\5\6\7\8\28	12.855	31.456	0.18572
3	22\24\25\26	8.59	40.046	0.124102
4	1\11\14	6.581	46.626	0.095078
5	13\27	4.758	51.384	0.06874
6	19	4.624	56.008	0.066804
7	10\16	3.753	59.761	0.054221
8	20	3.369	63.13	0.048673
9	9\23	3.064	66.194	0.044267
10	29	3.023	69.217	0.043674

GR CONTROL

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Square Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.731	22.738	22.738	7.731	22.738	22.738	3.720	10.941	10.941
2	2.744	8.069	30.808	2.744	8.069	30.808	2.714	7.984	18.925
3	2.329	6.851	37.659	2.329	6.851	37.659	2.584	7.599	26.524
4	1.891	5.562	43.220	1.891	5.562	43.220	2.467	7.257	33.780
5	1.502	4.417	47.637	1.502	4.417	47.637	2.146	6.312	40.093
6	1.425	4.191	51.829	1.425	4.191	51.829	2.069	6.085	46.178
7	1.269	3.732	55.560	1.269	3.732	55.560	2.055	6.045	52.223
8	1.161	3.413	58.974	1.161	3.413	58.974	1.868	5.495	57.718
9	1.131	3.325	62.299	1.131	3.325	62.299	1.558	4.581	62.299
10	.976	2.871	65.170						
11	.901	2.651	67.821						
12	.867	2.551	70.371						
13	.828	2.436	72.807						
14	.764	2.248	75.055						
15	.712	2.095	77.150						
16	.698	2.052	79.201						
17	.666	1.960	81.161						
18	.627	1.843	83.004						
19	.535	1.573	84.577						
20	.509	1.496	86.073						
21	.487	1.431	87.504						
22	.475	1.396	88.900						
23	.432	1.271	90.171						

24	.422	1.243	91.414					
25	.392	1.154	92.568					
26	.382	1.123	93.690					
27	.366	1.078	94.768					
28	.324	.952	95.720					
29	.312	.916	96.637					
30	.277	.814	97.451					
31	.255	.749	98.201					
32	.227	.668	98.869					
33	.203	.598	99.466					
34	.181	.534	100.000					

Extraction Method: Principle component analysis

Rotation Component Matrix^a

	Component								
	1	2	3	4	5	6	7	8	9
1			.746						
2							.782		
3							.832		
4						.659	.278		
5	.483							.288	
6						.672			
7									.712
8			.317			.528	.465		
9			.338	.287		.451			
10									.775
11			.764						
12	.783								
13	.580		.328	.344					
14	.575			.320				.363	
15	.463	.284			.481				
16	.794								
17	.516	.272			.479				
18	.666							.312	
19				.478	.488				
20				.696		.286			
21					.749				
22	.330			.495	.301			.265	
23				.291	.353	.372			
24			.321	.711					
25	.418						.285	.392	
26			.305	.289				.589	
27								.723	
28			.635	.317					
29			.388		.568	.340			
30		.542	.278						
31		.644							.401
32		.738							
33		.675						.259	
34		.717							

Extraction Method: Principle component analysis

Rotation Method: Vairmax with Kaiser Normalisation

Component	Question No.	Variance contribution rate	Cumulative variance contribution rate	Weight
1	5\12\13\14\16\17\18\25	10.941	10.941	0.175621
2	30\31\32\33\34	7.984	18.925	0.128156
3	1\11\28	7.599	26.524	0.121976
4	20\22\24	7.257	33.781	0.116487

a.
otati
on
conv
erged
in o

GR TEST

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.769	19.909	19.909	6.769	19.909	19.909
2	3.032	8.918	28.827	3.032	8.918	28.827
3	2.731	8.033	36.859	2.731	8.033	36.859
4	2.066	6.078	42.937	2.066	6.078	42.937
5	1.675	4.925	47.862	1.675	4.925	47.862
6	1.530	4.501	52.364	1.530	4.501	52.364
7	1.342	3.948	56.312	1.342	3.948	56.312
8	1.180	3.472	59.784	1.180	3.472	59.784
9	1.048	3.081	62.865	1.048	3.081	62.865
10	1.019	2.997	65.862	1.019	2.997	65.862
11	.957	2.815	68.678			
12	.942	2.769	71.447			
13	.786	2.312	73.760			
14	.744	2.188	75.947			
15	.675	1.987	77.934			
16	.657	1.933	79.866			
17	.625	1.838	81.704			
18	.586	1.724	83.428			
19	.547	1.610	85.038			
20	.530	1.560	86.597			
21	.494	1.453	88.051			
22	.483	1.421	89.471			
23	.427	1.257	90.729			
24	.406	1.193	91.921			
25	.388	1.142	93.063			
26	.364	1.072	94.135			
27	.352	1.035	95.170			
28	.322	.948	96.118			
29	.271	.797	96.915			
30	.263	.774	97.689			
31	.241	.709	98.398			
32	.215	.631	99.029			
33	.185	.545	99.575			
34	.145	.425	100.000			

Extraction Method: Principle component analysis

Rotation Component Matrix ^a

	Component									
	1	2	3	4	5	6	7	8	9	10
1	.368	.365			-.336			.250		
2	.320	.601				.289	.316			
3	.393	.544				.319		-.350		
4		.397				.404		-.388	.349	
5	.274	.412				-.534			.346	
6	.346	.329			-.259	-.362	.264			
7	.305	.360	-.294				-.394	.338		
8	.352	.454			.313				-.336	.323
9	.355	.483					.317			
10	.251	.467			.290				.286	
11	.338			.279			-.454	.335		-.258
12	.498		-.490	-.263	.290					
13	.556	-.253	-.294	-.312		-.266				
14	.601	-.339	-.311							
15	.520	-.271		-.358				.285		
16	.571	-.270	-.345		.255					
17	.557									-.348
18	.635	-.251		-.288						
19	.458				-.302	.494	.250			
20	.588				-.352		-.282			.250
21	.393									.530
22	.557	-.304		.285						
23	.626			.267						
24	.672						-.280			
25	.549			.371						
26	.468					-.293			.354	
27	.360		.259	.527						
28	.375		.254	.496						
29	.284			.383	.571					
30	.404	.280				-.273	-.299	-.358		
31	.429		.602	-.394						
32	.340		.580	-.350						
33	.272		.586	-.275	.341			.251		
34	.380		.616	-.250						

Extraction Method: Principle component analysis

Rotation Method: Vairmax with Kaiser Normalisation

a. Rotation converged in 10 iterations

Component	Question No.	Variance contribution rate	Cumulative variance contribution rate	Weight
1	1\13\14\15\16\17\18\20\22\23\24\25\30	19.909	19.909	0.30228
2	2\3\8\9\10	8.918	28.827	0.13540
3	12\31\32\33\34	8.033	36.859	0.12197
4	27\28	6.078	42.937	0.09228
5	29	4.925	47.862	0.07478
6	5\6\19	4.501	52.364	0.06834
7	7\11	3.948	56.312	0.05994
8	4	3.472	59.784	0.05272
9	26	3.081	62.865	0.04678
10	21	2.997	65.862	0.04550

FR CONTROL

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Square Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.017	20.638	20.638	7.017	20.638	20.638	5.782	17.005	17.005
2	5.769	16.968	37.605	5.769	16.968	37.605	3.758	11.052	28.057
3	3.467	10.196	47.802	3.467	10.196	47.802	3.686	10.840	38.897
4	2.415	7.104	54.905	2.415	7.104	54.905	3.548	10.435	49.332
5	2.207	6.490	61.395	2.207	6.490	61.395	2.786	8.195	57.527
6	1.877	5.520	66.916	1.877	5.520	66.916	2.236	6.578	64.105
7	1.709	5.026	71.941	1.709	5.026	71.941	1.943	5.715	69.820
8	1.416	4.165	76.107	1.416	4.165	76.107	1.666	4.901	74.721
9	1.056	3.107	79.213	1.056	3.107	79.213	1.528	4.493	79.213
10	.992	2.916	82.130						
11	.901	2.651	84.781						
12	.832	2.447	87.228						
13	.748	2.199	89.427						
14	.624	1.834	91.261						
15	.460	1.352	92.613						
16	.414	1.218	93.831						
17	.374	1.101	94.932						
18	.341	1.004	95.935						
19	.252	.743	96.678						
20	.251	.737	97.415						
21	.194	.570	97.985						
22	.147	.433	98.418						
23	.132	.388	98.806						
24	.112	.329	99.135						
25	.075	.220	99.355						

26	.066	.194	99.549					
27	.053	.155	99.704					
28	.041	.122	99.826					
29	.027	.081	99.907					
30	.015	.044	99.951					
31	.010	.029	99.980					
32	.005	.016	99.996					
33	.001	.004	99.999					
34	.000	.001	100.000					

Extraction Method : Principle component analysis

Rotation Component Matrix ^a

	Component								
	1	2	3	4	5	6	7	8	9
1	.427			.369					-.462
2	.861							-.328	
3	.875							-.322	
4	.854							-.331	
5	.582							.303	
6	.898								
7	.911								
8	.907								
9	.325					-.735			
10					-.305		.710		
11				.691					
12		.824					.303		
13		.900							
14				.801					
15			.849						
16		.821		.362					
17			.812						
18		.550		.466				-.488	
19			.729						
20				.543			.339	.330	
21				.882					
22							.768		
23	-.304		.329					.505	
24									.855
25				.432	.496			.549	
26			.463		.592				
27					.713	-.375			
28					.785				
29			.337	-.372	.570				
30		.533		.358	.493				

31		.502				.599	.312		
32			.730						
33		.395	.462			.503			
34	.301	.328				.663			

Extraction Method : Principle component analysis

Rotation Method : Vairmax with Kaiser Normalisation

a. Rotation converged in 11 iterations

Component	Question No.	Variance contribution rate	Cumulative variance contribution rate	Weight
1	2\3\4\5\6\7\8	17.005	17.005	0.214674
2	12\13\16\18\30\31	11.052	28.057	0.139523
3	15\17\19\32	10.84	38.897	0.136846
4	11\14\20\21	10.435	49.332	0.131733
5	26\27\28\29	8.195	57.527	0.103455
6	9\31\33\34	6.578	64.105	0.083042
7	10\22	5.715	69.82	0.072147
8	23\25	4.901	74.721	0.061871
9	1\24	4.493	79.213	0.05672

FR TEST

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.447	30.726	30.726	10.447	30.726	30.726	7.012	20.624	20.624
2	4.325	12.722	43.448	4.325	12.722	43.448	4.818	14.171	34.796
3	2.811	8.267	51.715	2.811	8.267	51.715	3.646	10.723	45.519
4	2.037	5.991	57.706	2.037	5.991	57.706	2.869	8.439	53.958
5	1.978	5.817	63.523	1.978	5.817	63.523	2.713	7.979	61.937
6	1.513	4.451	67.975	1.513	4.451	67.975	1.820	5.353	67.290
7	1.285	3.780	71.755	1.285	3.780	71.755	1.432	4.212	71.502
8	1.182	3.476	75.230	1.182	3.476	75.230	1.268	3.729	75.230
9	.959	2.821	78.052						
10	.898	2.642	80.693						
11	.784	2.306	82.999						
12	.736	2.164	85.163						
13	.657	1.931	87.095						
14	.563	1.655	88.750						
15	.469	1.380	90.130						

16	.432	1.270	91.400					
17	.381	1.120	92.519					
18	.352	1.036	93.555					
19	.299	.879	94.434					
20	.290	.853	95.287					
21	.270	.795	96.082					
22	.219	.644	96.726					
23	.194	.570	97.296					
24	.179	.527	97.823					
25	.147	.433	98.256					
26	.132	.388	98.644					
27	.113	.331	98.975					
28	.083	.244	99.219					
29	.075	.222	99.441					
30	.065	.192	99.633					
31	.046	.137	99.769					
32	.034	.099	99.868					
33	.025	.073	99.941					
34	.020	.059	100.000					

Extraction Method: Principle component analysis

Rotation Component Matrix ^a

	Component							
	1	2	3	4	5	6	7	8
1		.502		.498		.372		-.304
2		.781						
3		.761						
4		-.643					.342	
5		.755						
6		.680				.400		
7		.878						
8		.824						
9							.897	
10								.863
11				.492		.480		
12	.917							
13	.890							
14	.847							
15	.900							
16	.683		.344	.301				
17	.880							

18	.746						
19	.676			.359			
20	.844						
21				.641			
22				.802			
23	.362				.656		
24					.506		-.512
25				.520	.661		
26				.432	.653		
27					.726		
28					.488	.654	
29	.413	.373	.594				
30			.807	.309			
31			.792				
32			.777				
33			.855				
34						.722	

Extraction Method : Principle component analysis

Rotation Method : Vairmax with Kaiser Normalisation

a.Rotation converged in 10 iterations

Compon ent	Question No.	Variance contribution rate	Cumulat ive variance contribu tion rate	Weight
1	12\13\14\15\25\16\17\18\19	20.624	20.624	0.274146
2	1\2\3\4\5\6\7\8	14.171	34.796	0.188369
3	29\30\31\32\33	10.723	45.519	0.142536
4	11\21\22	8.439	53.958	0.112176
5	23\24\25\26\27	7.979	61.937	0.106061
6	28\34	5.353	67.29	0.071155
7	9	4.212	71.502	0.055988
8	10	3.729	75.23	0.049568

UK CONTROL

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Square Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.253	30.157	30.157	10.253	30.157	30.157	4.826	14.193	14.193
2	2.820	8.295	38.452	2.820	8.295	38.452	3.371	9.916	24.108
3	2.372	6.977	45.429	2.372	6.977	45.429	3.069	9.026	33.134
4	1.804	5.305	50.734	1.804	5.305	50.734	2.854	8.393	41.526
5	1.507	4.433	55.167	1.507	4.433	55.167	2.299	6.762	48.289
6	1.407	4.138	59.305	1.407	4.138	59.305	2.276	6.695	54.984
7	1.269	3.732	63.037	1.269	3.732	63.037	2.182	6.418	61.402
8	1.146	3.370	66.407	1.146	3.370	66.407	1.702	5.004	66.407
9	.988	2.907	69.313						
10	.909	2.674	71.987						
11	.805	2.368	74.356						
12	.784	2.305	76.660						
13	.693	2.039	78.699						
14	.609	1.790	80.489						
15	.588	1.730	82.219						
16	.563	1.656	83.874						
17	.523	1.537	85.411						
18	.485	1.427	86.838						
19	.442	1.300	88.138						
20	.424	1.248	89.386						
21	.396	1.166	90.552						
22	.381	1.122	91.674						
23	.348	1.024	92.697						
24	.336	.989	93.687						
25	.296	.871	94.558						
26	.281	.825	95.383						
27	.267	.784	96.167						
28	.266	.783	96.950						
29	.232	.682	97.632						
30	.203	.597	98.229						
31	.182	.535	98.764						
32	.159	.467	99.231						
33	.147	.433	99.665						
34	.114	.335	100.000						

Extraction Method: Principle component analysis

Rotation Component Matrix ^a

	Component							
	1	2	3	4	5	6	7	8
16	.808							
14	.807							
12	.807							
22	.699			.308				
18	.653					.355		
25	.527							
17	.492		.316	.343		.488		
6		.745						
7		.706						
5		.681						
8		.670			.356			
10		.582						
4		.572			.497			
34			.858					
31			.796					
32			.710					
33			.652					
24				.719				
20	.436			.676				
19				.668				
17				.629		.405		
23	.355			.403		.332		
2					.823			
3					.805			
29	.322					.655		
28						.537	.521	
15	.391		.423			.502		
1					.302		.663	
27	.303						.661	
26				.375			.581	
11	.360				.377		.572	
30								.754
9		.481						.593
13	.435			.330		.357		.466

Extraction Method: Principle component analysis

Rotation Method: Vairmax with Kaiser Normalisation

a. Rotation converged in 8 iterations

Component	Question No.	Variance contribution rate	Cumulative variance contribution rate	Weight
1	12/14/16/17/18/22/25	30.157	30.157	0.454124
2	4/5/6/7/8/10	8.295	38.452	0.124912
3	31/32/33/34	6.977	45.429	0.105064
4	19/20/23/24/21	5.305	50.734	0.079886
5	2/3	4.433	55.167	0.066755
6	15/28/29	4.138	59.305	0.062313
7	1/11/26/27	3.732	63.037	0.056199
8	9/13/30	3.37	66.407	0.050748

UK TEST

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Square Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.436	24.812	24.812	8.436	24.812	24.812	5.149	15.144	15.144
2	3.378	9.936	34.748	3.378	9.936	34.748	3.995	11.750	26.894
3	2.632	7.742	42.490	2.632	7.742	42.490	3.333	9.802	36.695
4	1.890	5.558	48.048	1.890	5.558	48.048	2.463	7.245	43.940
5	1.538	4.524	52.572	1.538	4.524	52.572	2.058	6.053	49.993
6	1.424	4.189	56.760	1.424	4.189	56.760	1.613	4.744	54.737
7	1.121	3.297	60.057	1.121	3.297	60.057	1.536	4.519	59.256
8	1.090	3.205	63.262	1.090	3.205	63.262	1.277	3.756	63.012
9	1.050	3.089	66.351	1.050	3.089	66.351	1.135	3.339	66.351
10	.996	2.929	69.280						
11	.827	2.432	71.712						
12	.819	2.409	74.121						
13	.784	2.307	76.428						
14	.761	2.239	78.667						
15	.689	2.027	80.693						
16	.659	1.937	82.630						
17	.573	1.685	84.315						
18	.528	1.554	85.870						
19	.504	1.483	87.352						
20	.467	1.374	88.726						
21	.441	1.298	90.024						
22	.421	1.239	91.264						
23	.402	1.181	92.445						
24	.388	1.141	93.586						
25	.337	.992	94.578						
26	.311	.914	95.492						
27	.254	.747	96.238						

28	.243	.716	96.954					
29	.219	.645	97.599					
30	.212	.623	98.222					
31	.186	.546	98.768					
32	.163	.480	99.249					
33	.135	.398	99.647					
34	.120	.353	100.000					

Extraction Method: Principle component analysis

Rotation Component Matrix ^a

	Component								
	1	2	3	4	5	6	7	8	9
14	.818								
16	.803								
22	.766								
12	.739					.308			
17	.728							.363	
18	.717	.313							
15	.643				.418			.331	
20	.574	.543							
24		.718							
29		.691							
26		.689							
28		.632			.341	.341			
21		.599							
23		.567							
25	.304	.502			.309			-.376	
27		.496							
2			.875						
3			.871						
7			.774						
8			.640						-.351
6			.473			.426			
34				.807					
33	.308			.780					
32				.777					
30					.735				
13	.411				.684				
1			.311		.492				
11						.703			
5			.405			.559	.306		

10								.741	
4								.557	
9								.498	

Component	Question No.	Variance contribution rate	Cumulative variance contribution rate	Weight
1	12/14/15/16/17/18/20/22	24.812	24.812	0.373951
2	23/24/25/26/27/28/29/21	9.936	34.748	0.149749
3	2/3/6/7/8	7.742	42.49	0.116682
4	32/33/34	5.558	48.048	0.083767
5	1/13/30	4.524	52.572	0.068183
6	5/11	4.189	56.76	0.063134
7	4/9/10	3.297	60.057	0.04969
8	19	3.205	63.262	0.048304
9	31	3.089	66.351	0.046555

19		.402						.621	
31									.870

Extraction Method: Principle component analysis

Rotation Method: Vairmax with Kaiser Normalisation

a.Rotation converged in 8 iterations