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SustainAble Catering?!

ACT Project

Commissioned by
S&I Student Party & Green Office Wageningen

How sustainable are the caterers of Wageningen University?

S-ACT 1613

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Preface

This report is the result of our research which is conducted for the course 'Academic Consultancy Training'. In this research a sustainability index is developed to measure the sustainability levels of the caterers of Wageningen University and Research Centre. We are very proud to present the outcome of our research. It should be mentioned that without the help of certain people, this research would not have been possible. Therefore, we first of all would like to thank our commissioners, Ms. M. Eggers and Anna Gellhausen (Green Office Wageningen) and Anne Walther, Yufei Wang and Zekun Dai (S&I, Student Council Party Wageningen UR). They gave us the opportunity to work on this interesting case. We also want to thank them for the time they spent on our research by providing information and feedback.

Another party without whom this research would not have been possible are the caterers (Cormet, OSP, Sodexo, Nieuw China and GoodFood) of the Wageningen University. We are very grateful for their participation in our research. We would also like to thank Annet de Haas and Lisette Schoonman of the Facility department for conducting interviews which were really helpful for our research.

During this research dr. ir. J.M. Soethoudt was of great importance with his expertise in the field of sustainability in the catering sector. We are very thankful for his feedback and the assistance he provided during our research.
We would like to thank Ramona Laurentzen for the coaching during the project. Her support and critical view helped us to successfully end this project and optimise our group process.
We are also very thankful to Nienke Haaksema, who participated in the first half of ACT in our project team. Her enthusiasm created a nice atmosphere for the group to work in.

Furthermore, we would like to thank Paul van Haperen for providing us with useful information and feedback during the proposal writing lectures and CPD sessions.
Lastly, a word of thanks to Mathijs Brink who helped us to analyse the statistical results. He gave us insight in the in depth analysis of the statistical results.

Wageningen, 14th of December, 2015

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Executive Summary

Sustainability is an important topic for Wageningen University and Research centre, Wageningen UR (Wageningen UR, 2015a). Within the university the focus on sustainability in the catering sector is indicated as being important, since *"We all need to eat, but it's good to think about the consequences of our food choices"* (Wageningen UR, 2015b). Therefore, the university tries to stimulate their five caterers to be sustainable. However, even though the caterers all have a sustainability plan, the sustainability levels of those caterers are not known. The Alliance for Sustainable Food identified nine factors of sustainability, specific to the food sector which can be used to measure the sustainability levels of the caterers. Those elements are Water, Energy, Emissions, Transport, Waste, Biodiversity, Labour, Fair Trade, and Animal Welfare (Alliantie Verduurzaming Voedsel, 2015).

The overall goal of the commissioners of this research project, Green Office Wageningen (GOW) and S&I, is to create more sustainability among the caterers of Wageningen UR. This research tried to create guidance in order to reach this goal of the commissioners. To achieve this goal, the purpose of this research was to create a sustainability index to get insight in the current sustainability level of the caterers of Wageningen UR and identify the behavioural intention of those caterers to change according to the output of the sustainability index. The main activities that were carried out for this study were a literature research, questionnaires among customers, an interview with the facility department and interviews with the contact persons from each caterer.

The knowledge retrieved by the literature study was summarized in a table and this formed the input for the index-indicators. Within this table it was found that half of the nine elements consisted of indicators mainly focussing on behaviour and equipment use. The other half of the elements was focused on the use of sustainable assortment, preferably with the use of labels.

The nine elements of sustainability were presented to the relevant stakeholders of the caterers; the customers and the facility department of Wageningen UR, in order to choose the elements that were most relevant to include in the sustainability index. First of all, it was found that the 370 customers who participated in the questionnaires valued sustainability as important, but that 73% of the customers did not make a sustainable choice related to food deliberately. Furthermore, both stakeholders were asked to rate all elements on importance. According to the customers, only the elements waste and labour were graded significantly higher as being more important that the other elements. Waste was seen as important by the facility department as well. However, labour which was not mentioned by the facility department. Fair trade and animal welfare were mentioned by the facility department with the customers' interest in mind. Though remarkable, these ones in particular were least valued by customers.

For the choice of elements to include in the index the opinion of the customers was mainly adhered to, since the facility department mentioned multiple times that the opinion of the customers was the most important factor. Therefore, the elements water, energy, waste, and labour were chosen for the index. The facility department gave weights to the different indicators in the index to decide the importance of those indicators for Wageningen UR. After implementing the index, the average score on the four elements of the different caterers at Wageningen UR were; Cormet: 7,63, GoodFood: 5,44, Nieuw China: 6,24, Sodexo: 6,38, and OSP: 8,07. Looking at these scores, it can be concluded that there is room for improvement in relation to sustainability for all caterers. Though, this is only a first trial run of the index. These hard numbers can only be seen as an image that is drawn, and no hard conclusions can be made.

During the interviews with the caterers it was seen that four of the five caterers found the use of a sustainability index positive and useful. For the current index a bigger focus on food and food suppliers was asked for by the caterers. Furthermore, it was found that three caterers mentioned a high level of control on changing according to the factors of the index. A lower level of control was perceived for indicators within the elements water and energy, as those were controlled by Wageningen UR.

It can be concluded that a sustainability index would be a useful tool for the caterers to get insight in and to further improve their sustainability levels. Further research needs to be conducted to develop the current trial version of the index further. Other organisations could use this index as a benchmark to work with and adapt it to become suitable to their organisation and the situation. Aspects that could influence the control of the caterers on certain aspects should be taken into account in future research. An elaboration on the further development of the index is described.

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1. Introduction

1.1 Background

Sustainability is a topic that many consumers, companies, and governments find important (Dyllick and Hockerts, 2002). Companies feel the urge to become more and more sustainable in the areas of food production, transport, and consumption, especially as the perceived importance by customers plays an important incentive for this (Reinders et al., 2013; Maloni and Brown, 2006). Being sustainable is something that gets a lot of attention in the policies of companies, however it is doubtful to what extent these policies are complied to (Reinders et al., 2013). According to the definition of the World Commission on Environment and Development (1987, p16) to be sustainable a company should focus: "*to meet the needs of the present without compromising the ability of future generations to meet their own needs*".

Also for Wageningen University and Research centre, Wageningen UR sustainability is an important topic (Wageningen UR, 2015a). This university is known for being the most sustainable university in the Netherlands (Studenten voor Morgen, 2014). Wageningen UR still has the motivation to become even more sustainable. This focus is on multiple aspects of sustainability; one of these aspects is related to the caterers that are hired. This focus on sustainability within the catering sector is important since *"We all need to eat, but it's good to think about the consequences of our food choices"* (Wageningen UR, 2015b). Therefore, Wageningen UR has set a goal to only sell sustainably produced products. Wageningen UR hires five different caterers, each on different locations: OSP, GoodFood, Sodexo, Cormet and a small Chinese caterer Nieuw China who is contracted by Cormet. Wageningen UR tries to stimulate these caterers to be sustainable.

The above mentioned definition of sustainability is very broad and can be split up into multiple areas specific to the food sector. Nine factors of sustainability specific to the food sector are created by the Alliance for Sustainable Food: Water, Energy, Emissions, Transport, Waste, Biodiversity, Labour, Fair Trade, and Animal Welfare (Alliantie Verduurzaming Voedsel, 2015). This Alliance is a partnership between the Dutch Agriculture and Horticulture organisation (LTO Nederland), the Federation Dutch Food Industry (FNLI), Central Agency for Food Retail (CBL), the Dutch Catering Organisation (Veneca), and the Royal Hospitality Industry (KHN) (Alliantie Verduurzaming Voedsel, 2015). Sustainability in the field of caterers could be discussed based on these nine themes.

All the caterers of Wageningen UR, besides the Chinese caterers, have their own sustainability policy. However, it is yet unknown how the caterers score in general on standardised sustainability factors. Therefore, a project about this topic was initiated by Green Office Wageningen (GOW) and the student party for Sustainability & Internationalisation (S&I). Together S&I and GOW are interested in the current sustainability levels of the caterers of Wageningen UR with the goal to create more sustainability (Green Office, 2013; Wageningen UR, 2015c).

1.2 Problem identification

GOW and S&I aim to have sustainable caterers at Wageningen UR. As there is no insight in how the different caterers score on standardised elements, it is unclear to multiple parties how sustainable they really are. When this knowledge gap is resolved, it could create opportunities in different ways. First of all, currently the caterers have no possibility to compare their sustainability level to their competitors due to the lack of a standardised measurement instrument. When they do know in which factors of sustainability they relatively score less or better, they have the possibility to improve their performances in this field in order to compete with the other caterers on this level. Besides that, insight in the value customers and the facility department of Wageningen UR attach to the elements of sustainability can give the caterers a better idea on which elements to work on and can provide extra stimulation to actually improve. Thereby, insight in the current sustainability level of the caterers creates opportunities to work further with this baseline measurement, and clearly see possibilities for improvement of the sustainability, also for other stakeholders (facility department, GOW, S&I). The knowledge gap in this research therefore is:

> *There is no insight in the current sustainability levels of the caterers of Wageningen UR and the behavioural intention of caterers towards change according to the output of a sustainability index.*

This knowledge gap can be split up into multiple parts. It is unknown by the commissioners how sustainable the caterers of Wageningen UR are in different factors of sustainability. Furthermore,

making sustainable choices in every part of the supply chain is complicated for caterers since they are not involved in every part (Rimmington et al., 2006). The caterers might for example have no say in how transport from suppliers is arranged. This is the last part that is entailed in the knowledge gap; the lack of insight into the capability and willingness of the caterers to change their performances according to a potential output of a sustainability index. This knowledge gap is of influence on different stakeholders, who are described in Appendix A1.

1.3 Purpose

The overall goal of the commissioners is to create more sustainability among the caterers of Wageningen UR. This research will try to create guidance in order to reach this goal of the commissioners. To achieve this goal, the purpose of this research is to create a sustainability index to get insight in the current sustainability level of the caterers of Wageningen UR and identify the behavioural intention of those caterers to change according to the output of the sustainability index. This purpose can be translated into the following main research question:

> *What is the current sustainability level of the caterers of Wageningen UR measured by a self-created sustainability index - derived from literature and input of relevant stakeholders - and what is the behavioural intention of the caterers towards changing according to the output of the sustainability index?*

To answer the main research question, sub-questions are formed. First of all, a sustainability index has to be created. This sustainability index will be related to the nine elements of the Alliance for Sustainable Food, mentioned in the introduction (Alliantie Verduurzaming Voedsel, 2015). The fact that these elements are based on experience causes them to be practically translatable into catering. This is less the case for example for the three aspects that need to be taken into account on a legal base when it comes to defining sustainability: environment, animal and social aspects (Alliantie Verduurzaming Voedsel, 2015). The first sub-question focuses on which of those nine elements will be best to use in the sustainability index, both according to the literature and to the opinion of the relevant stakeholders who are the customers and the facility department of Wageningen UR:

1. *In what way can the nine factors for food sustainability be used to form a sustainability index for the caterers of Wageningen UR?*
    a. *How can the nine factors for food sustainability be translated into measurable indicators of a sustainability index to measure the levels of caterers at Wageningen UR, according to the literature?*
    b. *Which of the nine factors of food sustainability are found to be most relevant to use according to the relevant stakeholders?*

The caterers are not taken into account as a stakeholder at this moment, to prevent them for choosing elements that might benefit them. After forming the sustainability index with the most relevant sustainability elements included, the sustainability level of the caterers will be determined with the next sub-question:

2. *What is the sustainability level of the caterers of Wageningen UR?*
    a. *Which weight does the Wageningen UR attach to the different indicators of the most relevant elements?*
    b. *How do the caterers of Wageningen UR score on the different factors of the index?*

If the caterers of Wageningen UR have to change their sustainability behaviour according to the outcome of the index, it is relevant to understand whether the caterers would actually confirm to the optional changes. The third sub-question focuses on this:

3. *What are the behavioural intentions of the caterers of Wageningen UR to change according to the output of the sustainability index?*

The theory of Planned Behaviour can be used to understand, predict and change the behavioural intentions of the caterers of the Wageningen UR to change their sustainable behaviour (Ajzen, 1985). According to the theory of Planned Behaviour (TPB), both personal attitude, subjective norm and behavioural control of the caterers can play a role in their intention to change their behaviour, as can be seen in Figure 1 (Ajzen, 1985). The subjective norm - the attitude of other relevant stakeholders towards sustainability - has already been indicated in sub-question 1b. It is expected that the agreement of the relevant stakeholders on the sustainability index will motivate

the caterers to change their sustainability behaviour. The personal attitude and the behavioural control of the caterers have to be indicated to investigate whether they will change their behaviour. The personal attitude of the caterers entails their willingness to change conform the outcome of the sustainability index. The behavioural control of the caterers indicates whether they think they will be able and capable to change according to the outcome of the sustainability index. Therefore, the third sub-question entails both the following questions:

a. *How willing are the caterers of Wageningen UR to change according to the output of the sustainability index?*
b. *How capable are the caterers of Wageningen UR to change according to the output of the sustainability index?*

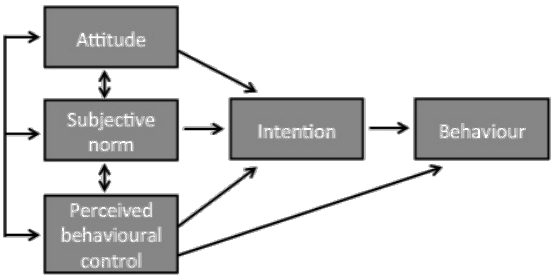

Figure 1 – Theory of Planned Behaviour (Azjen, 1985).

1.4 Phases

Figure 2 illustrated the steps that are taken in this study. Further elaboration on each of the steps is provided in Chapter 2 Methods.

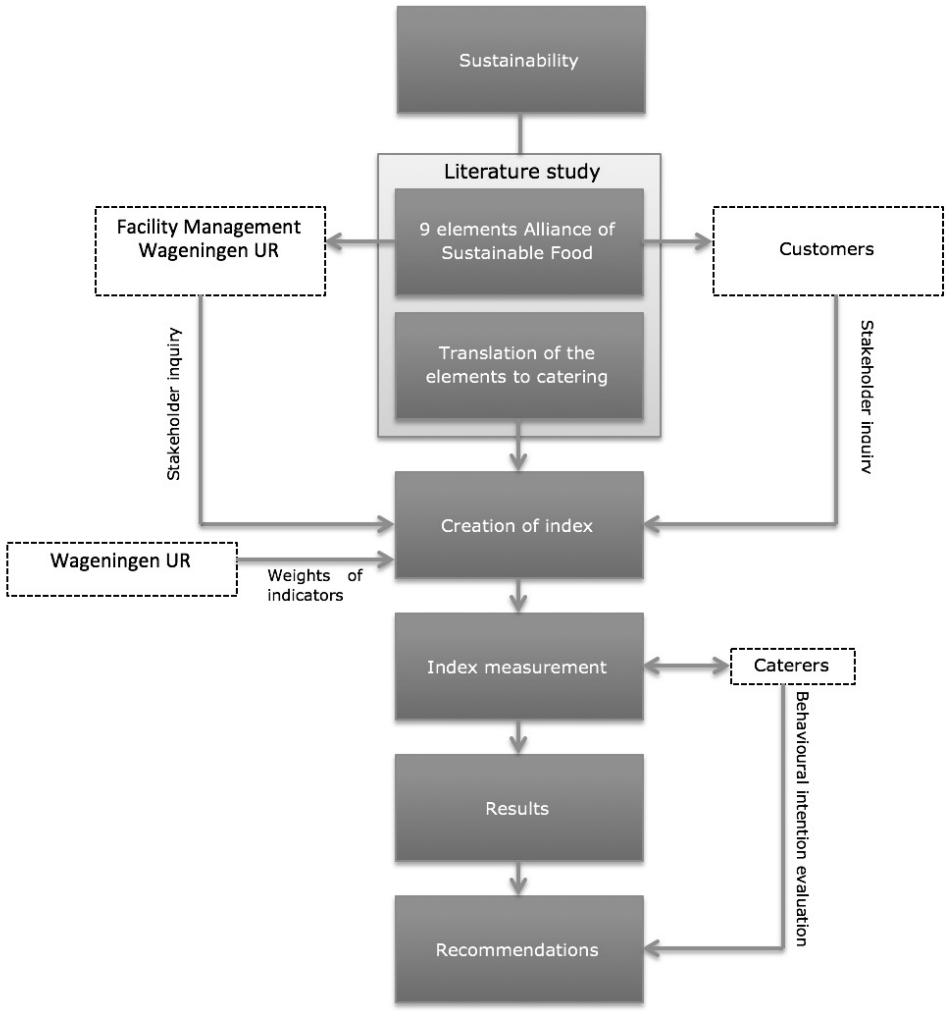

Figure 2 – Process diagram

2. Methods

2.1 Activities

The main activities that were carried out for this study are a literature research, questionnaires among customers, two interviews with persons from the facility department, and interviews with the contact persons from each catering company.

2.1.1 Literature research

A literature research was performed to gain more knowledge about sustainability in general, and how this subject could be translated to the catering sector. Within the literature study the nine elements of the Alliance Verduurzaming Voedsel (2015) were researched in order to translate them into measurable indicators. In order to write reliable and applicable conclusions, in the literature study at least twenty scientific articles were included that were all published after the year 2000. The keywords that were used to standardise a part of the literature study were: sustainab* AND cater* combined with one of the nine elements of the Alliance Verduurzaming Voedsel (2015); 'water', 'energy', 'emissions', 'transport', 'waste', 'biodiversity', 'labour', 'fair trade', 'animal welfare'. These keywords were searched for in the following databases: Scopus and Web of Science, which were accessed via the WUR library. In order to make the input for the indicators practical usable, also existing initiatives were taken into account. To find these initiatives, the website of Alliantie Verduurzaming Voedsel (2015) was used. Also other articles from the field were used, such as catering policies and label requirements, to make the translation to the practical environment. Furthermore, indicators that labelling systems use are researched for this same reason.

Only articles about aspects that are of interest when it comes to catering are taken into account. According to the Ministry of Infrastructure and Environment (2011), of the whole supply chain (Raw material extraction - Production - Preparation - Use - Disposal / Recycling), the caterer only has direct influence on the preparation and disposal/recycling phases. This article states that the first two phases are the most critical with reference to sustainability. The caterer will have to examine the production process of the suppliers to control for these phases and adapt their assortment based on this examination (Ministerie van Infrastructuur en Milieu, 2011). By using this demarcation, aspects such as what kind of fuel a farmer uses are excluded from this research. This makes the input for the indicators relevant for an index to measure the sustainability level of caterers.

The literature retrieved for each element is divided into four categories related to catering practices. The four categories (equipment, behaviour, assortment and product use) are based on the criteria for sustainable procurement and sustainability policies of different caterers in the Netherlands. In the criteria of the ministry a big part is focused on sustainability in the assortment. The criteria also provide guidance for sustainable product use and awareness of the employees (behaviour) and sustainable equipment (Ministerie van Infrastructuur en Milieu, 2012). Caterers use those four elements also in their sustainability policies, as noticed in a desk research to sustainability documents of caterers. For example, Hutten catering, has sustainable brands in the assortment, lowers the energy use by sustainable equipment, and made steps to create awareness in the behaviour of employees (Hutten Groep, 2015). After the literature research of each separate element was finished, a table was made to provide an overview of the information retrieved.

2.1.2 Questionnaires customers

Questionnaires have been used to get insight in the attitude that customers have towards the different factors of the sustainability index. The value they gave to each element, together with the results from the interview of the facility department (described below), has determined which factors of sustainability were used to measure the sustainability of the catering companies.

The questionnaires contained eight questions. The first three questions were descriptive variables, focused on age, gender and the science group in which the respondents work or study. The following four questions were about sustainability. One question measured the importance of sustainability according to the respondents on a 7-points scale (very unimportant - very important). Furthermore, an open question was used to indicate the sustainable behaviour of the respondents. The third question of this section contained the nine elements of which each element had to be rated on a 7-points scale (very unimportant - very important). For this question keywords to explain each element were added to make sure that customers had the right understanding of the nine elements. This was done to improve the internal validity of this question.

Finally, extra comments were asked. In the last question respondents could fill in their email address to win catering vouchers. To test the questionnaire, ten students were asked to fill in the concept version and give feedback on the questions asked. The questionnaire substantiation based on Emans (2007) and the final questionnaire itself are added in Appendix B1.

Sample
A sample of the customers of the WUR caterers was taken to include in the study. The sample was representative for all customers of the WUR caterers, also because all locations were included in the research. Every table with customers was asked to fill in the questionnaire that were present at the moment of research. The required sample size was measured using the formula: margin of error = $1/\sqrt{n}$ (Niles, 2015). For this questionnaire, the aimed confidence interval was 90% with an error margin of 10%. This gave n = (1/margin of error)^2. With a margin of error of 10% (fraction 0,1), n = $(1/0,1)^2$ = 100 participants.

In total 370 questionnaires were randomly handed out to customers of the caterers at Wageningen UR. Table 1 contains the schedule for handing out the questionnaires. Also the number of questionnaires handed out in each location are mentioned in this table. There were two researchers at each location, in Forum an extra researcher helped to hand out the questionnaires because of the expected high amount of customers.

Table 1 - Schedule for handing out the questionnaires

	Monday 23-11	Tuesday 24-11	Wednesday 25-11
Lunch (11.30-13.30)	Leeuwenborch (60) Restaurant of the future (40)	Orion (80) Atlas (30)	Forum (100) Lumen (20)
Dinner (17.00-19.00)		Orion (20)	Forum (20)

To encourage customers to fill out the questionnaire, participants could win prizes in the form of ten gift vouchers of the catering companies. The caterers and location managers of different Wageningen UR buildings were asked permission prior to the study.

Data analysis
Excel was used to create an overview of the data and the descriptive statistics. The statistical program SPSS was used for the data analysis. First of all, the data was checked for normality by the use of histograms and a Shapiro-Wilk test. Thereafter, a Friedman's ANOVA was used to analyse if one of the averages per elements differed from the other averages. To compare the elements mutually a Wilcoxon Signed-Rank test was used. Since this is not a posthoc analysis, the alpha used in this experiment was corrected for the amount of comparisons made. This correction was based on Bonferroni: 0.10/36=0.003.

2.1.3 Interview facility department Wageningen UR
A semi-structured interview was performed to get insight in the attitude of the facility department towards the different factors of the sustainability index. The semi-structured interview was based on the nine elements of the Alliance for Sustainable Food (Alliantie Verduurzaming Voedsel, 2015).

The interview consisted of 9 questions, and was divided into a general part and a part about the sustainability index. The general part contained six open questions about the attitude of the facility department towards sustainability in general and sustainability linked to the caterers. The second part included a question about the attitude of the facility department towards a possible sustainability index followed by a question on the importance of each of the nine elements. Those elements could be rated on a 7-point scale (very unimportant - very important), for each rating per element an explanation was asked. Finally, the facility department was asked to give any comments or additions to the sustainability index. The substantiation based on Emans (2007) and the interview guide can be seen in Appendix B2. To test the interview questions, an ex-coworker of the facility department was asked to revise and give feedback on the question list. The interview took place on the 24th of November, at 10.00 o'clock at Actio with Lisette Schoonman, contract manager of Wageningen UR.

2.1.4 Index measurement

Based on the findings of the literature study, the questionnaire, and the interview with the facility department, an index was made to measure the sustainability level of the caterers of Wageningen UR. The elements chosen as most relevant by the main stakeholders of the caterers were included in the index. Each element was measured by multiple questions (indicators). Together these indicators were used to measure the level of sustainability that the caterers scored on each element.

Creation of the indicators

The indicators were based on the results from the literature study. Those results were summarized in a table and formed the input for the indicators. Next to using the literature results from this table to form the indicators, the indicators also had to adhere to several demands on indicators (Logatcheva & Baltussen, 2015). The indicators had to be measurable, so a score is given to each answer by the researchers. The facility manager of Wageningen UR gave weights to the different questions within the elements to decide the importance for Wagenignen UR. The indicators also had to be reproducible and therefore the scoring of each indicator is made transparent for further research (Logatcheva & Baltussen, 2015). Furthermore, the indicators had to be easy to interpret, valid, reliable, complete, present and relevant. The themes are also checked on relevance by asking the relevance to the customers and the Wageningen facility department. Furthermore, the completeness of the indicators in total are retrieved by a literature study and by testing them with the caterers and with the sustainability expert. The interpretation and validity of the indicators was checked during the interviews with the caterers.

Implementation of the index

The index was implemented at the five catering companies of Wageningen UR: OSP, GoodFood, Sodexo, Cormet, and Nieuw China. The implementation took place in the week of the 30th of November until the 4th of December. Table 2 contains the schedule for the implementation at the caterers.

Table 2 - Schedule for interviews

Week 6 (week 49)	Monday 30-11	Tuesday 1-12	Wednesday 2-12
Caterer	14.00h: Good Food 15.00h: Sodexo	13.45h: Nieuw China 14.15h: OSP	9.00h: Cormet

2.1.5 Interview caterers

Five semi-structured interviews were conducted with the contact persons of each catering company at Wageningen UR. These interviews took place during the same appointment as the index measurement (see Table 3). The semi-structured interviews contained questions to determine the attitude of the caterers towards changing behaviour according to the results of the sustainability index. The caterers were also asked to give arguments why they were willing or able to change or not, for every factor of the sustainability index. The substantiation based on Emans (2007) and the interview guide can be seen in Appendix B3.

2.2 Time schedule

This research was executed in a time span of eight weeks in total. The literature research was finished in week four, the interview with the facility department of Wageningen UR and the questionnaires among the customers were conducted in week five (week 48), and the interviews with the caterers were held in week six (week 49). The last two weeks were used to visualise the outcomes and finalise the report.

3. Results literature study

In order to answer the first part of the knowledge gap related to the sustainability index, a literature study was performed to answer the following question: *How can the nine elements for food sustainability be translated into measurable indicators of a sustainability index to measure the sustainability level of caterers at Wageningen UR, according to the literature?* The literature study resulted in the use of 30 articles from Scopus and Web of Science as can be seen in Table 3. Articles found were included or excluded based on relevance and the aspects mentioned in paragraph 2.1.1.

Table 3 - Literature research

Elements	Scopus	Web of Science
Emissions	Found: 53 Used: 3	Found: 4 Used: 0
Transport	Found: 44 Used: 0 Used: 1 via reference list	Found: 10 Used: 0
Energy	Found: 157 Used: 8	Found: 34 Used: 0
Water	Found: 72 Used: 2	Found: 27 Used: 0
Labour	Found: 20 Used: 0	Found: 7 Used: 0
Fair trade	Found: 11 Used: 2	Found: 3 Used: 1
Biodiversity	Found: 59 Used: 5	Found: 13 Used: 0
Animal welfare	Found: 14 Used: 4	Found: 0 Used: 0
Waste	Found: 61 Used: 2	Found: 13 Used: 2

The information of articles from those databases is enhanced with literature from sustainability initiatives like GreenKey (a label for sustainable businesses also in the catering industry), the criteria for sustainable procurement (Ministerie van Infrastructuur en Milieu, 2015) and Alliantie Verduurzaming Voedsel (2015). Furthermore, literature from smaller sustainability initiatives and sustainability labels is used.

The nine elements of the Alliance Verduurzaming Voedsel (2015) are described with the use of the above mentioned literature. First general information on each element is given. This is followed by linking the element to the catering sector and dividing the information according to the four catering categories (i.e. assortment, behaviour, equipment, product use). Each paragraph concludes with input for the index-indicators per particular element.

3.1 Element Emissions

The Alliance for Sustainable Food states that the element 'Emissions' is concerned with greenhouse gases and other noxious emissions in the air. Concrete examples of emissions to the atmosphere that need to be avoided are: carbon dioxide (CO_2), methane (CH_4), fluorinated carbonic substances, ozone (O_3), nitrous oxide (i.e. laughing gas, N_2O), and ozone-depleting emissions (e.g. ammonia, nitrogen dioxide) (Alliantie Verduurzaming Voedsel, 2015). The biggest share of greenhouse gases comes from CO_2 emissions, which causes this paragraph to focus on this aspect of sustainable emissions (Pandey, Agrawal, Pandey, 2010). The found difficulty to measure other gas emissions, like methane (CH_4), ozone (O_3) and nitrous oxide (i.e. laughing gas, N_2O), supported this choice (Wiedmann & Minx, 2008).

3.1.1 Emissions in the catering sector

Assortment

To reduce the emissions created by the production of assortment, caterers could incorporate products with the label 'Metric Sustainable Livestock' (Maatlat Duurzame Veehouderij). This label is provided to farms that prove to produce more sustainable animal products (SMK, 2015a). The use of vegetarian alternatives for certain food products would reduce emissions even further. Foods of animal origin use relatively more land and energy in comparison to vegetable-based products (Sáez-Almendros, Obrador, Bach-Faig & Serra-Majem, 2013). The production of meat substitutes also prevents emissions that come from manure and digestion processes of the livestock in normal meat production (SMK, 2015a). According to Ministry of Infrastructure and the Environment (2012), it is also important to take the CO_2 emissions from crop production in greenhouses into account. Companies who have received the labels 'Milieukeur' or 'Groen Label Kassen' show that they work with a saving standard with regard to the use of primary energy sources (Ministerie van Infrastuctuur en Milieu, 2012).

Behaviour

Literature shows that encouraging staff members to reduce their CO_2 emission in the form of transportation management can contribute to overall emission reduction. By stimulating other ways of transport (e.g. going to work by bike), the employees are made aware of their own contribution and possibilities to make their lifestyle more sustainable (Stichting Keurmerk Milieu, Veiligheid en Kwaliteit, 2015). Another perspective on reducing carbon emissions is to inform the consumer about the impact of the specific food product and to stimulate them to buy products that are less harmful for the environment (Pulkkinen, Roininen, Katajajuuri & Järvinen, 2015).

Product use

According to the study of Liqin (2011), the vast majority of the CO_2 emissions is related to the use of gas. In practice, for caterers this relates mostly to heating the food products.

Indirect sources of CO_2 emissions, which are far below the direct source of use of gas, are electric consumption (for lightning, air-conditioning, refrigeration), produced waste and water consumption (Liqin, 2011). Transport and waste management are elements that produce a large amount of emissions if they are not regulated and organized well (Wiedmann & Minx, 2008). Those factors will be further elaborated in the next paragraphs of this chapter since overlap exists between those elements.

3.1.2 Input for indicators

- Do you limit the heating of your food products?
- Do you use indicators on your products to inform the consumer about emissions produced per product?
- Do you offer meat substitutes to your consumers as alternative choice?
- Do you have a decreased amount of meat products in the assortment?
- Do your animal products contain the label of Metric Sustainable Livestock?
- Do your plant-based products contain labels like the Milieukeur or Groen Label Kassen?
- Do you have a transportation management plan for stimulating staff members in the use of bike or public transport (or walking)?

3.2 Element Transport

Transport is a major contributor of greenhouse gases (Chapman,2007). By the use of oil as one of the dominant fuel sources transport has a major impact on the global climate (Chapman, 2007). Already in 1997 the Kyoto protocol mentioned transport as one of the key sectors to tackle within sustainability; sustainable transport affects the three types of goals of sustainability: economic, social and environmental goals (Litman, 2015).

3.2.1 Transport in the catering sector

Assortment

The duration of travelling, also called the food miles, can be lowered by the use of local food producers. Local food producers are the producers within 30 to 50 miles of the food caterers (Lethinen, 2011). Local food producers are not found to be more sustainable than the bigger food producers, as this depends on the use of other resources to produce the food, however the shorter food supply chains do have advantages over longer food supply chains (Lehtinen, 2011). With the smaller supply chains the food miles are less, the visibility of suppliers is better and there are less hygiene and quality risks (Lehtinen, 2011). The criteria for sustainable procurement also suggest to buy seasonal and local products to lower the environmental impact (Ministerie van Infrastructuur en Milieu, 2015).

Behaviour

Apart from the food miles and the type of transport used by the food caterers, also the behaviour of the company's' employees plays a role in sustainable transportation. According to the norms of the GreenKey, a label for sustainable companies in the tourism and recreation branch, measures for sustainable transport of the employees have to be taken into account (Stichting Keurmerk Milieu, Veiligheid en Kwaliteit, 2015). Examples which are given are; giving a bonus for using the public transport instead of the car and promoting bike use by providing appropriate facilities Stichting Keurmerk Milieu, Veiligheid en Kwaliteit, 2015). Examples of Zegras (2006) and Veneca (2010) to measure sustainable transportation are focused on the frequency and duration of travelling (Zegras, 2006) and the moment of travelling (presence of traffic jams) (Veneca, 2014).

Equipment

The use of the vehicle can also influence the level of sustainability of transport (Champan, 2007; Veneca, 2014). Alternative fuels and vehicles are mentioned by Chapman (2007). Examples of those alternatives are the use of biofuels, the use of gaseous fuels, vehicles with hydrogen fuels or (hybrid) electric vehicles.

3.2.2 Input for indicators

- Do you limit the frequency of food transport?
- Do your suppliers use cars that limit the CO_2 emissions?
- Do you minimize food miles?
- Do you inspire your employees to come to work by a sustainable variant? (bike/walking/ bus, train)

3.3 Element Energy

Energy in the sustainability context can be defined as the responsible use of energy, and the aim to use as much as possible sustainable energy sources (Alliantie Verduurzaming Voedsel, 2015). Since this index is based on the sustainability of caterers, a bigger focus in the index shall be on the responsible use of energy instead of using possible sustainable energy sources.

3.3.1 Energy in the catering sector

Assortment

The type of products that caterers sell has an influence on the energy sustainability impact on the environment. Sáez-Almendros, Obrador, Bach-Faig and Serra-Majem (2013) found that an increase in following the Mediterranean Diet in Spain resulted in a 52% lower energy consumption. A Mediterranean diet is a plant-centered diet with moderately low amounts of animal foods. This lower energy consumption is mainly based on less meat, fish and dairy products. The researches of Wilson and Garcia (2011b) and Pimentel and Pimentel (2003) also found a higher energy use of animal protein compared to plant protein. Hybrid products have substituted a part of the animal proteins for vegetable protein resources (Ministerie van Infrastructuur en Milieu, 2012). Products that need to be prepared and stored cold require more energy than products that can be eaten without preparation, and have no need for cold storage (Lang & Barling, 2013). All the products that need extra processing and packaging, will cost extra energy along the supply chain (Friel, Barosh & Lawrence, 2013). Also food waste represents a big part of energy consumption (Lang & Barling, 2013). This will however be discussed further in the paragraph about the factor waste.

Behaviour

Replacing air filters from ventilation systems and optimising the space in an oven when it is used, are measures that can be taken into account for sustainable energy use (Peregrin, 2011). This is pointed out by Wilson and Garcia as well in relation to dishwashers (2011a). Furthermore, the importance of cleaning equipment, like defrosting a refrigerator, can reduce the energy costs by 23% (Peregrin, 2011). Besides that, turning off equipment when they are not used, e.g. coffee machines and a fryer saves of course a lot of energy (The Green Restaurant Association, N.D.a).

Equipment

An indicator that is used to measure the sustainability of energy-using equipment is checking up on the equipment, so for example measuring the temperature of the refrigerator, heaters, and thermostat (United States Environmental Protection Agency, 2012). Furthermore, more energy efficient equipment like a pasta-cooker could save up to 60% energy compared to range tops (Fusi, Guidetti & Azapagic, 2015). The investment to use LED-lights instead of normal light bulbs can already be paid back by reducing energy costs within four months (Peregrin, 2011). Indicators that the National Restaurant Association's Conserve Initiative (2015) puts forward are the use of Energy Star equipment, having a barrier between outside and main entrance, occupational sensors, and insulation around heating. Also, having a barrier between the walk-in refrigerator and the main area to retain the temperature is found to influence energy use (Stichting Keurmerk Milieu, Veiligheid en Kwaliteit, 2015).

Product use

Most of the energy in a restaurant, which can be compared to catering, goes to food preparation (35%) and HVAC; heating, ventilation and air conditioning (28%) (United States Environmental Protection Agency, 2012). Other sources are lighting (13%), refrigeration (6%), and sanitation (18%).

3.3.2 Input for indicators

- Do you use LED-lights?
- Do you leave the heating on during closing time?
- Do you leave the air conditioning on during closing time?
- Do you leave the ventilation on during closing time?
- Do you leave the lights on during closing time?
- Do you use soup wells that are fully insulated?
- Do you use food warmers that are fully insulated?
- Do you only put your equipment on when it will be used?
- Do you fill the oven totally when it is in use?
- How large is the percentage of food products in the assortment that contains meat, fish and dairy products?

3.4 Element Water

Factors that play a role in element about water are: water use, water and soil pollution and soil depletion (Alliantie Verduurzaming Voedsel, 2015). Due to an increasing distance between the food production and food consumption, and the involvement of a lot of stakeholders in the process, losses in the food chain arise. This has implications for water resources, like a higher use of water in agriculture and more water wastage (Lundqvist, 2008). Advantages of water savings are a reduction of costs, also energy costs, and protection of the environment. A reduction of water can also serve the interests of the society, like farmers and consumers (Lundqvist, 2008).

3.4.1 Water in the catering sector

Assortment

According to Saez-Almendros, et al. (2013) a Mediterranean diet pattern leads to 33% less water consumption, compared to a western diet pattern. This lower water use is mainly because of lower use of dairy products, vegetal oils and fats, and fish (Saez-Almendros et al., 2013). For the production of food, a large amount of water is needed, especially for beef. Beef cattle is responsible for 33% of the global water footprint in animal production (Gerber, 2015). Furthermore, different sustainability labels focus on careful use of water (Ministerie van Infrastructuur en Milieu, 2012).

Behaviour

Advices from Energy Star are to run fully loaded machines and use no more water than necessary by keeping an eye on the pressure gauge of the machine (United States Environmental Protection Agency, 2012). The 'MVO prestatieladder' states that organizations must provide insights in their water use, and they must reduce the water use from scarce resources (MVO Prestatieladder, 2010).

Equipment

Fusi, Guidetti and Azapagic (2015) found that cooking pasta in cookers saves 28% water compared to range tops. A program about external energy audits, executed by Energy Star, pays attention to water use in kitchens. Dishwashers use a lot of water and therefore Energy Star made a label for dishwashers that use on average 25 percent less water and energy than regular dishwashers (United States Environmental Protection Agency, 2012). The Green Key certification states that organizations must apply one water-saving measure. For example: pressure taps, sensor, taps, and reduce waterflow in taps. (Stichting Keurmerk Milieu, Veiligheid en Kwaliteit, 2015).

Product use

Water wastage also occurs in the food preparation process. The use of great amounts of water in restaurant kitchens has environmental effects. These great amounts of water are most of the time used for poor food preparation techniques, like thawing under running water (Martinelli et al., 2012).

3.4.2 Input for indicators

- How large is the percentage of beef products in your assortment?
- How large is the percentage of meat substitutes in your assortment?
- Do you thaw products under running water?
- Do you cook pasta in pasta cookers?
- Which energy label has your dishwasher (e.g. A, A+, A++)?
- Do you run fully load dish machines?
- Do you use pressure taps/ sensor taps?
- Do you reduce the waterflow in taps?

3.5 Element Labour

This element focuses on the working conditions for the employees of (food production) companies. The 'Alliantie Verduurzaming Voedsel' takes into account different elements related to labour. For example, the terms of employment, like salary, facilities, the collective agreement, trade unions, education and training, and personal development. Also the working conditions like health, safety and working hours are taken into account. Another aspect is the diversity and equality, this is focussed on discrimination and employment for people with a distance to the labour market. Other aspects of this element are illegal employment, voluntary work, child labour and the creation of employment opportunities (Alliantie Verduurzaming Voedsel, 2015).

3.5.1 Labour in catering

Behaviour

Most of the aspects of the element labour mentioned above from the Alliantie Verduurzaming Voedsel (2015) are defined in the collective agreement (CAO) for contract catering. Examples are the working hours and salaries. Salaries will be defined based on 'Handboek Referentie functies Contract catering'. Furthermore, each employee has a yearly interview with his/her supervisor about his/her performances, development and progress in the organization. Caterers must promote equal chances for men and women, and for all ages, sexes, sexual orientation, inclination, skin colours and races. The target group policy ('doelgroepenbeleid') in the contract catering CAO promotes the employment of people with a distance to the labour market (Vakraad voor de Contractcatering branche, 2015).

The human resource policy of the Wageningen UR is also focused on sustainable employability. Focal points are talent and leadership development, gender balance, academic integrity, internationalization and operational excellence (De Groot, 2015). Furthermore, Veneca, the Dutch association for caterers agreed with other facility service suppliers on the 'bidbook voor facilitaire dienstverlening', which sets steps to social responsible employment (OSB, Veneca and Nederlandse Veiligheidsbranche, 2011).

Poulston (2009) investigated in her research that employees working in hospitality services, like catering, complain about pay, breaks, workloads, and rosters. They complained also on negative management behaviours, like abuse of position, petty malice, discrimination, and bad management (Poulston, 2009). A study on working population in northern Sweden investigated the relation between burnout, working conditions and gender. Due to socioeconomic conditions of women, a higher level of burnout was set for women than for men. Other indicators that related to burnout were job insecurities and the demand and control level at work (Norlund et al., 2010).

3.5.2 Input for indicators

- Do you work conform the CAO contract catering?
- Do you have a social responsibility policy?
- Is the men/women ratio equal in your organization?
- Do you employ people of all kind of origins?
- Do you employ people with a distance to the labour market?
- Are your employees satisfied with the working conditions?

3.6 Element Fair trade

Fair trade can be seen as a more social aspect of sustainability (Tikkanen & Varkoi, 2011). It concerns the way in which companies include creating fair opportunities for mankind in their activities. Fair trade aims to achieve a more equal distribution of income between all stakeholders in the supply chain (Auroi, 2003). Companies can contribute to fair trade by paying attention to various matters, including human rights, fair prices and trade terms, right of indigenous population, diseases control, and compliance with (local) social legislation (Alliantie Verduurzaming Voedsel, 2015). Strong (1997) emphasizes that it is important to incorporate fair trade as it is the human component in the supply chain. This author states that fair trade is as important as the more environmental focussed factors of sustainability, but also indicates that it is harder to get consumers to change their purchasing behaviour towards fair trade choices (Strong, 1997)

3.6.1 Fair Trade in catering

Assortment

Corporate social responsibility is an often discussed subject in the catering sector (Tikkanen & Varkoi, 2011). There are many labels that are concerned with the concept of fair trade, the labels that are incorporated in the Dutch governmental guideline for sustainable procurement will be further elaborated (Ministerie van Infrastructuur en Milieu, 2012). The label UTZ Certified is mainly focused on the improvement of the working conditions of farmers who produce cocoa, tea and coffee. It provides farms with opportunities to improve their farming methods and take better care of their families and the environment (UTZ Certified, 2015). Milieukeur is a sustainability label that takes different elements of sustainability into account. For Fair Trade it focuses on a more social perspective of working conditions. Examples of guidelines from Milieukeur are: working conditions must be in agreement with the CAO of the sector, and the organization employs people with a distance to the labour market (SMK, 2015b). FairTrade Max Havelaar is the Dutch representative of the international FairTrade label. This organisation helps farmers and workers in Asia, Africa and Latin-America to acquire a better place in the supply chain to make sure the farmers can provide their families with their earnings and can invest in a sustainable future (Stichting Max Havelaar, 2015). The organisation of The Rainforest Alliance label focuses mainly on the environmental impact of farming and has, inter alia, the goal to preserve the existing ecosystems and wildlife as much as possible. Other labels that focus on fair trade within a more specific product group are Fair Produce for mushrooms (Stichting Fair Produce Nederland, 2015), RTRS for soy products (RTRS, 2014) and RSPO for palm oil (Roundtable on Sustainable Palm Oil, 2015).

3.6.2 Input for indicators

- Are your coffee, tea and cocoa products UTZ certified?
- Do you have products in your assortment with the Milieukeur label?
- Do you have products in your assortment with the FairTrade Max Havelaar label?
- Are your products Rainforest Alliance certified?
- Are your mushrooms, soy and palm oil products labelled with respectively the Fair Produce, RTRS and RSPO label?

3.7 Element Biodiversity

Biodiversity is about the contribution of the business world towards the variety of animals and plants in the world, the more the better (Alliantie Verduurzaming Voedsel, 2015). This variety of species in the world is declining. For example, from 1970 onwards, the vertebrate populations have declined with 30% on average (Allen, Prosperi, Cogill & Flichman, 2014). The environment and food are interlinked in this process, since environmental degradation can affect food systems negatively, but the food systems themselves cause pollution and waste in the environment (Allen, et al., 2014). Furthermore, the use of intensive agriculture affects the biodiversity in the soil and influences the environment in this way (Allen, et al., 2014). Therefore, the idea of sustainable diets has become more apparent over the years. Sustainable diets are diets with low environmental impact. These diets do take into account the security of food and health in present and future lives. (FAO, 2010).

3.7.1 Biodiversity in the catering sector

Assortment

Aiking (2014) argues that the use of animal protein production and consumption are a major driver of biodiversity loss, since the use of plant protein could be six fold (Aiking, 2014). Aiking (2014) therefore advocates for a reversed diet transition by using more plant proteins and less animal proteins. Other ideas of a sustainable diet do exist. One example is the idea of a Mediterranean diet to be sustainable, however more evidence is needed to prove its effectivity (Burlingame & Dernini, 2011).

Apart from the sustainability of the diet, also the way of food production can have an influence on whether the ecosystems are harmed or not. The use of organic farming is found to be a solution, since this is aimed at producing foods whereby the ecosystems are harmed as minimal as possible (Seufert, Ramankutty & Foley, 2012). A disadvantage of the use of organic crops however, is the lower yields compared to conventional agriculture, which comes at stake when the goal is feeding the growing world population (Seufert, Ramankutty & Foley, 2012). The control on the use of organic food products can be done by looking for food labels which are focused on organic food production. Examples of those organic food labels are the 'EKO-label', which is used when products are for 95% originating from organic agriculture. This label is a European label, which is prohibited on all organic food products since 2012 (Alliantie Verduurzaming Voedsel, 2015). The EKO-label is controlled by the agency 'Skal', which has regulations for deciding whether products can be named 'organic' (Skal, 2015). However, those regulations are not usable for the self-made products of the catering branch. Therefore, the foundation Cercat, made its own regulations for its contracted caterers (Cercat, 2015). Furthermore, the ISO 14001 is a norm which is used worldwide for environmental management systems. Those systems make sure that the companies who are ISO 14001 certified are controlling their impact on the environment (Alliantie Verduurzaming Voedsel, 2015).

Not only the agriculture and the diet can influence the biodiversity. Also the fishing industry can have major influences on the biodiversity in the sea. The way that caterers can control the biodiversity in the sea, is by the use of several labels. The first one is the Marine Stewardship Council (MSC), which controls that as little as possible damage is done to the life in the sea (MSC, 2015). This label is not focused on animal welfare, only on biodiversity. With this in mind, the MSC made it possible that fishing companies can be evaluated separately on biodiversity and animal welfare. Another label which is among others focused on the biodiversity in the sea, is the Aquaculture Stewardship Council (ASC) (ASC, 2015). This label is a certification in best practises around fishing harvest.

3.7.2 Input for indicators

- Do you purchase organic food products, with the EKO label?
- Are you ISO 14001 certified?
- Are you contracted to Cercat?
- Do you provide a vegetarian alternative in minimal 3 of the 4 categories daily: soup, salad, snack, bread (minimum 2)?
- Do you purchase ASC- or MSC- fish?

3.8 Element Animal welfare

The Alliantie Verduurzaming Voedsel (2015) clearly defines what animal welfare means in regard to sustainability: *"it includes physical and emotional (well)being of animals, …, it concerns the absence of disease and other physical disabilities.".* In order to translate this definition to the catering sector a bigger focus needs to be on the products they have in their assortment, than the activities they perform themselves. Aspects that are related to animal welfare are for example, the quality of animal housing, the quality of animal transport, and the slaughtering procedures, but also aspects like the use of hormones and medicines, resistance to antibiotics, and disease prevention (Alliantie Verduurzaming Voedsel, 2015). Those are aspects that the caterers should take into account when selecting products (Alliantie Verduurzaming Voedsel, 2015). It should furthermore be mentioned that the paradigm of animal welfare used by producers is different from the one perceived by consumers (Borkfelt, Kondrup, Rocklinsberg, Bjorkdahl & Gjerris, 2015). This can be overcome by using objective, well defined indicators in labelling systems. Furthermore, also the lack of education or attitude from people that deal with animals can result in reduced animal welfare (Godfray & Garnett, 2014; Fraser, 2001). This means that welfare cannot be measured only by using external parameters of the living environment (Blokhuis, Jones, Geers, Miele & Veissier, 2003). Indicators are now sometimes used based on stereotyped behaviour, however it can be the case that an animal adapted in a certain way to an inadequate environment (Blokhuis et al., 2003). Therefore, these indicators are not always fully inclusive.

3.8.1 Animal Welfare in the catering sector

Assortment

As mentioned above, for the catering sector this topic is especially relevant for the products they sell. To improve sustainability in relation to animal welfare a caterer can sell products with a label, or replace animal products with vegetarian options. Currently, there are already a lot of labelling systems for products that have to do with animal welfare, which are also stated by Alliantie Verduurzaming Voedsel (2015). One of the best known is the Beter Leven label from the animal protection agency in the Netherlands. This labelling system consists of a three-star system, in which the criteria for each level are different per animal type and stage of the supply chain. So, for example different criteria exists for a farm with laying hens or a company that processes boiled eggs (Dierenbescherming, 2015). The criteria are subdivided into different themes, that are closely related to the aspects mentioned above: nutrition, management, health, animal housing, transport, and slaughtering. For caterers their sustainability level in regard to animal welfare could thus be graded based on the amount of products they sell with a 1, 2, or 3-star label of the animal protection agency. Other labels only cover part of the supply chain, like the label from the Dutch governmental institution PVE in cooperation with Producert; Scharrelvlees. They certify companies with this label based on rules in relation to the living environment of the animals (Producert, 2015). Sometimes these smaller labels are also incorporated into the better life label from the animal protection agency, like Label Rouge from the French government (Alliantie Verduurzaming Voedsel, 2015).

Besides meat products, also labels exist on other type of animal products such as milk and eggs. One label exists for pasture milk, for which the following criteria is used; milk from cows that from spring to autumn stand at least 120 days a year, at least six hours a day in the meadow (Stichting Weidegang, N.D.). For eggs specifically the Alliantie Verduurzaming Voedsel (2015) provides two kind of labelling systems. First of all, the former CPE "scharreleieren" label. This label is granted to eggs from chicken that can wander around in barns with bedding material on the floor (Alliantie Verduurzaming Voedsel, 2015). Another scaling for this label is "Vrije-uitloopeieren". Here the chickens have more space to wander around, since these chickens also need to be able to go outside. At least four square meters per chicken should be available (Alliantie Verduurzaming Voedsel, 2015).

3.8.2 Input for indicators

- Do you have vegetarian alternatives in your assortment?
- Do you have animal products that have a 1-star label of the animal protection agency?
- Do you have animal products that have a 2-star label of the animal protection agency?
- Do you have animal products that have a 3-star label of the animal protection agency?
- Does the milk you sell and/or use contain the Weidegang or another sustainability label?
- Does the meat you use contain the Scharrelvlees label or another sustainability label?
- Do the eggs you sell and/or use contain the Scharreleieren label?
- Do the eggs you sell and/or use contain the Vrije-uitloopeieren label or another sustainability label?

3.9 Element Waste

Sustainability of waste in the catering sector mainly focuses on the prevention of waste (Alliantie Verduurzaming Voedsel, 2015). Waste prevention can be divided into bio-waste (e.g. food) and non-biowaste (e.g. packaging) (Manfredi et al., 2012).

3.9.1 Waste in the catering sector

Assortment

The FAO (Food and Agriculture Organization of the United Nations) estimated that globally around 30 percent of cereals, 40-50 percent of fruits and vegetables, 20 percent of oilseeds, meat and dairy products and 35 percent of fish goes to waste (FAO, 2014). Food waste in the Dutch catering sector can have different causes, of which the most important one is that the caterer does not know beforehand how many guests can be expected in the restaurant (Soethoudt, 2012). Products that are most prone to be wasted are the large pan of soup and the salad bar, followed by milk and buttermilk (Soethoudt, 2012). Furthermore, advices are given to use reusable tableware, to make agreements about smaller packing units, the inventory system, waste processing, a limited menu, and make only meals on order just before closing times (Ministerie van Infrastructuur en Milieu, 2015). The type of packaging that could be used best is not agreed on yet (Accorsi et al., 2014). When it comes to packaging, different aspects play a role. For example, recyclable plastics are better for the environment in the manufacturing phase (less new products have to be made), whereas single-use plastics do not have to be transported as much as recyclable plastics. As the type of packaging that should be used is debatable, in this research the focus lies on reducing the amount of packaging and the separation of the waste from packaging. In the Netherlands, waste can be separated into glass, paper and cardboard, bio-waste, tins, plastics, electronics and cooked foods (Dutch: swill) (MilieuCentraal, 2015).

Behaviour

Several national and international initiatives have set indicators for sustainable catering. In the area of waste, in order to receive The Green Key, the restaurant has to separate its own waste into bio-waste and plastics, and also give their customers this opportunity. The Green Restaurant (N.D.b) mentions several indicators for sustainable waste management, like bringing leftover foods to the Food Bank and/or a shelter, and the choice for customers to take a smaller portion for a decreased price. Thiagarajah and Getty (2013) found in their research that the presence of trays to carry the food on might induce customers to take more food than they intended to eat, leading to more waste. For non-bio waste, the indicator that attributes most to the environment in a negative way is packaging (Accorsi et al, 2014). To prevent waste, the Green Restaurant (N.D.b) mentions indicators like a paperless payroll for employees, the possibility for customers to bring their own mugs, and returnable packages from suppliers. Another certificate for sustainability is the MVO (Maatschappelijk Verantwoord Ondernemen) management system certificate, which is measured with the MVO Prestatieladder (MVO Prestatieladder Stichting Duurzaam Verantwoord, 2013). Indicators for sustainable waste management are transparency of the organisation about its waste management and the recycling of as many products as possible. The criteria for sustainable procurement (2015) give suggestions to limit waste. It is wise to make an overview of the actual food use during lunch to limit waste.

Product use

To reduce the food waste of the caterer, leftovers could be used in meal planning for the next day or caterers could use the 'op=op' standard (Soethoudt, 2012).

3.9.2 Input for indicators

- Do you offer trays?
- Do your suppliers deliver their products in returnable packaging?
- Do you know how many customers you will welcome (e.g. are you informed when there are activities planned so you can expect more guests?)?
- Can people bring their own plate, cutlery and mug?
- Are smaller portions of food offered against a lower price (e.g. 25% off for a smaller portion)
- Are left-overs used in the meal planning for the next day(s)?
- Do you separate bio-waste?
- Do you separate plastic?
- Do you separate paper & cardboard?
- Do you separate glass?
- Are you aware of the amount of waste per week?

3.10 Overview

The question which this literature research was focused on was: *"How can the nine elements for food sustainability be translated into measurable indicators of the sustainability levels of caterers at Wageningen UR, according to the literature?"* Literature research was performed on all nine elements of the Food Alliance which provided a translation of the elements towards usable information for measuring the sustainability of the caterers at the Wageningen UR. In Table 4 the columns are formed according to the ways in which the elements play a role in the sustainability of the catering company. Those ways have an influence on the equipment of the caterers, the behaviour of the caterers and their employees, the assortment of the caterers, and the use of the products.

It can be noticed that the use of certain equipment to be more sustainable, is only linked to the elements emissions, transport, energy, water and labour. For both the emissions and the transport element the use of the right vehicle and the use of as little transportation as possible is important. Furthermore, the efficiency of the equipment, preferable with an Energy Star label, is important to both the use of water and energy in a sustainable way.
The awareness of the employees, towards the effect of CO_2 emissions, the use of energy, water, transportation, and waste is important in five of the nine elements for sustainability.
The assortment has influence on sustainability according to eight of the nine elements of the Food Alliance. The most important results are that the use of meat should be limited and the use of vegetables and preferably organic food is valued. By translating the elements of fair trade, animal welfare and biodiversity towards the catering sector, the main indicator of sustainability is the use of a certain amount of labelled products by the catering company.
The use of the product is mainly focussed on the most sustainable way of processing or stocking products. For the sake of emissions and energy use, it is valued that as less heating as possible is applied to products. Furthermore, products which require little packaging are both sustainable according to the use of energy and the production of waste.

Table 4 - Elements restructured

Elements	Equipment	Behaviour	Assortment	Product use
1. Emissions 	/	•Inform consumer about the CO_2 impact •Awareness among employees and promotion of sustainable transport	•Use little meat •Use products with the label Metric Sustainable Livestock •Use crops from sustainable greenhouses	•Heat as little products as possible
2. Transport 	•Use vehicles with low CO_2 emission	•Efficient use of transport (shorter travelling, moment of travelling) • Promotion of sustainable transport	•Use local products •Use seasonal products	/
3. Energy 	•Use Energy Star label •Use LED lights •Use efficient equipment instead of for example range tops	•Cleaning the equipment •Awareness of use of the equipment (on/off)	•Use Mediterranean products (less meat, fish and dairy products) •Use no animal products or use substitutes •Use products who provide little waste/ limit use of packaged products	•Limit preparation of food products •Limit freezing/cooling of products

4. Water 	•Use pasta cookers instead of range tops •Use Energy Star label dishwashers •Use Pressure taps, sensors, etc.	•Run fully loaded dishwashers •Use no more water than necessary	•Use no beef •Use Mediterranean diet instead of Western diet	•Avoid water waste during preparation by not thawing under running water
5. Labour 	/	•Max. 9 hours of working a day •No discrimination •CAO salaries •Healthy and safe working conditions	/	/
6. Fair trade 	/	/	•Use products with the following labels: UTZ Certified, Mileukeur, FairTrade Max Havelaar, Rainforest Alliance, Fair Produce, RTRS and RSPO label	/
7. Biodiversity 	/	/	•Use little meat/ provide vegetarian alternatives •Use organic foods •Use products with the following labels: EKO label, Cercat label, ISO 14001 label, MSC, ASC label	/
8. Animal welfare 	/	/	•Use products with the following labels: Better Life label (1-3 stars), Scharrelvlees label, Scharreleieren label, Vrije-uitloopeieren label	/
9. Waste 	/	•Separate own waste •Give the customers the opportunity to separate waste •Provide no trays •Know the amount of guests	•Returnable packaging •Provide smaller portions of food	•Left overs should be used in meal planning for the next day •Limit packaging

4. Results – Questionnaires

4.1 Descriptive statistics

In total 370 questionnaires were handed out to customers of caterers on Wageningen campus. To get a representative sample of all the customers of the caterers, all the catering locations were taken into account. Therefore 58 questionnaires were collected at GoodFood in the Leeuwenborch building, 41 at Sodexo in Restaurant of the Future, 80 at OSP in Orion during lunch time, and 20 at OSP in Orion during dinner time. In Atlas 32 questionnaires were collected at Cormet, 97 at Cormet in Forum during lunch time, 20 at Cormet in Forum during dinner time, and 22 at Cormet in Lumen. These amounts were chosen based on the relative size of the catering locations.

The 370 questionnaires were filled in by 175 men and 195 women. The sample had on average an age of 31 with a standard deviation of 12 years. The minimum age was 18, with the highest value being 69. An age graph can be seen in Figure 3. The respondents were asked at which science group they studied or worked, which resulted in the following results: 93 Agro and Food Science, 15 Animal Science, 83 Environmental Science, 39 Plant Science, 71 Social Science, and 64 Other. This division reflects the fact that in the first group, Agro and Food Science, multiple studies are linked, while the science group Animal Science only contains one study. By categorising the answers given in the last category 'Other', the following departments could be found: Facility Department (24) and Rikilt (5). The remaining 35 could not be categorised further, such as visitors or an OWI employee. The labelling system for the open questions can be found in Appendix C1.

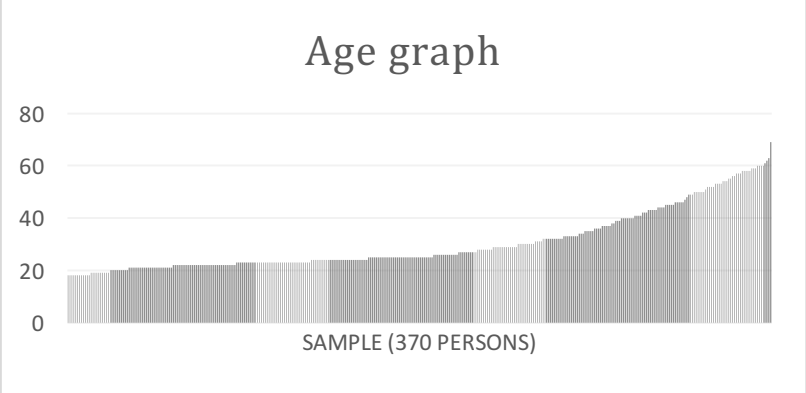

Figure 3 - Age graph sample questionnaire

4.2 General sustainability

368 respondents filled in the question about their opinion on the importance of sustainability in the catering sector. Response options were between 1-7 (very unimportant - very important). On average respondents gave sustainability an importance of 5.4 with a standard deviation of 1.4. When the counts are compared it can be seen in Table 5 that most respondents reported a 6 on this question. Very few people gave sustainability an importance of a 1 or 2 (18 respondents).

Table 5 - Count distribution importance sustainability

Opinion on sustainability	**Count of response (368 in total)**
1	11
2	7
3	19
4	46
5	87
6	116
7	87

Respondents thus valued sustainability to a certain extent in the catering sector. However, when customers were asked if they made a deliberate sustainable choice when buying food at a WUR canteen, only 97 of the 362 respondents that filled out this question answered yes. This means that 73% of the respondents did not include sustainability into their process of buying food at a WUR canteen. For both answers some respondents included the reason for their answer. These reasons could be categorised and show some overlap. 73 Respondents answered yes and gave a reason, these reasons can be seen in Table 6.

Table 6 - Labelling reasons yes questionnaire

Label reason yes	**Count**
Vegetarian	26
Plastic avoidance	9
Packaging avoidance	7
Waste avoidance	9
Other	22

Answers that 232 respondents gave for their no-answer can be found in Table 7.

Table 7 - Labelling reasons no questionnaire

Label reason no	**Count**
No clear information, unaware, no options	68
Do not care	39
Do not buy (often/much) at canteen	27
Responsibility of WUR/caterer	17
Price more important	12
Taste more important	46
Other	23

In the comment section at the end of the questionnaire place was reserved for respondents to add any remaining remarks. These were also categorised into three labels. Of the 65 customers that did mention a comment, 18 respondents asked for more information or options in relation to sustainability. Price concerns were mentioned by 8 respondents. The other 39 remaining comments could not be categorised.

4.3 Importance of the elements

In Figure 4 an overview of the average values of importance graded by respondents to the different elements can be seen. It is seen that the highest score on importance is awarded to the element waste, a 5,96. The lowest score on importance was a 4,92 for the element biodiversity. After making histograms of the separate questions per element in SPSS it was seen that the data is not normally distributed among the elements. The histograms and frequency tables per element can be found in Appendix C2. Therefore, no standard deviations are inserted in this figure. Due to the shift of the graph to the right, the standard deviations are namely larger to the lower side of the spectrum than to the higher side.

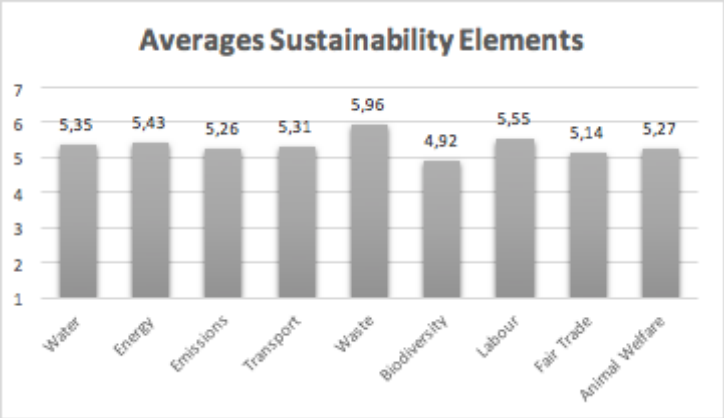

Figure 4 - Averages sustainability elements questionnaires

To test this even further a Shapiro-Wilk test was used (applicable to datasets smaller than 2000 elements) to test for normality. In Figure 5 it can be seen that none of the elements were normally distributed, since they were all highly significant ($p<0.001$). Therefore, a parametric test could not be used to compare the means between the elements.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Water	,209	330	,000	,879	330	,000
Energy	,199	330	,000	,860	330	,000
Emissions	,177	330	,000	,892	330	,000
Transport	,181	330	,000	,885	330	,000
Waste	,262	330	,000	,748	330	,000
Biodiversity	,173	330	,000	,901	330	,000
Labour	,184	330	,000	,852	330	,000
Fair Trade	,163	330	,000	,905	330	,000
Animal Welfare	,185	330	,000	,877	330	,000

a. Lilliefors Significance Correction

Figure 5 - Shapiro-Wilk test for normality

This remark in relation to normality also needed to be taken into account when doing a statistical analysis on these nine averages in SPSS. The variables are therefore not scale-variable, but ordinal. This resulted in the use of a non-parametric test, namely the Friedman's ANOVA. This test translates all the scores per respondents in rank scores. During the analysis it is tested if one average score differs from the other average scores. The SPSS output from this non-parametric test can be seen in Figures 6 and Figure 7.

Ranks

	Mean Rank
Water	4,94
Energy	5,17
Emissions	4,80
Transport	4,81
Waste	6,40
Biodiversity	4,22
Labour	5,41
Fair Trade	4,37
Animal Welfare	4,87

Figure 6 - Ranks Friedman's ANOVA

Test Statistics[a]

N	330
Chi-Square	209,031
df	8
Asymp. Sig.	,000

a. Friedman Test

Figure 7 - Test statistics Friedman's ANOVA

It can be seen that one of the averages differed from the others significantly with a p value of <0.001. The output of this test does however not tell which score differed from which others. Therefore, pairs had to be compared mutually. Since no posthoc test is available for this non-parametric test, a Wilcoxon Signed-rank test was used. This test uses the same concept as Friedman's ANOVA, but can be applied on pairs. This means that 36 combinations between the nine elements were made. Due to the fact that multiple tests had to be performed, a Bonferroni correction had to be made to achieve the desired confidence interval of 90%. This means that the alpha (in this case 0.10) needed to be divided by the number of comparisons (36) used. This resulted in an alpha of 0.003 for all the comparisons. Comparisons with a p value below this new alpha were then found significant. In Figure 8 the output from all the Wilcoxon Signed-rank tests was found. The comparisons that were significant were highlighted in green. It can be seen that waste was significantly higher than all other elements. Furthermore, biodiversity was significantly lower than all other elements, except for Fair Trade. Lastly, Labour was significantly higher in comparison with five from the eight other elements.

Test Statistics[a]

	Energy - Water	Emissions - Water	Transport - Water	Waste - Water	Biodiversity - Water	Labour - Water	Fair Trade - Water	Animal Welfare - Water
Z	-2,049[b]	-1,327[c]	-,286[c]	-8,327[b]	-4,311[c]	-2,400[b]	-2,422[c]	-,834[c]
Asymp. Sig. (2-tailed)	,040	,185	,775	,000	,000	,016	,015	,404

	Emissions - Energy	Transport - Energy	Waste - Energy	Biodiversity - Energy	Labour - Energy	Fair Trade - Energy	Animal Welfare - Energy
Z	-2,933[b]	-2,165[b]	-7,198[c]	-5,923[b]	-1,007[c]	-3,751[b]	-2,003[b]
Asymp. Sig. (2-tailed)	,003	,030	,000	,000	,314	,000	,045

	Transport - Emissions	Waste - Emissions	Biodiversity - Emissions	Labour - Emissions	Fair Trade - Emissions	Animal Welfare - Emissions
Z	-,357[b]	-7,957[b]	-3,886[c]	-3,114[b]	-1,917[c]	-,267[c]
Asymp. Sig. (2-tailed)	,721	,000	,000	,002	,055	,789

	Waste - Transport	Biodiversity - Transport	Labour - Transport	Fair Trade - Transport	Animal Welfare - Transport
Z	-8,686[b]	-4,625[c]	-3,124[b]	-2,251[c]	-,581[c]
Asymp. Sig. (2-tailed)	,000	,000	,002	,024	,561

	Biodiversity - Waste	Labour - Waste	Fair Trade - Waste	Animal Welfare - Waste
Z	-10,354[b]	-5,560[b]	-8,757[b]	-8,124[b]
Asymp. Sig. (2-tailed)	,000	,000	,000	,000

	Labour - Biodiversity	Fair Trade - Biodiversity	Animal Welfare - Biodiversity
Z	-6,546[b]	-2,143[b]	-4,257[b]
Asymp. Sig. (2-tailed)	,000	,032	,000

	Fair Trade - Labour	Animal Welfare - Labour
Z	-4,835[b]	-3,013[b]
Asymp. Sig. (2-tailed)	,000	,003

	Animal Welfare - Fair Trade
Z	-1,666[b]
Asymp. Sig. (2-tailed)	,096

Figure 8 - Output Wilcoxon's Signed-rank test in which green is significant p<0.003.

5. Results – Facility department interview

The interview with the facility department is conducted with Mrs. Schoonman, contract manager of the facility department. One of her responsibilities is the contracts with the caterers. According to Mrs. Schoonman, sustainability is very important to Wageningen UR. Wageningen UR won the SustainaBul award three times on a row, and it is important to keep this first position in sustainability. Furthermore, the facility department makes improvements in sustainability in the operational processes. Green Office is the department which mainly communicates about sustainability to the students of Wageningen UR.

5.1 Sustainability in catering

Within the interview it was told that two and a half years ago the catering companies were contracted by Wageningen UR. Cormet and OSP were contracted via a tender, GoodFood was deliberately selected and Sodexo already had a contract in the Restaurant of the Future. The most important elements in the contracts with the caterers were customer satisfaction and experiences of the customers. Besides customer satisfaction, the Criteria for Sustainable Procurement (determined by the government) in the catering sector are taken into account. For example, 40% of the assortment of the caterers, even divided in different product groups, has to be sustainable.

5.2 Collaboration between caterers and facility department

Mrs. Schoonman explained that yearly, all caterers have to provide their sustainability policy to the facility department. The caterers decide about their own suppliers and assortment. The facility department however stimulates the caterers in their choice of the sustainable alternative. Mrs. Schoonman stated that it is important to have a common goal with the caterers.

> '*We have to think about how they can be profitable, but also how to achieve our common goals'*.

An example of a sustainability issue for the caterers was the 'meatless Monday' initiative of Green Office, on which the caterers got a lot of complaints. Therefore, the facility department started conversations with the caterers to think about solutions for their problems, and compromises were arrived. Another issue was waste.

> '*We obligate the caterers to have a wide assortment two minutes before closing times, but also want less waste*'.

The location managers and caterers have to pick up these issues together and find compromises. Regularly, there are contact moments between the facility department and the caterers to discuss those issues and to discuss about the performances of the caterers and catering-related projects at Wageningen UR.

5.3 Index

Currently, the facility department has no tools to measure the sustainability level of the caterers at Wageningen UR. According to Mrs. Schoonman some elements, like CO_2 emissions, are hard to measure. Therefore, she is looking for an index which indicates possibilities for improvements in the sustainability level of the caterers. After presenting the nine elements of sustainability, Mrs. Schoonman mainly focused on what customers would find important. With this in mind she immediately stated her five most relevant elements: water, waste, biodiversity, fair trade, and animal welfare. Mrs. Schoonman chose those elements because she expected them to be visible for the customers.

After immediately expressing her five most relevant elements, Mrs. Schoonman ranked all separate elements on importance on a scale from one to seven (very unimportant to very important). Both energy use and labour were ranked with a five. According to Mrs. Schoonman energy use is less visible for the customers. She also stated that the assortment that the customers desire is determinative. If customers want certain products, a certain amount of energy is needed. Within the labour element Mrs. Schoonman acknowledged the importance of employees being aware about health, safety and environment.

Water use was ranked a six, as were emissions, transport, biodiversity, animal welfare and fair trade. Mrs. Schoonman argued about water use:

> *'It is quite easy to improve this element by some technical changes'*.

Water wastage was also seen as quite visible for the customers. Both emissions and transport were important according Mrs. Schoonman, however she found difficulty in thinking of possible improvements in those sectors. Furthermore, she acknowledged that the caterers sometimes had to use more transport because of the requests of the WUR for the caterers to go to multiple buildings on the campus. The elements biodiversity, animal welfare and fair trade were ranked with a six, because Mrs. Schoonman thought those elements could be made fairly visible to the customers (with the use of labels), but she doubted whether customers would buy those 'more expensive' products.

The element waste was ranked with a seven. Waste is seen as important because this is visible for the customers. There are however also issues in waste, because the caterers have to present choices for customers even two minutes before closing time, which can cause a lot of food waste. Mrs. Schoonman stated that the caterers can influence the customer satisfaction as well as the environment by their assortment choices. The caterers have to make conscious decisions to meet both.

Table 8 illustrates the five elements that were perceived as most important by the facility department, and the scores given to each element.

Table 8 – Important elements Facility management

Relevant elements	**Score**
Water	6
Waste	7
Biodiversity	6
Fair Trade	6
Animal Welfare	6

6. Results – Index

A sustainability index was created to measure the sustainability levels of caterers. This index is based on four elements of the 'Alliantie Verduurzaming Voedsel'. Four out of nine elements were chosen based on an interview with the facility department and questionnaires among customers.

6.1 Choice of elements

The choice of the elements was based on the opinion of the customers and the opinion of facility department. The most important elements chosen by both stakeholders were put side by side to make the final choice of the elements for the index. The most important elements for the facility department were water, waste, biodiversity, fair trade, and animal welfare. For customers the most important elements were waste, labour, energy, and water. Waste was rated significantly higher than all other elements and therefore incorporated in the index. From the interview with Mrs. Schoonman it can be concluded that waste was the most important element of sustainability as well. Water is important to both the facility department and customers, so this element is also included in the index. Labour was found to be the second most important element according to the customers. This element is significantly higher compared to four out of eight other elements. As Mrs. Schoonman mentioned that the customer's wishes are important for the facility department, the element labour is also used in the index. Energy is the third most important element for customers, so this element is also included. Biodiversity is not included in the index despite the fact that facility management did mention this element as important. The reason for this is that biodiversity is the least important element for the customers. This element is significantly lower than all other elements except fair trade. Fair trade is not incorporated in the index since this element was scored significantly lower by customers compared to three other elements.

It has to be noted that the importance attached to the elements is subjective and does not indicate the real importance of the element with relation to sustainability. Mrs. Schoonman for example perceived waste as an important element because of the visibility of this element, which does not indicate whether this element also has more effect on the general concept of sustainability of caterers, compared to other elements.

6.2 Weight indicators

To find out which indicators are seen as most relevant and important within Wageningen UR, the head of the facility department was asked to attach a weight to each indicator. Drs. AA (Annet) de Haas gave a weight on a scale of 0 to 10 that indicated the importance of the indicators of the chosen elements. Within the rating, she took into account the control of the caterers, by giving indicators out of the control span of the caterer a weight of 0. As can be seen in chapter 6.3.3, this is applied to the indicators concerning (LED-)lights, heating, ventilation and air conditioning.

6.3 Creation of the index

The index can be found on the next pages in Figure 9-12. As it is an Excel-format with formulas behind certain cells, codes as "#DEEL/0!" or "ONWAAR" can be seen. This should not be taken into account. The input for the indicators from the literature research is translated to measurable questions in the index, the first column. The index consists of the four elements chosen, and each element is translated into multiple measurable questions. Most of the times, the questions can be answered with 'yes', 'no' or 'partly/sometimes' or a percentage needs to be given. The answer options are shown in the second column per question. The scores are elaborated upon practical examples of sustainability criteria, as can be seen in the third column. By filling in an answer in the column 'answer' the programme automatically calculates the score in the column 'score' based on a formula. The weights per answer element, as perceived by the facility department as described above, are found in the sixth column. This leads to an eventual weighted score per question and eventual grade per element.

Sustainability is a dynamic concept, influenced by time, perception and circumstances. Therefore, the index to measure this concept should also be dynamic. In order to achieve this, room has been reserved for decision makers to add questions to the index in relation to other circumstances than the ones currently used. Also the weighing of the indicators can be adapted, if the index is used under different circumstances and in a different time. It should however be mentioned that this addition should only be made if the addition is relevant and substantiated. Furthermore, this decision has to be made by the overarching organisation with no stake in the matter, if a comparison between different caterers wants to be made.

6.3.1. Element Waste

Input for indicators	Answer options	Points division	Answer**	Score	Weight WUR***	Weighted Score
Do you offer trays?	Yes/No	Yes = 0, No = 10		ONWAAR	2,5	0
Which percentage of your assortment is delivered in returnable packaging?	0-100%	0=0, 10=1,…100=10		0	2,5	0
Do you know how many customers you will welcome (e.g. informed about activities planned)?	Yes/No	Yes =10, No = 0		ONWAAR	2,5	0
Do you offer reusable plates, cutlery and mugs?	Yes/No	Yes =10, No = 0		ONWAAR	7,5	0
Are smaller portions of food offered against a lower price (e.g. 25% off for a smaller portion)?	Yes/No	Yes =10, No = 0		ONWAAR	2,5	0
Are left-overs used in the meal planning for the next day(s)?	Yes/Some/No	Yes =10, Some=5, No = 0		ONWAAR	8,5	0
Are food leftovers of customers seperated from other waste (e.g. plastics, paper)?	Yes/No	Yes =10, No = 0		ONWAAR	8	0
Is food waste from production seperated from other waste?	Yes/No	Yes =10, No = 0		ONWAAR	8	0
Is the plastic waste of customers seperated?	Yes/No	Yes =10, No = 0		ONWAAR	8	0
Is the plastic waste of production seperated?	Yes/No	Yes =10, No = 0		ONWAAR	8	0
Is paper and cardboard waste from customers seperated?	Yes/No	Yes =10, No = 0		ONWAAR	8	0
Is paper and cardboard waste from production seperated?	Yes/No	Yes =10, No = 0		ONWAAR	8	0
Is glass waste from customers seperated?	Yes/No	Yes =10, No = 0		ONWAAR	8	0
Is glass waste from production seperated?	Yes/No	Yes =10, No = 0		ONWAAR	8	0
Are you aware of the amount of waste in kg per week?	Yes/Partly/No	Yes =10, Partly=5, No = 0		ONWAAR	8	0
*Additions**						
Total score					98	0
Maximum score (using weights given by WUR)						980
Final result element Waste (scale;0-10)						0,0
** Additions; extra lines for additional questions*						
*** Answer; as obtained by ACT group*						
**** Weight WUR; importance of specific question as perceived by WUR (scale; 0-10)*						

Figure 9 – Index element waste.

6.3.2. Element Labour

Input for indicators	Answer options	Points division	Answer**	Score	Weight WUR***	Weighted Score
Do you work conform the CAO contract catering/horeca?	Yes/No	Yes=10, No=0		ONWAAR	10	0
Do you have a social responsibility policy?	Yes/No	Yes=10, No=0		ONWAAR	10	0
What is the men/women ratio in your organization?	50-50,40-60,30-70,20-80,10-90,0-100	50-50=10,40-60=8,..0-100=0		ONWAAR	2,5	0
Do you employ people of all kind of origins?	Yes/No	Yes=10, No=0		ONWAAR	8	0
*Do you employ people with a distance to the labour market?****	Yes/No	Yes=10, No=0		ONWAAR	10	0
Are the employees satisfied with the working conditions?	Yes/Some/No	Yes=10, Some=5, No=0		ONWAAR	8	0
*Additions**						0
						0
						0
Total score					48,5	0
Maximum score (using weights given by WUR)						485
Final result element Labour (scale; 0-10)						0,0
** Additions; extra lines for additional questions*						
*** Answer; as obtained by ACT group*						
**** Weight WUR; importance of specific question as perceived by WUR (scale; 0-10)*						
***** Distance to the labour market = People with (light) mental disabilitiy, psychologically vulnerable people, people with physical disabilities, people with insufficient training or learning disabilitites, prolonged jobseekers*						

Figure 10 – Index element labour.

6.3.3. Element Energy

Input for indicators	Answer options	Points division	Answer**	Score	Weight WUR***	Weighted Score
Which percentage of your lighting consists of LED-lights?	0-100%	0=0, 10=1, 100=10		0	0	0
Do you leave the heating on during closing time?	Yes/Sometimes/No	Yes=0, Sometimes=5, No=10		ONWAAR	0	0
Do you leave the air conditioning on during closing time?	Yes/Sometimes/No	Yes=0, Sometimes=5, No=10		ONWAAR	0	0
Do you leave the ventilation on during closing time?	Yes/Sometimes/No	Yes=0, Sometimes=5, No=10		ONWAAR	0	0
Do you leave the lights on during closing time?	Yes/Sometimes/No	Yes=0, Sometimes=5, No=10		ONWAAR	0	0
Are the soup wells fully insulated?	Yes/No	Yes=10, No=0		ONWAAR	8	0
Are the food warmers fully insulated?	Yes/No	Yes=10, No=0		ONWAAR	8	0
Are all the devices enabled by default? (not only when in direct use)	Yes/Partly/No	Yes=0, Some=5, No=10		ONWAAR	8	0
Which percentage of daily fresh assortment (soup, sandwiches, snacks) contains meat and fish products?	0-100%	0-30=10, 40=6, 50=4, 60-100=0		ONWAAR	5	0
*Additions**						0
						0
						0
Total score					29	0
Maximum score (using weights given by WUR)						290
Final result element Energy (scale; 0-10)						0,0
** Additions; extra lines for additional questions*						
*** Answer; as obtained by ACT group*						
**** Weight WUR; importance of specific question as perceived by WUR (scale; 0-10)*						

Figure 11 – Index element energy.

6.3.4. Element Water

Input for indicators	Answer options	Points division	Answer**	Score	Weight WUR***	Weighted Score
Which percentage of the daily fresh assortment (soups, sandwiches, snacks) contains beef products?	0-100%	0-30=10,40=6,50=4, 60-100=0		ONWAAR	5	0
Do you thaw products under running water?	Yes/No	Yes=0, No=10		ONWAAR	8	0
Do you cook pasta in pasta cookers?	Yes/No	Yes=10, No=0		ONWAAR	8	0
Which energy label does your dishwasher have?	Label (A+++/A++/A+/A/B-G)	A+++=10, A++=8, A+=6, B-G=0		ONWAAR	8	0
Do you run fully load dish machines?	Yes/Sometimes/No	Yes=10, Sometimes= 5, No=0		ONWAAR	8	0
Do you use pressure taps/ sensor taps?	Yes/Partly/No	Yes=10, Partly =5, No=0		ONWAAR	2	0
Do you reduce the waterflow in taps?	Yes/No	Yes=10, No=0		ONWAAR	2	0
*Additions**						0
						0
						0
Total score					41	0
Maximum score (using weights given by WUR)						410
Final result element Water (scale; 0-10)						0,0
** Additions; extra lines for additional questions*						
*** Answer; as obtained by ACT group*						
**** Weight WUR; importance of specific question as perceived by WUR (scale; 0-10)*						

Figure 12 – Index element water.

6.4 Index measurement

The previously mentioned index was implemented with all the caterers on Wageningen UR Campus. The overall scores per element can be found below. If indicators were found to be not applicable for a certain caterer, such as the isolation of soup warmers if they sell no soup, the weight of this indicator was set to zero. This can be seen in the maximum score achievable per element. Also the overall sustainability score as an average of the four elements can be found per caterer. The results are described under each figure. The full distribution of the scores can be requested from the researchers.

Element Waste	**Score**
Total score	885
Maximum score (using WUR standards)	980
Final result (0-10)	9,03
Element Labour	**Score**
Total score	480
Maximum score (using WUR standards)	485
Final result (0-10)	9,90
Element Energy	**Score**
Total score	180
Maximum score (using WUR standards)	290
Final result (0-10)	6,21
Element Water	**Score**
Total score	220
Maximum score (using WUR standards)	410
Final result (0-10)	5,37
Total sustainability result caterer	**Score**
Final result on all elements	**7,63**

Figure 13 - Output index measurement Cormet.

Cormet received an average score of 7,63. As can been seen in Figure 13, Cormet has a score of 9,03 out of 10 on the element Waste. Cormet scores less on the availability of smaller portions for a reduced price, the use of no trays, and waste awareness. On the element Labour the caterer has a score of 9,90. Only on the man-woman ratio the company does not receive the full score, but 8 out of 10 points. On energy a score of 6,21 is achieved. On the percentage of meat and fish products 4 points out of 10 are achieved. The topics lightning and enablement of devices were rated 0. The final result of the element Water is a score of 5,37. For the energy label of the dishwasher, the absence of pasta cookers and reduction of water flow, 0 points were received.

Element Waste	**Score**
Total score	665
Maximum score (using WUR standards)	980
Final result (0-10)	6,79
Element Labour	**Score**
Total score	290
Maximum score (using WUR standards)	485
Final result (0-10)	5,98
Element Energy	**Score**
Total score	80
Maximum score (using WUR standards)	210
Final result (0-10)	3,81

Element Water	Score
Total score	210
Maximum score (using WUR standards)	250
Final result (0-10)	8,40
Total sustainability result caterer	**Score**
Final result on all elements	**6,24**

Figure 14 - Output index measurement Nieuw China.

Nieuw China received an average score of 6,24, as can be seen in Figure 14. On Waste, this caterer received a score of 6,79. On labour, a score of 5,98 is achieved. For not employing people with distance to labour market and unsatisfied employees, the caterer received 0 points. The element Energy is scored the lowest (3,81 out of 10), this is mainly due to the high percentage of meat and fish products that are used. For the element Water the caterer received a score of 8,40. The caterer received 10 points for cooking rice in special cookers and for not thawing products under running water.

Element Waste	Score
Total score	760
Maximum score (using WUR standards)	980
Final result (0-10)	7,76
Element Labour	**Score**
Total score	235
Maximum score (using WUR standards)	485
Final result (0-10)	4,85
Element Energy	**Score**
Total score	110
Maximum score (using WUR standards)	290
Final result (0-10)	3,79
Element Water	**Score**
Total score	220
Maximum score (using WUR standards)	410
Final result (0-10)	5,37
Total sustainability result caterer	**Score**
Final result on all elements	**5,44**

Figure 15 - Output index measurement GoodFood.

The final result of GoodFood on all elements is a score of 5,44, as can be seen in Figure 15. This company scores the highest (7,76 points) on the element Waste. 10 points are achieved on most of the waste separation questions, only on separation of paper waste and food leftovers of customers the company received 0 points. On Labour, a score of 4,85 is achieved. The absence of full satisfaction of employees, no employment of people with distance to the labour market, unequal male-female ratio, and absence of a social responsibility policy led to a reduction in the total score. A score of 3,79 was achieved on the element Energy. Not insulating the soup and food warmers led to a 0-score. The element Water received a score of 5,37. No reduction of water flow, a low energy label on the dishwasher, and the absence of pasta cookers are indicators that received 0 points.

Element Waste	Score
Total score	845
Maximum score (using WUR standards)	980
Final result (0-10)	8,62
Element Labour	**Score**

Total score	440
Maximum score (using WUR standards)	485
Final result (0-10)	9,07
Element Energy	**Score**
Total score	260
Maximum score (using WUR standards)	290
Final result (0-10)	8,97
Element Water	**Score**
Total score	230
Maximum score (using WUR standards)	410
Final result (0-10)	5,61
Total sustainability result caterer	**Score**
Final result on all elements	**8,07**

Figure 16 - Output index measurement OSP.

The catering company OSP received an 8,07 according to the index, which is shown in Figure 16. On the element Waste a score of 8,62 was achieved. On the topics about the offer of trays, availability of smaller portions, and waste awareness the company obtained 0 points. On the element Labour the caterer has a score of 9,07. Only the topics man-woman ratio the company and employee satisfaction do not receive the full score, but respectively 8 and 5 out of 10 points. On energy a score of 8,97 is achieved. On the percentage of meat and fish products 4 points out of 10 are achieved. The final result of the element Water is a 5,61. For the energy label of the dishwasher, the absence of pasta cookers and reduction of water flow, OSP received 0 points.

Element Waste	**Score**
Total score	732,5
Maximum score (using WUR standards)	980
Final result (0-10)	7,47
Element Labour	**Score**
Total score	470
Maximum score (using WUR standards)	485
Final result (0-10)	9,69
Element Energy	**Score**
Total score	80
Maximum score (using WUR standards)	290
Final result (0-10)	2,76
Element Water	**Score**
Total score	250
Maximum score (using WUR standards)	410
Final result (0-10)	5,61
Total sustainability result caterer	**Score**
Final result on all elements	**6,38**

Figure 17 - Output index measurement Sodexo.

The final result of Sodexo on all elements is a score of 6,38. These results are shown in Figure 17. This company scores a 7,47 on the element Waste. On the topics about the use of no trays and the separation of paper and glass waste, the company received 0 points. On Labour, a score of 9,69 is achieved. Only the unequal male-female ratio led to a reduction in the total score. A score of 2,76 was achieved on the element Energy. Not insulating the soup and food warmers, a high percentage (60-100) of meat and fish, containing pressure/sensor taps, a low energy label on the dishwasher, and the absence of special pasta cookers are indicators Sodexo received 0 points for.

These results were also visually presented to the caterers. To establish a positive approach, no hard grades were presented. The grades were translated into a five-star system. This means that 1-2 is one star, 3-4 two stars, 5-6 three stars, 7-8 four stars, and 9-10 five stars. Per element the rating was presented. An example of such a visualisation can be found in Appendix D1. All caterers received an A4 with this visualisation of their current sustainability level measured by this research. Furthermore, caterers were given a 1A4 format with the main results per element. This included their strong points, and recommendations on improvements so they can try to improve their sustainability level based on these findings. To motivate the caterers even more to change they are also informed about the importance of the elements as perceived by the customers and the facility department.

7. Results – Intentional Behaviour interview

In this chapter the results of the interviews with the caterers will be displayed. The results are written in a way that the anonymity of the caterers is safeguarded, this was requested by the caterers. The goal of these interviews was to indicate the attitude and perceived behavioural control of the caterers towards the sustainability index. This goal is based on the third sub question of the research: *What are the behavioural intentions of the caterers of Wageningen UR to change according to the output of the sustainability index?*

7.1 Attitude towards a sustainability index

The first goal of the interview was to indicate the attitude of the caterers towards the use of a sustainability index. Three caterers mentioned the guidelines that an index could provide for the caterers as an argument. Furthermore, the visibility that this index could provide towards the customers was seen as relevant by one caterer. Three caterers gave suggestions that the choice of what to measure and in what way was important and should be underpinned well. Two caterers doubted the value of using sustainability labels to measure sustainability.

When asking the caterers about the use of the current index, all caterers perceived the index as important, and three of them mentioned the visibility and guidelines of the index again as important factors. Three of the caterers agreed upon the use of the current four themes in the index, with one of them suggesting two additional themes focused on the food suppliers and the cleaning policy to be incorporated. Two other caterers also talked about the importance of the right (sustainable) food suppliers, with one of them also advocating to implement this in the index under the name of assortment. Two caterers mentioned that they would change, but only if it was in their practical ability to change. Therefore, the index had to take into account the practical possibilities of the caterers towards change.

Two caterers expected positive effects for themselves when the index would be used, as they were confident to be sustainable caterers. Another caterer was convinced of the positive effect of the index, but expected to score lower on the index compared to the other catering companies.

7.2 Perceived control to change according to the sustainability index

After asking for the attitude of the caterers towards a sustainability index, the caterers were questioned on their perceived behavioural control to adhere to possible guidelines resulting from the sustainability index. Three caterers mentioned a high level of control on all factors of the index, as they trusted on good communication with the Wageningen UR. Some of the elements, mostly energy and water, are partly under control of the Wageningen UR. However, the three caterers indicated that when they would provide sufficient arguments for sustainable changes, this would also be made possible by the Wageningen UR. One caterer stated that he does not have the power to change, he is under control of another caterer. The last caterer only mentioned the Wageningen UR to indeed be in control of several factors mentioned in the index, like indicators for water use and energy use. Despite this, the same caterer mentioned to be able to change multiple things towards more sustainable levels that were not under control of Wageningen UR. Four caterers mentioned that they could not change the water consumption by lowering water pressure in the sinks. All four caterers mentioned that they needed the water they used, so there was as little waste as possible. Also a high water pressure was needed especially in the cleaning area.

The caterers came up with multiple factors to have an effect on the amount of control of the caterers on changing according to the index. Three caterers named the budget, either of themselves or the Wageningen UR, to have an effect on the range in which big changes could be made (e.g. a sustainable dishwasher). Furthermore, the restrictions of the assortment made by the Wageningen UR were partly seen as a limiting factor in the sustainability, as was indicated by one of the caterers. Those guidelines for the assortments appeared to contribute to food waste. Also three caterers mentioned the willingness of customers towards buying more sustainable products, especially when those products would be more expensive, as a limiting factor in being more sustainable. Also one caterer mentioned that he retrieved new ideas by the index itself, which could also be seen as a factor which promoted sustainability. Therefore, the provision of knowledge in what could be more sustainable is seen as a stimulating factor. Furthermore, the mainly positive communication with the Wageningen UR is seen as a stimulating factor for a good sustainability level. Only one of the caterers mentions a need for a clearer perspective of the Wageningen UR on sustainability requirements, which would cause the caterer himself to be less in need of advocating for sustainable changes.

8. Discussion

Sustainability is an important topic for both Green Office and S&I. Therefore, both parties requested for a sustainability index to indicate the sustainability level of the caterers at Wageningen UR. This research had the purpose to create a sustainability index to get insight in the current sustainability level of the caterers of Wageningen UR and identify the behavioural intention of those caterers to change according to the output of the sustainability index.

8.1 Literature study

First a literature study was done which resulted in the translations of the nine elements into input for index-indicators in the field of catering. An overview of these indicators per element was shown, divided into four different categories. It could be seen that not all elements could be divided into the four chosen categories. For example, the element labour only contained indicators in the field of behaviour. Besides that, it was seen in the table that some overlap existed between the nine elements. For example, the use of meat was seen as unsustainable for the elements energy, water, emissions and biodiversity. Also a negative relation between some elements was found. For example, the use of reusable cutlery caused less waste, but caused also the dishwasher to be used more often. In this example the elements waste, and water and energy are negatively related to one another. This gives insight in the fact that all elements are not individual items but are interlinked with each other. The question that therefore arises is, especially since the concept of sustainability is so broad, if these nine elements should be adhered to when developing the index further.

8.1.1 Limitations

As both a standardized literature study and an extra use of practical documents were used, the researchers tried to be as complete as possible concerning the factors of sustainability for every element. However, due to the scope of the research, it could not be checked whether all elements were completely covered. Further research has to be conducted to make sure whether indeed all factors of the nine elements are covered within the index.

All indicators are based on the literature found, which assures the relevance of each input for the indicator. However, the translation of the information towards indicators could only be done by the use of examples. Because of the scope of the research project, not all scores for the indicators could be sufficiently supported by literature. To control for this, both the facility department of Wageningen UR and the caterers were asked to give their opinion about the indicators.

8.2 Stakeholder inquiry

It was found that overall the 370 customers did value sustainability as important, since on average a 5.4 was scored here on a scale of 1-7. However, when looking at if people would also make a sustainable purchase, it was seen that 73% of the customers did not make a sustainable choice deliberately. The three most common reasons were that information is lacking, people did not care, or found taste more important. These last two reasons question the fact if customers would really buy more or different things at a certain canteen if this caterer would improve its sustainability. Therefore, it is doubtful if customers can be seen as a motivational factor for the caterers to improve their sustainability, as was thought based on the Theory of Planned Behaviour.

The facility department valued the elements with the opinion of the customers in the back of their mind. When comparing the results of the interview with the results of the questionnaire it can be seen that some opinions were the same, while others differed. The question is therefore if the facility department has made wrong judgement about what customers really value, or if the questionnaires is not a true reflection of the opinions of the customers. For the choice of elements to include in the index the opinion of the customers was mainly adhered to, since the facility department multiple times mentioned that the opinion of the customers was the most important factor.

8.2.1 Limitations

The questionnaires among the customers of the catering companies at the WUR provided a guideline for the selection of elements for the index. The questions in which the customers had to rate the elements on importance appeared to result in a non-normal distribution of the results. It is expected that the formulation of the question could have influenced this skewed division of results.

The goal of the interview with facility department was also to provide a guideline for the most relevant elements for the index. One limitation of the interview, was that the interviewed person was not fully aware of which sustainability factors were most important at Wageningen UR in total. This might have caused her to be less adequate to rate the elements on importance. However, the interviewee did provide useful information about the contracting terms connected to sustainability of the caterers.

8.3 The index

Based on the stakeholders' opinion the four most relevant elements were chosen to incorporate in the index. The most important aspect that needs to be kept in mind when looking at the index and its outcomes it that this is the first trial run of a newly established index. Therefore, at this moment no real conclusions can be made about the index or its outcomes. Only a gentle image is drawn about the current state. Only four elements were used to make an index to create a positive effect of the social norm on the intentional behaviour of the caterers. However, therefore these elements are not covering the topic of sustainability completely. Though the fact that the index is dynamic, based on aspects like the weight given to each indicator and the fact that more indicators can be added, makes it valuable in the future. This makes the index also likely to be applicable to more situations and circumstances.

Currently the index is only in its trial phase which causes some problems for the validity of these values. Since the index is not covering the full concept of sustainability it could be that caterers that score low on this index, might score high on the elements excluded. This should be kept in mind when considering the results of the index.

Furthermore, some other elements need to be looked at more closely in relation to the catering sector. An example of such an indicator is the male/female ratio. This ratio was established to have a higher chance of more women on higher functions. Though, in the catering sector this is mostly not the case, since the percentage of women is higher in this sector. It is therefore questionable if this indicator should be taken into account when assessing the sustainability in this sector.

8.3.1 Limitations

The index, which was measured during interviews with all caterers had answer options which most of the times included yes or no. This might have steered the caterers to make a choice, even when the true value would have been in between these options. It is also possible that caterers gave social desirable answers to the questions, which also may not give a true reflection of the real sustainability level. To avoid this problem, the index can be measured with real figures and percentages in the future. However, the comparison between caterers will then not be possible, as all caterers have different situations to work with. Another limitation is the construct validity. It is not sure that what is measured in the sustainability index is a true reflection of the intended concept measurements, as was already discussed shortly above. This is limited by the use of pokes to clarify some questions (in the interview) and by pretesting the checklist with the expert and the interview with the facility department.

Because of the dynamic character of the index, decision makers can always include extra elements based on the circumstances. One of the caterers advocated specifically towards more use of indicators measuring the sustainability of the assortment. This was one of the four catering categories used to visualise the literature study results and questions were incorporated in the index about this category, but the emphasis on this aspect could be increased.

8.4 Evaluation of the index

During the interviews with the caterers it was seen that four of the five caterers found the use of a sustainability index positive and useful. Especially the visibility of the guidelines was important for them. This makes the feasibility of the desired goal of the index bigger, since caterers thus have a positive attitude against a sustainability index. This attitude causes a positive effect on the behavioural intention of the caterers to change according to the index. Though when discussing the index in its current state some remarks were made. In general, a bigger focus on food and food suppliers was mentioned by the caterers. Also the effectiveness of the use of labels was both questioned by the facility department and by the caterers. The facility department argued that customers would not buy the more expensive products with sustainability labels. The caterers talked about their doubts whether sustainability labels were that sustainable as was advocated for.

Furthermore, it became clear that the index had to be practical and useful for the caterers. It is an important notion for further use of the index that the caterers need to have the opportunity to discuss why they do not apply to certain indicators. During the interviews it was namely indicated that there were some funded reasons for this.

When looking at the behavioural control it was found that three caterers mentioned a high level of control on all factors of the index, as they trusted on good communication with the Wageningen UR. Though most indicators under the element water and energy fall under the control of Wageningen UR as already mentioned when discussing the index. Some aspects could have an influence on the behavioural control of the caterers such as budget from themselves or Wageningen UR, the restrictions put in the contract in relation to assortment, and customers' willingness to buy more sustainable products. These factors should be taken into account when developing the index further. If this is done, a positive behavioural control is expected which causes a positive behavioural intention.

8.4.1 Limitations

During the evaluation of the index the interview with one of the caterers resulted in little information. This was due to the fact that this caterer claimed to be under control of a bigger caterer at the Wageningen UR. As this caterer did not have much input in sustainability behaviour, and also because facility department does not see this caterer as separate from the bigger caterer, further research might elaborate on leaving this caterer out of the evaluation.

Furthermore, it has to be kept in mind that the concepts attitude and behavioural control are asked in this research by only three questions in an interview. Due to social desirable answers the response generated could not be a true reflection of these concepts. Besides that, it could be that the questions did not measure attitude and behavioural control in a valid way. Though, this limitation was reduced due to a scientific foundation of the interview guidelines.

9. Conclusion and recommendations

9.1 Conclusion

The overall goal of the commissioners was to create more sustainability among the caterers of Wageningen UR. This research tried to create guidance in order to reach this goal of the commissioners. To achieve this goal, the purpose of this research is to create a sustainability index to get insight in the current sustainability level of the caterers of Wageningen UR. The index is based on a literature study and input from relevant stakeholders. Using a literature study, the nine elements of the 'Alliantie Verduurzaming Voedsel' were translated into concrete measurable indicators to measure the sustainability levels of the caterers. For each element separately the relevant indicators were selected.

The relevant stakeholders for this research, the customers and facility management, together perceived four elements as most important in relation to sustainability. The most important elements for the index were therefore selected as follows; waste, labour, energy and water. The next step was to find out how the caterers scored on the different factors of the sustainability index. The total average scores of the different caterers at Wageningen UR that were found were; Cormet: 7,63, GoodFood: 5,44, Nieuw China: 6,24, Sodexo: 6,38, and OSP: 8,07. Looking at these scores, it can be concluded that there is room for improvement in relation to sustainability for all caterers. There is a certain difference in the sustainability levels of the caterers, but the full score of 10 points is not reached by any of them. Caterers were given individual advice based on the index measurement to improve their performances. Specific recommendations to improve the index in future research will be discussed in the next paragraph.

In general, it can be concluded that the caterers are willing and capable to change according to the output of the sustainability index. The behavioural intentions of the caterers to change according to the output of the sustainability index can thus be generally considered as positive. Besides that, the questions about the perceived control to adhere to possible guidelines resulting from the index were answered by most caterers as being within their power. Three caterers namely stated to have high control on all the elements of the index, one caterer indirectly has power to change via the overarching caterer. One caterer stated that the power to change lays with the university. Though, some indicators were highlighted by everyone to be under the control of Wageningen UR, such as lighting or heating.

Referring back to the Theory of Planned Behaviour, it can be seen that all elements (personal attitude, subjective norm and behavioural control) are measured and all indicate that the intention to change according to the index is present. Therefore, it can be concluded that a sustainability index would be a useful tool for the caterers to get insight in and to further improve their sustainability levels. However, it should be kept in mind that even though the customers did value the measured elements most, the actual behaviour of buying more sustainable products is doubtful. Therefore, the subjective norm might not benefit to the behavioural intention that much. Further research needs to be conducted to develop the current trial version of the index further. Aspects that could influence the control of the caterers on certain aspects should be taken into account in this research, such as budget related aspects. An elaboration on the further development of the index is described below.

9.2 Recommendations

A few recommendations will be given to improve the sustainability index in future research. First of all, it is emphasized that this index is a first trial and that there are no existing indexes that measure sustainability in a similar way. This index should be seen as a 'best practice' case as it can be used as a benchmark for other universities and organisations. The index is open for evolvement when improvements are being found. Other organisations could use this index as a starting point to work with and adapt it to become suitable to their organisation and the situation.

9.2.1 Recommendations with regard to the index set-up

Sustainability is a dynamic concept, therefore the index to measure this concept should also be dynamic. This means that decision makers should be able to add questions to the index. It is recommended to only add questions if these are relevant and substantiated. This decision should be made by an overarching organisation without personal interest in the results of the measurement, if a comparison between different caterers wants to be made.

To come up with a complete index that covers all nine elements of the 'Alliantie Verduurzaming Voedsel', further research could focus on how the remaining five elements could be included in the index. According to the caterers, there has to be a bigger emphasis on the sustainability of the assortment. The implementation of more indicators that measure the sustainability level (within the nine elements) should be emphasised in further research.

Furthermore, there are doubts among caterers whether the use of labels to evaluate sustainability would measure the sustainability correctly. Also the facility department doubts if the customers would buy products with labels if they would be more expensive. Therefore, a recommendation is to not incorporate questions about sustainability labels in the index. Research on the effectiveness of the use of sustainability labels could be performed to get a better insight in the effect of those labels.

The index has to take into account to what extent the caterers can adhere to the indicators. Some elements are under control of Wageningen UR, and the caterers are not able to change these elements. These elements could be excluded from the index, (or attach a zero weight to it, as was done in this study) in case the caterer is not able to adhere. Examples of elements that are not always under the control of the caterers are mainly in the elements 'energy' and 'water'. Decision makers can decide to exclude those elements, or give them a low weight.

To gain a fair view of the sustainability level, it could be recommended to change the measurement methods of the index and to ask for hard numbers instead of yes/no answers. Social desirable answers can be avoided by this recommendation. However, hard numbers could make a comparison between different catering locations difficult due to the differences in size. It is recommended to perform further research to evaluate which measurement methods can be best used for the index.

9.2.2 Recommendations with regard to the use of the index

Also with regard to the use of the index some recommendations can be made for future research. A point of attention should be that the index can not only be used to cause improvements for the caterers, but can also be used to create feedback for the facility department. If there are indicators that negatively influence the sustainability of the caterers, but are under control of the facility department, these factors could be improved by them. This would for example be the case for building-related equipment that is provided by the facility department to the caterers. The weighing factor in the index makes sure that caterers are not judged on indicators that they cannot control, as those questions have a weight of zero. So the reason that those question are not taken out of the index, is that these questions can reveal improvements for the party that does have the control over these indicators, this mostly will be the facility department. To ensure that an increase in sustainability is reached, the results of the index should therefore also be communicated to other parties of influence.

It is important that Green Office and S&I use the index as a supportive tool for the caterers. It is not a tool to rank the sustainability level of the different caterers, or to compare them to each other. By using the index, the caterers gain insights in how they score individually on the different elements, and what improvements are possible to increase their sustainability performances even more. To gain insight in the improvement caterers make according to the index, it is advised to implement the index and thereby measure the sustainability level of the caterers on an annual basis. An evaluation research could be performed to measure the actual effect of the index on the change of behaviour of the caterers.

Also further research can be conducted to investigate if the visualisation of the sustainability levels per element (the posters with the stars) would be noticed by the customers, and if the customers would change their purchasing behaviour according to these posters. This means that customers could be asked about whether they would buy their lunch or dinner at a certain caterer based on the sustainability levels per element.

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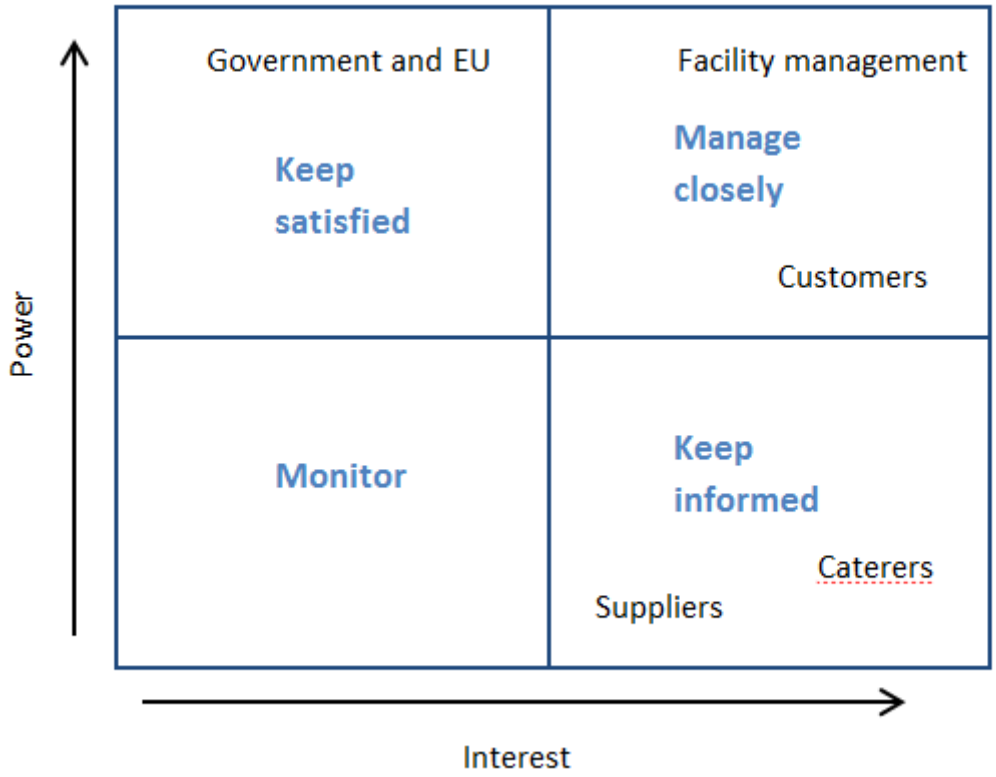
Appendix A1 – Stakeholder analysis

The resolution to the knowledge gap is mainly interesting for GOW, S&I, the facility department of Wageningen UR, and the customers of the caterers. They all have no insight in how sustainable the caterers of the Wageningen University really are. It is also very relevant to the caterers themselves. They are unaware about what elements are valued highly by customers and facility department of Wageningen UR, and besides that do not know which elements they can improve. GOW, S&I, facility department of Wageningen UR, and customers are therefore stakeholders in this project. The customers should also be taken into account when assessing the caterers, so they have an influence on the solution to the problem. In the end the customers should get insight in the actual sustainability levels of the caterers. Furthermore, the facility department of the Wageningen UR is important since they have an influence on selecting a caterer. Therefore, they also should have an influence on the solutions to the problem. In the end they should be provided with insights in the sustainability levels of the caterers. Other stakeholders are the government and EU, and suppliers. The government plays a role in this project because of all the laws and regulations related to food. The supplier can also play a role in this project. They may be affected by the results of the caterer performances, if the caterers decide to change their performances related to the products of the suppliers. The stakeholders are visualised in stakeholder matrix below.



Appendix B1 – Customer questionnaire substantiation + questionnaire

Sub question related to this questionnaire:
Which of the nine factors of food sustainability are found to be most relevant to use according to the relevant stakeholders?

The relevant stakeholders are the customers (questionnaire) and the facility department of WUR (interview).

Methodology
Questionnaires are used to get insight in the attitude that customers have towards the different factors of the sustainability index. The questionnaire was based on the nine elements of the Alliance for Sustainable Food (Alliantie Verduurzaming Voedsel, 2015).

Goal of the interview: to find out which elements of sustainability are valued the most by customers of the caterers.

Variables:

Gender	Male/female	Closed
Age	Number 0-100	Open
Science group	- Agro technology food science - Animal sciences - Environmental sciences - Plant sciences - Social Sciences - Other….. (because employees can also work in other departments)	Closed
Importance sustainability	Very important Very unimportant All values in-between 1-7	Closed
Practical use sustainability	Yes, in this way ... No, because	Semi
Importance of elements	Very important Very unimportant All values in-between 1-7	Closed

* O = customers catering WUR for all variables

Variables under importance of elements:

- *Water*
- *Energy*
- *Emissions*
- *Transport*
- *Waste*
- *Biodiversity*
- *Labour*
- *Fair Trade*
- *Animal Welfare*

Questionnaire Sustainability in the catering sector

Under the responsibility of Green Office and S&I a research about sustainability in the catering sector is being deployed. You are asked to fill out this questionnaire as honest as possible. The answers will be treated anonymous and confidential. It takes less than 5 minutes of your time. Write down your email-address to win one of the ten €5,- catering vouchers. We appreciate your input. Thank you in advance!

1. Gender:

O Male O Female

2. Age: _____

3. Science group you are studying or working at:

- O Agro technology and Food science
- O Animal Sciences
- O Environmental Sciences
- O Plant Sciences
- O Social Sciences
- O Other, namely; _____

4. What is your opinion on sustainability in the catering sector?

Very unimportant	1	2	3	4	5	6	7	Very important
	O	O	O	O	O	O	O	

5. Do you deliberately make a sustainable choice when buying food at a WUR canteen?

- o Yes, in this way: _____
- o No, because: _____

6. To what extent do you feel that caterers at WUR campus should act on the following elements of sustainability in relation to their activities and assortment?

	Very unimportant 1	2	3	4	5	6	Very important 7
Water use	○	○	○	○	○	○	○
Examples: Water-efficient machines and limited water wastage in food preparation and production.							
Energy use	○	○	○	○	○	○	○
Examples: Use of energy saving equipment and energy efficient produced food.							
Emissions (CO_2)	○	○	○	○	○	○	○
Examples: Limited production of CO_2 by choice of assortment, product use, and transportation.							
Transport	○	○	○	○	○	○	○
Examples: Vehicles with low CO_2 emissions, efficient use of transport, and use of local products.							
Waste	○	○	○	○	○	○	○
Examples: Waste separation, little use of pre-packaged foods, and limited food waste.							
Biodiversity	○	○	○	○	○	○	○
Examples: Use of products with labels like EKO (organic), MSC, and ASC (sustainable fish).							
Labour conditions	○	○	○	○	○	○	○
Examples: Safety, health, and social regulations for employees of the caterers.							
Fair Trade	○	○	○	○	○	○	○
Examples: Use of products with labels like UTZ Certified, Milieukeur, and FairTrade Max Havelaar.							
Animal Welfare	○	○	○	○	○	○	○
Examples: Use of products with labels like Beter Leven, Scharrelvlees, and Scharreleieren.							

7. Do you have any remaining comments you want to add in relation to this questionnaire?

_____

8. Fill in your email-address to win one of the catering vouchers:

_____

Appendix B2 – Facility department interview substantiation + interview guide

Sub question related to this interview:
Which of the nine factors of food sustainability are found to be most relevant to use according to the relevant stakeholders?
The relevant stakeholders are the customers (questionnaire) and the facility department of WUR.

Methodology
The semi-structured interview gave insight in the attitude of the facility department towards the different factors of the sustainability index. The semi-structured interview was based on the nine elements of the Alliance for Sustainable Food (Alliantie Verduurzaming Voedsel, 2015).

Goal of the interview: to find out which elements of sustainability are valued the most by the facility department of Wageningen UR.

Variables:

Meaning sustainability in WUR	All imaginable meanings of sustainability	Open
Meaning sustainability caterers	All imaginable meanings of sustainability	Open
Procedure contracting caterers	Explanation procedure	Open
Relation/contact caterers	Description of way of communicating with caterers.	Open
Evaluation method caterers	Description of evaluation method	Open
Perceived sustainability current	Opinion on sustainability per caterer	Open
Attitude towards index	Opinion on index	Open
Importance of elements (scale)	Very important Very unimportant All values in-between 1-7	Closed
Importance of elements (why)	All imaginable reasons of importance	Open

* O = Facility manager WUR

Variables under importance of elements:

- *Water*
- *Energy*
- *Emissions*
- *Transport*
- *Waste*
- *Biodiversity*
- *Labour*
- *Fair Trade*
- *Animal Welfare*

Interview Sustainability facility department Wageningen UR

Introduction:
We are …. and …, and we are working on an ACT project commissioned by Green Office Wageningen and S&I. Currently we are doing a project to come up with a sustainability index to measure the sustainability level of the different caterers on Wageningen campus. In this interview we want to ask your opinion as a relevant stakeholder about the different aspects of the index were are going to make. Is it correct that you have indicated to take part in this interview?
The interview will approximately take 60 minutes. The interview consists of two parts with in total 9 questions. The first part will contain general questions about sustainability and catering. The second part will be focused on the index. I will ask the questions, and … will note down the answers. It would be great if you could answer as thoroughly as possible. Is anything still unclear? Do you mind if we record the interview? We can now start the interview.

Part 1 – General questions
We will start with the first part of the interview, namely the general questions.

1. What does sustainability mean in general for Wageningen University? (not specific for catering)
    - What is the ultimate goal/mission in relation to sustainability?
    - How is it regulated in policies of the WUR?
    - Which themes of sustainability are important?
    - Concrete actions?

2. How do you translate sustainability to the caterers on Wageningen campus?
    - What is the ultimate goal/mission in relation to sustainability?
    - How is it regulated in policies specific for caterers?
    - Which themes of sustainability are important?

3. Can you describe the procedure of contracting a new caterer on campus?
    - What aspects do you take into account when contracting a new caterer?
        - How is sustainability related to other concepts (e.g. price)?
        - Concrete demands
    - Are there different guidelines/rules set per location/caterer?
    - What kind of contract. E.g. Freedom of choice of assortment

4. Can you tell something about the relation and contact you have with the current caterers?
    - Contact moments, frequency?
    - Responsible person/department (location manager?)
    - Feedback possible from their side?

5. How are the caterers on the campus evaluated?
    - Frequency
    - Evaluation method
    - Consequences
    - Responsible person/department
    - How important is sustainability in this evaluation? (relative to price, quality, etc.)

6. Do all caterers apply in the same way towards the sustainability criteria of the WUR?
    - Differences/ similarities
    - Room for improvement?
    - OSP, Cormet, Sodexo, New China, GoodFood

Part 2 – Questions about the index
We will now go on with the second part of the interview, namely questions about a potential sustainability index to assess the caterers of Wageningen UR.

7. What does facility department think about the idea to create a sustainability index to assess the sustainability level of the caterers of Wageningen?
    - What would you use it for (stimulating, transparant, evaluation)
    - What do you expect
    - Is something like this present
    - Other suggestions?

For the index we used nine elements based on the Alliantie Verduurzaming Voedsel (2015). Therefore, the following nine elements will be included in the index based on the importance you and the customers attach to them: Water, Energy, Emissions, Transport, Waste, Biodiversity, Labour, Fair Trade, and Animal Welfare. This means that not all nine elements will be included into the eventual index, but that based on the outcome of this interview and questionnaires among customers of the caterers the most relevant and valued factors will be chosen.

8. To what extent do you feel that caterers at WUR campus should act on the following elements of sustainability in relation to their activities and assortment?

	Very unimportant						Very important
	1	2	3	4	5	6	7
Water use	○	○	○	○	○	○	○

Examples: Water-efficient machines and limited water spoil in food preparation and production.
- Why?

Energy use ○ ○ ○ ○ ○ ○ ○
Examples: Use of energy saving equipment and food products
- Why?

Emissions (CO_2) ○ ○ ○ ○ ○ ○ ○
Examples: Limited production of CO_2 by choice of assortment, product use and transportation.
- Why?

Transport ○ ○ ○ ○ ○ ○ ○
Examples: Vehicles with low CO_2 emissions, efficient use of transport, and use of local products.
- Why?

Waste ○ ○ ○ ○ ○ ○ ○
Examples: Waste separation, little pre-packaged foods, limiting food waste.
- Why?

Biodiversity ○ ○ ○ ○ ○ ○ ○
Examples: Use of products with labels like EKO (organic), MSC and ASC (sustainable fish).
- Why?

Labour conditions ○ ○ ○ ○ ○ ○ ○
Examples: Safe, healthy and social regulations for employees of the caterers.
- Why?

Fair Trade ○ ○ ○ ○ ○ ○ ○
Examples: Use of products with labels like UTZ Certified, Milieukeur, FairTrade Max Havelaar.
- Why?

Animal Welfare ○ ○ ○ ○ ○ ○ ○
Examples: Use of products with labels like Better Life label, Scharrelvlees and Scharreleieren.
- Why?

9. Do you have any remaining comments you want to add in relation to this questionnaire?
- Additions to nine elements
- Tips for the index?

<u>Conclusion:</u>
This is the end of the interview. Thank you very much for your participation. Do you still have any things, which you would like to say at this point?
Is there anything that is unclear or you would like to ask? We will analyse the information during the following weeks. Would you like to have a copy of the final report as soon as we are done, so you could see the final result? In case of yes, where should we send this to?
Thank you very much for your time and participation.

Appendix B3 – Intentional Behaviour interview substantiation + interview guide

General research question of total ACT study:
What is the current sustainability level of the caterers of Wageningen UR measured by a self-created sustainability index - derived from literature and input of relevant stakeholders - and what is the behavioural intention of the caterers towards changing according to the output of the sustainability index?

Sub question related to this interview:

3. *What are the behavioural intentions of the caterers of Wageningen UR to change according to the output of the sustainability index?*
    a. *How willing are the caterers of Wageningen UR to change according to the output of the sustainability index?*
    b. *How capable are the caterers of Wageningen UR to change according to the output of the sustainability index?*

Methodology
The interview consisted of questions related to the Theory of Planned Behaviour (Ajzen, 2002). Both the attitude of the caterers towards the sustainability index and their perceived behavioural control was discussed within this interview. Interview guides of other researches were used as example for this interview guide. According to the interview guide of (Rhoades, Kridli & Penprase (2011) and based on the article of (Ajzen, 2002) the attitude towards the sustainability index were discussed by asking about advantages and disadvantages of the index and its elements. Furthermore, the effects of the implementation of the index were discussed, to discover the outcome evaluation of the caterers. The outcome evaluation, together with behavioural beliefs are both the factors that influence the attitude of the caterers towards the use of the sustainability index (Rhoades, et al., 2011; Ajzen, 2002).
To measure the perceived behavioural control, both the confidence of the caterer about his/her own control as the influence of perceived barriers and facilitators were discussed (Rhoades, et al., 2011; Ajzen, 2002).

Goal of the interview: to gain insight in their willingness and capability to behave according to the recommendations that flow from the index.

Variables:

Willingness	Explanation of perceived value and intention to cooperate	Open
Capability	Explanation of the possibilities and competence to improve	Open

* O = Catering manager of each of the five caterers at Wageningen UR.

Intentional Behaviour interview guide

Introduction:
We are …. and …, and we are working on an ACT project commissioned by Green Office Wageningen and S&I. Currently, we are doing a project for which we have created a sustainability index to measure the sustainability level of the different caterers on Wageningen campus. This index is based on literature and practical documents from the work field. In the coming interview we would first like to ask you the different questions from the index. We would like you to answer all the questions, even if you have to make an estimate. We want to ask you to only comment about the index in the second part of this interview, remarks also in relation to the control you have about certain indicators. The first part is thus a blunt checklist, the second part will go in depth about your opinion.
The interview will approximately take 30 minutes. I will ask the questions, and … will note down the answers. It would be great if you could answer as thoroughly as possible. Is anything still unclear?
Do you mind if we record the interview? We can now start the interview.

- Index measurement -

We now go on with the second part of this interview. In this part we would like to hear your opinion about the index and its usefulness and the feasibility of implementation.

1. *How do you feel about the general idea that Green Office & S&I would implement a sustainability index to measure sustainability of the catering companies on a yearly basis?*
   - *What are the advantages of the implementation of a sustainability index?*
   - *What are the disadvantages of the implementation of a sustainability index?*

2. *What do you think of the implementation of this first version of the sustainability index with four elements?*
   - *What is positive about this index?*
   - *What is negative about this index*
   - *Ask for the different elements*

3. *What do you expect are the effects for your company, when this current index would be implemented?*
   - *Which elements will have the most effect? Negative/positive effect?*

4. *How confident are you in your ability to change your behaviour according to the outcomes of the sustainability index?*
   - *Self-efficacy (belief you can do it)*
   - *Other authorities?*
   - *Ask for the different elements*

5. *What factors or circumstances would enable you to adhere to the outcomes of the sustainability index?*
   - *Different influences (difference in power/strength)*
   - *Ask for the different elements*

6. *Do you have any remaining comments you want to add in relation to this interview?*
   - *Missing aspects interview*
   - *Additions to nine elements*

Conclusion:
This is the end of the interview. Thank you very much for your participation. Do you still have any things that you would like to say at this point?
Is there anything that is unclear or you would like to ask? We will analyse the information during the following weeks. We will provide you a visualisation of the results of the measurement. Would you like to have a copy of the final report as soon as we are done?
- *In case of yes, where should we send this to?*

Lastly, we want to ask you if we can buy gift vouchers (two vouchers of 5 euro) of your company. We use these vouchers as prizes to stimulate customers to fill in the questionnaires. We could also give the winners money but it would be nice if the money comes back to you of course.

Thank you very much for your time and participation.

Appendix C1 – Labelling open questions questionnaire

Labelling system open questions questionnaires. The reasons for making a deliberate sustainable choice when buying food in a WUR canteen or not were labelled. The comments made in the last section, and the clarification of the group "other" in the science group question.

Distribution labels reason yes	
Vegetarian	26
Plastic avoidance	9
Packaging avoidance	7
Waste avoidance	9
Other	22
Total yes with reason	73

Distribution labels reason no	
No clear information, unaware, no options	68
Do not care	39
Do not buy (often/much) at canteen	27
Responsibility of WUR/caterer	17
Price more important	12
Taste more important	46
Other	23
Total no with reason	232

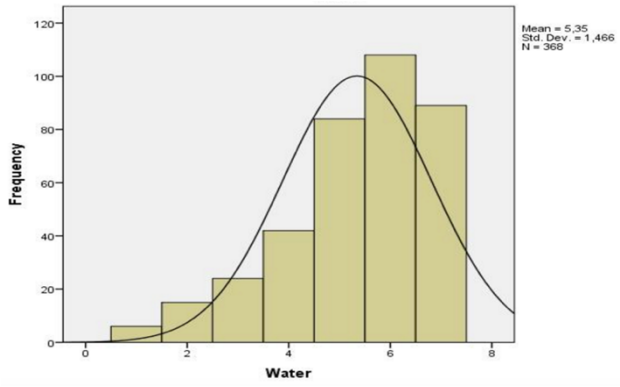
Distribution labels comments	
More information/options	18
Price concerns	8
Other	39
Total comments	65

Distribution labels 'other' group	
FB	24
Rikilt	5
Other	35
Total other	64

Appendix C2 – Frequency tables and histograms questionnaires

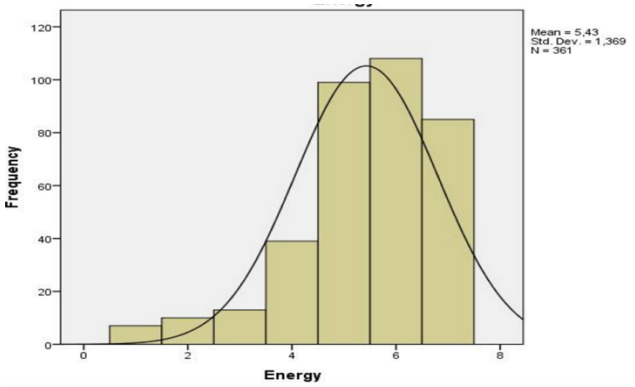
Water

		Frequency	Percent
Valid	1	6	1,6
	2	15	4,1
	3	24	6,5
	4	42	11,4
	5	84	22,7
	6	108	29,2
	7	89	24,1
	Total	368	99,5
Missing	System	2	,5
Total		370	100,0



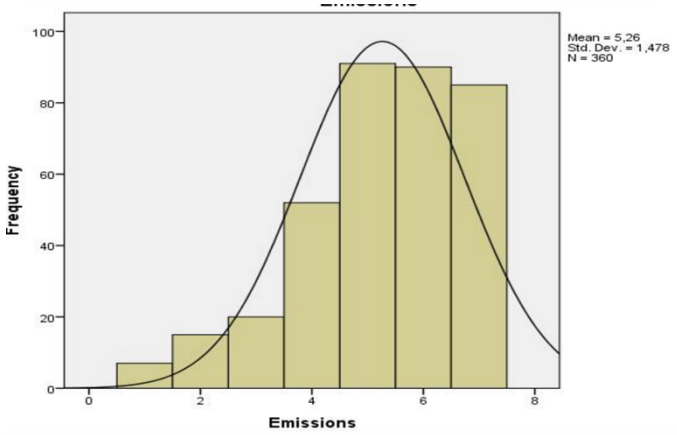
Energy

		Frequency	Percent
Valid	1	7	1,9
	2	10	2,7
	3	13	3,5
	4	39	10,5
	5	99	26,8
	6	108	29,2
	7	85	23,0
	Total	361	97,6
Missing	System	9	2,4
Total		370	100,0



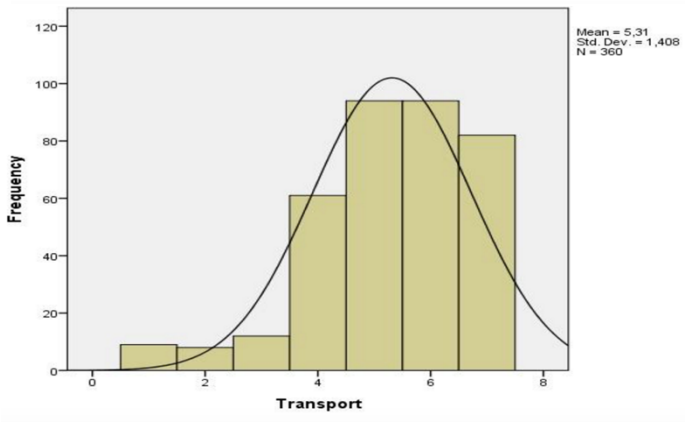
Emissions

		Frequency	Percent
Valid	1	7	1,9
	2	15	4,1
	3	20	5,4
	4	52	14,1
	5	91	24,6
	6	90	24,3
	7	85	23,0
	Total	360	97,3
Missing	System	10	2,7
Total		370	100,0



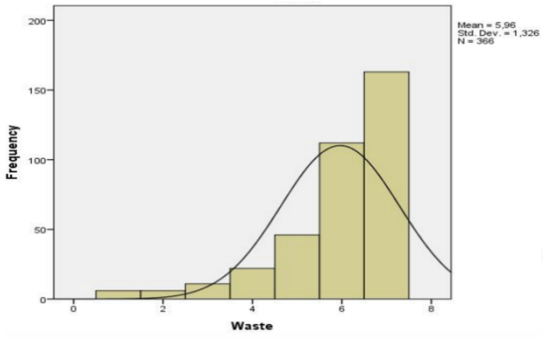
Transport

		Frequency	Percent
Valid	1	9	2,4
	2	8	2,2
	3	12	3,2
	4	61	16,5
	5	94	25,4
	6	94	25,4
	7	82	22,2
	Total	360	97,3
Missing	System	10	2,7
Total		370	100,0



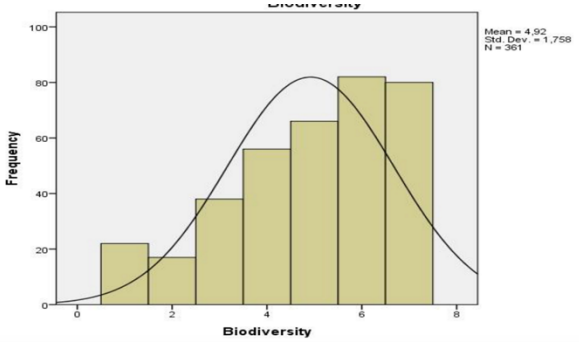
Waste

		Frequency	Percent
Valid	1	6	1,6
	2	6	1,6
	3	11	3,0
	4	22	5,9
	5	46	12,4
	6	112	30,3
	7	163	44,1
	Total	366	98,9
Missing	System	4	1,1
Total		370	100,0



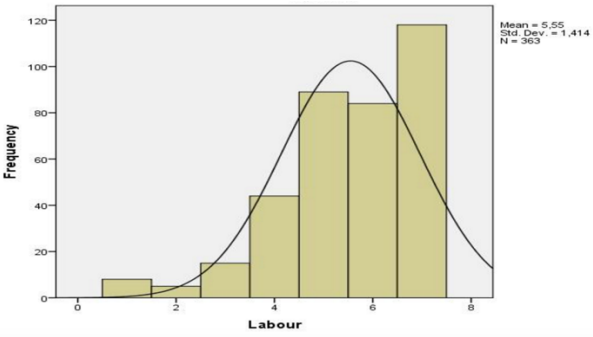
Biodiversity

		Frequency	Percent
Valid	1	22	5,9
	2	17	4,6
	3	38	10,3
	4	56	15,1
	5	66	17,8
	6	82	22,2
	7	80	21,6
	Total	361	97,6
Missing	System	9	2,4
Total		370	100,0



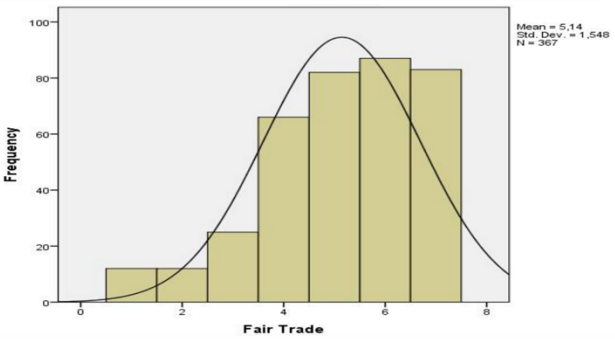
Labour

		Frequency	Percent
Valid	1	8	2,2
	2	5	1,4
	3	15	4,1
	4	44	11,9
	5	89	24,1
	6	84	22,7
	7	118	31,9
	Total	363	98,1
Missing	System	7	1,9
Total		370	100,0



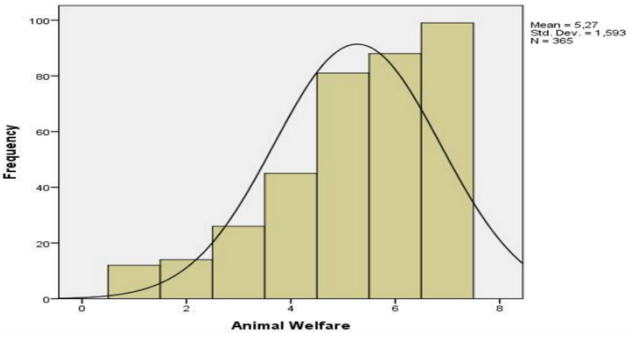
Fair Trade

		Frequency	Percent
Valid	1	12	3,2
	2	12	3,2
	3	25	6,8
	4	66	17,8
	5	82	22,2
	6	87	23,5
	7	83	22,4
	Total	367	99,2
Missing	System	3	,8
Total		370	100,0



Animal Welfare

		Frequency	Percent
Valid	1	12	3,2
	2	14	3,8
	3	26	7,0
	4	45	12,2
	5	81	21,9
	6	88	23,8
	7	99	26,8
	Total	365	98,6
Missing	System	5	1,4
Total		370	100,0



Appendix D1 – Visualisation index measurement