

Can you help Cormet reduce food waste?

ACT Final report group 1442



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1 Executive summary

Within Wageningen University, the catering of six locations is offered by Cormet. Cormet is a catering company that cares strongly about sustainability. Food waste is an important aspect of sustainability. The company already implements strict guidelines on food waste. However, recently, Cormet was triggered to investigate the current situation of food waste within their company by a discussion with a group of students and sustainability advocates. Our ACT team was assigned to address this topic and find out how Cormet is doing and if further improvements could be made concerning food waste. Our team consists of two facility management students, an environmental sciences student, a health and society student and a biologist. This report contains a thorough literature review concerning the background of food waste and its consequences. Furthermore, this report contains the results of 3 weeks of field research at the Cormet restaurant in the Forum building of Wageningen University, in which 1) an estimation was made of the average food waste per customer per day, 2) an estimation was made of the average food waste in Cormet's kitchen, 3) the consumers were observed to see the percentage of people that waste food, 4) kitchen staff were observed in order to give a clear advice on how to improve their work habits (if necessary) and 5) surveys were held among customers in order to investigate the customer perception of Cormet's food. This report contains a thorough discussion of the results. Our results have shown that Cormet scores very well compared to the global average of food waste. However, there is always room for improvement. Based on the results of the research and the literature review, an action plan was formulated, indicating which measurements can be taken by the company to further improve their work ethics regarding food waste. Because for Cormet, the action plan is the most important part of the report, this action plan will be presented in the report right after the introduction, as agreed upon with the commissioner. The results of our investigation will be presented to the Cormet location managers on December 17th, 2014.

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3 Introduction

Cormet catering company is a campus catering organization with many years of experience in catering facilities at Wageningen University. Food quality and safety are among the highest priorities of the company as it has been certified BS EN ISO 9001 since 2008 (Cormet Campuscatering, 2014a). The cornerstone of the Corporate Social Responsibility of Cormet company is to follow and apply sustainability policies not only with regard to consumers but also the environment as well as integrate them (Cormet Campuscatering, 2014b). This is mainly illustrated in its waste management and materials policy. Cormet catering company is also a member of the Programme Sustainable Management of Governments and cooperates with several parties upon agreements. Some of the aforementioned ones include the Dutch environmental quality label Milieukeur, Nature and the Environment Federation Foundation, the Dutch Nutrition Centre Foundation and a wide range of producers. Consequently, the environmental burden is being reduced on a daily basis and this can be deduced by the current activities of the company. Environmentally friendly production process of food, reuse and recycling of packaging materials, use of eco-label cleaning products, special training of the staff with regard to environmental protection, distribution of food under limited transport guidelines, short commute behaviour of the staff, food waste separation at source, organic quality of multicultural healthy products and fair-trade products are among its main activities. Additionally, Cormet catering company uses local products for preparing hot and cold meals.

Despite the fact that Cormet company has a sustainable attitude, food waste is an issue including many environmental and health impacts that need to be addressed further by the company. As there are no previous data of food waste measurements of either Cormet company or other relevant catering companies, field research in the Forum building of the Wageningen UR Campus as well as literature review study needed to be done. This report contains a review of the available relevant literature as well as the outcome of the field research that was conducted at the Cormet restaurant in the Forum building, where the current state of food waste at Cormet catering will be discussed. Based on the literature review and the outcome of the research, the incorporated action plan was written for Cormet. The action plan will give suggestions that might improve the situation regarding food waste at Cormet. Furthermore, some additional advice was given, based on the outcome of our work, which could improve the company's image. The action plan was placed directly after the introduction, before the literature review and the research outcome, as requested by the commissioner.

4 Action plan

Here we describe the major actions that we would advise Cormet to take. We would like to stress that our results have shown that Cormet is already doing a great job when compared to global food waste averages. At the Cormet restaurant, only 8.51% of total food is going to waste during lunch, 19.35% during dinner respectively, whereas globally around 33.3% of the total food is going to waste. This is a good start. However, there is always room for improvement. Our task was to identify possible points of improvement, based on our literature review and our field research outcome and personal observations. This action plan is our main advice towards the company. Between parentheses, the resources for the specific actions are added.

Dinner hours:

Prepare less energy-dense food (literature review).

Research has shown that energy-dense foods (processed foods; fast-food, cakes, pastries, candy) increase a 'full' feeling, which would lead to more food waste.

Serve a variety of hot meals instead of one (questionnaires/literature review).

People indicate that they want more meal variety and options. It is hard to satisfy all the customers, but one could consider a healthy option and a deep-fried option (both were mentioned in questionnaires). Research has shown that options lead to fewer food waste on the consumer level. However, this might negatively influence the amount of kitchen waste.

Offer different portion sizes (questionnaires).

Many customers indicated that they would prefer three options: small, medium, large portion sizes. Here pricing can be different per option.

Select menus that can be reheated if there are leftovers (personal observations).

Some meals cannot be reheated due to the cosmetic standards or decreased quality of the meal (eg. Lasagna), whereas others can be re-heated maintaining their quality (eg. Plain pasta, stews, cooked fresh vegetables). Select meals that can be re-heated; this might reduce waste, because what would otherwise go to waste, may be sold again at another day.

Make salads optional (food waste collection/questionnaire).

Many people do not like salads. Why should they be served salads? Make salads optional and save a part of the waste.

Offer salad dressings and add fewer sharp onions (questionnaires).

Many people complained about the lack of dressings in the salads and the high amount of red onions in the salads. Many people do not like too much quantity of red onions; this might be a thing to consider.

Use more fresh vegetables in the dinner meals (questionnaires).

This suggestion was by far the most important aspect of the questionnaires. People do want healthy food and value fresh vegetables. In general, the pre-cooked vegetables are not preferred. Fresh and healthy ones is very important

Healthier/Better balance between carbohydrates/proteins/fat/vitamins in dinners (questionnaires).

People want healthy foods and consider carbohydrates to be too much as ingredients of the Cormet dinner meals. Pay attention to the ingredient balance.

Put an effort into making food look delicious (questionnaires/literature review).

Many studies indicate that the use of colour(s) in meals and/or plates makes food much more attractive. Questionnaires indicated that the looks may be improved during dinners.

Offer take-away options (questionnaires/literature review).

Many people do not want to waste food, but they just do not have an option to take their leftovers. Furthermore, research has indicated that take-away options indeed decrease the amount of food waste at restaurants.

Offer meal rating cards along with every hot meal (personal observations in other canteens).

Many other canteens use this system. Meal ratings and remarks can give the chef insight in how people perceive their meals. This is an interesting and simple option that can be easily incorporated. The knowledge can be incorporated to serve meals that people like more and therefore would waste less.

Lunch hours:

Prepare sandwiches and hot snacks upon demand from 13:15 (personal observations).

By making food on demand, the ingredients can be left refrigerated and therefore this method prevents food waste. Some days, many sandwiches and snacks are wasted because the customers show up in lower numbers in the last hour of the lunch shift. In this way, you can partially avoid extra food waste.

Make only sandwiches that can be used as paninis in the last 30 minutes (personal observations).

To some extent, this is already happening. However, if all staff members did this, some food waste could be avoided.

Increase the use of sales tactics in the staff members (personal observations).

Many people that arrive late do not know what is available and what is not. By using some sales techniques, a few of the (otherwise) leftover meals could be sold in this way

Further suggestions for improvement of Cormet's performance:

The suggestions mentioned below are points of attention that Cormet might want to incorporate into their strategies. They do not necessarily regard food waste directly, but might affect visitor numbers and the sustainable image of the company.

Improve the advertising of opening hours, website, menu, deals, sustainable attitude, etc. (personal observations/literature review).

Cormet company has a website; however, it is not obviously advertised. Neither the menu, the sustainable attitude nor the opening hours are advertised. This is something to consider. Some people told us that the restaurant should serve dinner meals (this is only one example of the fact that this was not obvious to many people). Other people told us that Cormet company should serve organic food (another example that is already occurring but is not visible). Research indicates that clear advertising along with a positive experience results in repetitive visits by customers. This could help bring the customer numbers during dinner back to the old level and hereby help prevent food wasted by over-preparation.

Improve internal communication (personal observations).

It seems that usually the lunch staff is not aware of what will happen during the evening or the next day, or the other way around. Therefore, some food is sometimes stored and not used at a later point in time (due to mislabelling). By improving internal communication, people can cooperate to reduce food waste and increase the sustainable attitude of the company.

Make consumers aware of food waste (literature review).

Research indicates that awareness leads to prevention. This is also the case in food waste. Many people throw away food because they do not know any better practice. By making them aware of the food waste problem, some consumer waste can be avoided. This could be achieved by flyers, posters and advertisement on the website, to name a few examples.

Lower prices (questionnaires).

Many people have complained about high prices of the meals during lunch, but especially during dinners. People are willing to pay for the quality of meals, but not for food of a lower quality in sharp contrast to their expectations. Since people are not willing to pay too much for sub-optimal quality meals, they might decide not to visit. The low amount of customers during the dinners is the most important generator of food waste. Therefore, either the quality should be improved, or the prices lowered.

Avoid the use of disposable plastics (questionnaires).

This does not have anything to do with food waste, but with customers' preferences. Many people have indicated that they would prefer paper plates and steel cutlery to plastic ones. Plastic waste is a growing problem world-wide, so more people start complaining about this topic. It might be well worth it.

5 Literature review

Over the last decades, eating outside home has increased and played a crucial role on people's dietary habits. Consequently, catering companies have an extra responsibility to forward a balanced and healthy diet to the consumers (Ferreira et al., 2013). Both commerce and retail food organizations including dining services of universities are among them (Whitehair et al., 2013). Moreover, they have to manage the food waste problem which has become a global issue. To be more specific, every single European citizen causes 240 kg of food waste annually including 15% of egg and milk products, 13% of vegetables, fruit and bread, 12% of meat and 9% of precooked meals (Ferreira et al., 2013). Food waste might be caused in the production, distribution, storage, preparation process or during consumption. The following literature review addresses ethical factors, environmental (nature) factors, commercial factors, behavioural and cultural factors, environmental (surroundings) factors as well as physical food factors that might influence food waste at service companies in one way or another; hereby we give a detailed outline of the scientific background of the problem.

5.1 Ethical factors

Nowadays, for restaurants and canteen, it is not only about making food, but also about corporate social responsibility. The European Commission defines CSR as: “the responsibility of enterprises for their impacts on society.” Respect for applicable legislation and collective agreements among social partners is a prerequisite for meeting that responsibility. To fully meet their corporate social responsibility, enterprises should have in place a process to integrate social, environmental, ethical, human rights and consumer concerns into their business operations and core strategy in close collaboration with their stakeholders (Commission, 2011). As mentioned in this definition, ethics is a part of CSR. The point of CSR is what firms can do and not what they want (Pompe & Korthals, 2010). Therefore, it is all about moral effectiveness, which leans on the ability of making CSR operational in a complex moral world (Pompe & Korthals, 2010). CSR is about adaptation to the ever-changing social reality and making oneself fit into the current societal demands seriously (Pompe & Korthals, 2010). The ethical part is about the principles, values and codes which people have in life. How should we act and make a good decision after considering all relevant things (Organic Centre Wales, 2011)?

In the western world, food waste can be seen as a part of the high living level. Food waste is seen as ethically wrong, especially when you look deeply to the relation between humans and nature and its consequences (Gjerrisa & Gaianib, 2014).

5.1.1 Society

When looking to the consequences for humans, people say that throwing away food is not ethically right when people have famine on the other side. However, the food waste of the consumer side is hard to be used for people in need. Decreasing food waste will result in saving money, which could be used for people in need. Yet, the money which is saved, goes towards other sorts of consumption such as new clothes, holidays, a new car (Gjerrisa & Gaianib, 2014). An organization like Cormet would use the money for investments. There should be other actions if people suffering from famine will benefit from food waste reduction. The ethical question is whether people who live in affluence and do not waste food should use the saved money to help people in need. If yes, why is this only for food waste and not for other waste of resources such as fashion? And to what extend are humans forced to change their consumption patterns to help others except for themselves (Gjerrisa & Gaianib, 2014)?

There are many different reasons that cause food waste. One of them is there is too much food available in supermarkets, restaurants and canteens. In affluent countries of western societies consumers can choose a multitude of foods. The food that is not chosen by the consumers ends up as food waste. Consumers pay indirectly for those losses and the luxury of multitude of choices. Consumers wonder what they like to eat rather than what they might eat. Is this ethically right? Directly, consumers do not hurt other human beings in the way they spend their money and while people are willing to pay for a system that entails food waste with no limits, food waste is more arbitrary than problematic. Food waste is a sign of richness although it seems morally wrong. On the news we see people suffering from hunger, which makes it hard for us to not react on those conspicuous inequalities. Thus, food waste has become a symbol of human injustice (Gjerrisa & Gaianib, 2014).

5.1.2 Human health responsibilities for canteens

Food waste is not only an ethical part of restaurants and canteens, but also healthy nutrition and diet. The school canteen is a suitable environment to encourage people to eat healthy (Graça S.

Carvalho, 2013). It is seen as a good opportunity to encourage fruit and vegetable intake. 'Canteens are also seen as socialization spaces where the pleasure for healthy meals must also be promoted' (Graça S. Carvalho, 2013). A study shows that changes in the availability of healthy products in canteens can change the nutritional quality of lunches and improve the diet of the customers (Lachat, Verstraeten, Meulenaer, & Huybregts, 2009). The study was done by randomly putting 209 canteen customers in a fruit and vegetable group (FVG) and a control group (CG). The FVG group got two portions of fruit and one portion of vegetables for free at lunchtime. The study showed that consumers in the FVG group ate 80g more fruit and 108g more vegetables (de Castro et al, Bellisle, Feunekes, Dalix, & De Graaf, 1997)

The environment is also important for consumers to make healthy choices; the factor of nudging is related to this. A lot of studies have investigated how nudging can help people to make healthier food choices. One study states the importance of the accessibility and availability in relation to buying healthy and unhealthy snacks. Availability and easy access to high energy-dense foods are related to increasing chances of overeating. With regard to accessibility and availability, it is suggested that the use of color-coded labelling and exhibition of healthy items to the public should lead more people to buy healthy items. Furthermore, nudging strategies have significance effects on stimulating consumers to healthier snacking. Especially by increasing the exhibition and availability of healthy snacks and decreasing access/availability of unhealthy ones can increase healthy snacking consumption (Kleef, Otten, & Trijp, 2012).

5.1.3 Environment

The production of food has negative environmental consequences when looking to the agricultural practices, especially farming animals. If food is thrown away easily and is not used for humans or animals, food waste have even worse effects on the ecosystem such as eutrophication, climate change and air pollution, while a lot of food is produced for nothing. The impacts on the ecosystem can have negative effects on humans. This will be more deeply explained in paragraph 1.2. By only reducing food waste, we will not mitigate these environmental consequences; it should be looked from a wider perspective such as food consumption reduction in general (Gjerrisa & Gaianib, 2014).

The last ethical problem of food waste is disrespectfulness towards the ecosystems, organisms and biosphere despite the fact that they provide us with food. Food is a part of the life on the planet where humans have an intimate relation with the world. It is a disrespectful attitude towards nature around us to throw away food (Gjerrisa & Gaianib, 2014).

5.2 The natural environment

The food industry has a huge impact on our planet. If a large proportion of food is wasted, this has major environmental implications. It means that not only the food itself has gone to waste, but also the energy that has been used to produce the food including fertilizers, transportation, packaging and refrigeration. Altogether, this adds up to a big waste of resources, which should be avoided. We briefly describe the impact the food industry has on our environment.

The main sources of the food waste problem nowadays are private households and commercial organizations, such as restaurants (Zhao & Deng, 2014). Despite the fact that food waste can be utilized as a bio-product (biofuel, compost producer, means of energy recovery), plenty of environmental problems such as global warming, nitrogen loss, leachate problems, odour and greenhouse gas emissions still do occur (Papargyropoulou et al., 2014). Food waste landfilling is the major contributor to the global warming and composting of food waste is the main cause of nutrient enrichment and acidification due to the emissions of NH_3 and SO_2 at the decomposition stage (Papargyropoulou et al., 2014). Moreover, apart from the environmental impacts, such as pollution and depletion of natural resources, food waste has economic impacts including food production, purchasing and final disposal costs (Papargyropoulou et al., 2014). Ethical and social impacts have arisen because of the disparity between extravagant food wastage and malnutrition. Food waste is a problem that concerns not only industrialized countries where retail and consumer waste prevail, but also developing countries where food spoilage is caused by bad storage infrastructures and outdated means of transport, especially under extreme weather conditions in terms of high temperatures and humidity (Venkat, 2011).

Unfortunately, the food demand will become much more prevalent and competitive in comparison to energy, water and land in the future. To tackle this problem, some possible options of food waste prevention could be the minimization of food surplus and avoidable food waste, the distribution of this surplus to communities plagued by famine and the conversion of the food waste to animal feed (Papargyropoulou et al., 2014). Last but not least, concepts such as the waste hierarchy, the “3Rs” (Reduce, Reuse, Recycle), producer responsibility, Life Cycle Assessment (LCA), Life Cycle Management (LCM), polluter pays principle and Sustainable Consumption and Production (SCP) can contribute to the mitigation and obstruction of this problem because food waste is treated as a “resource.”

5.2.1 *Global warming*

Global warming – the gradual rise of temperature in our planet’s atmosphere - has been a topic of debate for several decades. There is a general consensus that human presence on earth has led to devastating changes to the planet and the life it supports in a relatively short time span. Over the past fifty years human population has more than doubled requiring a massive increase in food production; thus, global food scarcity has decreased, resulting in fewer people that have not had access to high-quality food (Godfray et al., 2010). This huge increase in food production has had a big impact on our planet. Next to an increased need for agricultural land resulting in deforestation, soil depletion and erosion, agriculture has heavily contributed to global warming due to the production of greenhouse gases such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) as well (Steinfeld et al., 2006). Carbon dioxide is mostly produced in combustion, respiration and metabolic processes. However, methane (produced by microorganisms in the fore-stomach (rumen) of ruminants (cows, sheep, camels etc.)) and nitrous oxide (which is produced by micro-organisms in soil during (de-)nitrification processes) have a global warming potential that is 23 and 296 times higher than that of carbon dioxide

respectively (Steinfeld et al., 2006). The European Commission estimated that the European food chain causes 17% of its greenhouse gas emissions and 28% of material resource use (EC, 2011). The agricultural production can be divided in crop production and farm animal production. Farm animal production has a huge impact on global warming both due to the growing of feed crops and greenhouse gas production by the animals and their manure (Koneswaran & Nierenberg, 2008). A thorough study in 2006 calculated that livestock production vastly contributed to the global anthropogenic emission of carbon dioxide by 9%, methane by 35-40% and nitrous oxide by 65% (Steinfeld et al., 2006). Here, only livestock has been taken into account, but the story does not end at this point. Crop production also contributes to global warming in various ways. Global estimates indicate that the production of nitrogenous fertilizers use about 1% of the total fossil energy, worldwide (Smith, 2002). An estimated 75-80% of the total fertilizer use is accounted for crops that are grown for human consumption, whereas the rest is used for feed crops for livestock (Steinfeld et al., 2006). Nitrogen-rich fertilizers contribute to greenhouse gas emissions by adding N₂O to the atmosphere (Steinfeld et al., 2006). Leguminous crops, such as soy beans, alfalfa, green beans and peas, also contribute to N₂O levels; their endosymbiotic rhizobacteria are able to form atmospheric nitrogen into larger nitrogen-based molecules that contribute to N₂O production in the soil (Steinfeld et al., 2006).

5.2.2 Pollution

Livestock production accounts for 64% of the global ammonia emissions (Steinfeld et al., 2006), whereas total agriculture accounts for around 90% of it (Misselbrook et al., 2000). Research has shown that a high emission of ammonia into the atmosphere could lead to the formation of ammonium salt particles which accumulate near the origin of emission; the accumulated particles end up in soils nearby causing soil acidity, forest productivity, stream acidity and terrestrial ecosystem biodiversity (Galloway & Cowling, 2002; Ritz, Fairchild, & Lacy, 2004). High quantities of atmospheric nitrogen also contribute to acid rain, which can have a devastating impact on aquatic life, plant life and might result in over-fertilization and algal blooms (Matson, Lohse, & Hall, 2002; Ritz et al., 2004).

5.2.3 Other side effects

If a large proportion of food is wasted, this means that there has to be overproduction at some stage. At an agricultural level, this means that more food is grown than is consumed. Since agricultural industries have been estimated to use up to 70% of the freshwater supplies on an annual basis (Postel, Daily, & Ehrlich, 1996), this implies that overproduction accounts for a large proportion of this used freshwater. A research group in the United States calculated that food waste due to overproduction at the agricultural level may account for up to 25% of the annual freshwater use in the US. Furthermore, this study discusses the food waste cost in terms of energy expenditure (Hall, Guo, Dore, & Chow, 2009). The average farm needs around 3 kcal of energy to produce 1 kcal value of food energy (Horrigan, Lawrence, & Walker, 2002). The input energy is usually coming from fossil fuels, which means that annually 3% of US oil use is accounted for food waste (Hall et al., 2009).

The increased demand for food worldwide has also resulted in an increased demand for agricultural land. Especially in developing countries, where agricultural standards are lower, deforestation occurs in order to create arable land for crop production. Furthermore, forest areas are cleared in many countries to make room for cattle ranches. However, deforestation does not only occur due to agricultural malpractice. Advances in agricultural technologies may

have led to an increase in deforestation over the past years as well. Angelsen and Kaimowitz (2001) describe how labour-saving technology at the frontiers of agricultural advances pose the highest risk for deforestation due to the agricultural sector (Angelsen, Kaimowitz, Lee, & Barrett, 2001). Deforestation is one of the main reasons for the extinction of animal species worldwide (Tilman, May, Lehman, & Nowak, 1994). Additionally, deforestation has been identified as one of the main reasons for erosion and soil depletion. However, repeated tillage of the soil, as it is done in many agricultural scenarios, also leads to higher erosion rates, which means that agriculture contributes to soil erosion in two ways (Montgomery, 2007). Research has shown that no-till agriculture leads to a more sustainable form of agriculture than the current standards in agriculture allow. Additionally, erosion and soil depletion have been widely accepted as major reasons for decreased agricultural potential (Brink, Densmore, & Hill, 1977; Montgomery, 2007).

5.3 Macrosystem factors

The macrosystem factors influence food consumption in an indirect way. Macrosystem factors contain: mass media and advertisement, pricing and trends in the current world. All these influences may determine the food consumption of students who are exposed to these variables before consumption occurs (Story et al., 2002).

5.3.1 *Mass media and advertisement*

The difficulties about food advertising is how to establish clear concepts, images, symbols, stories and types of information concerning food so as to attract consumers and promote a successful consumption. These images can show where the food comes from, how to consume it and how it benefits the human body in terms of health and pleasure. Other relationships, which can also be considered, are between society and the environment. This can be seen in various ways by different consumers and groups of producers (Korthals, 2008). Research has shown that the amount spent on advertising leads to an increase of the product quality perception on behalf of the consumers (Kirmani, 1990). If the company lacks giving external information, the consumers will rely on their own experience and intuition with respect to the product (Naipaul & Parsa, 2001).

Nowadays, sustainable food gets more and more important; an indicative example is organic food. There are various reasons why people buy organic food; the most important one is personal well-being and health; another reason is the benefits towards the environment (Padel & Foster, 2005). Some impediments of not buying organic food are high prices, lack of information, bad advertisement (wrong exhibition of proper information) and no availability (Padel & Foster, 2005). Moreover, thinking of organic food is mostly misunderstood with the consumption of only fruit and vegetables by the majority of people (Padel & Foster, 2005).

5.3.2 *Pricing*

Foods that are consumed outside home are often consumed “as they are”, because the consumer has less control over the portion size and nutritional content (French, 2003). However, the price is a decision variable that effects the purchase behaviour of consumers; consequently, it influences whether consumers will purchase the product or not. (Chang & Wildt, 1994).

Price is what is given up or sacrificed to obtain a product (Zeithaml, 1988). The influence of the price on the decision making process depends on the price-consciousness of the consumers. Studies have showed that consumers do not always remember the actual prices of products.

There are different ways of price-consciousness. People can either remember the exact price and code it as an expensive or cheap one, or they are not aware of the price at all (Zeithaml, 1988). The awareness of the price depends on the importance of obtaining the product. According to Stout (1969), consumers do not take the price into account when they do not spend part of their own incomes. When consumers are not concerned about their own welfare, their preferences override the purchase behaviour (Stout, 1969).

Studies have shown that price is correlated with the objective quality of the product (a statement concerning the quality based on observations or measurements). A general price-quality relationship is not discovered because there are more indicators like the external information. This involves factors such as advertising, word-of-mouth (oral communication) and product experiences (Hjorth-Andersen, 1991). After repeated exposure of the consumers to these external information, consumers will interpret these information cues as facts. According to Kirmani and Wright (1987), there is a positive relationship between the budget spent on advertising and the consumers' quality perception (Kirmani, 1990).

Consumers appear to depend more on the price as a quality signal in some product categories than in others. This can be due to the difference in price-objective quality relationships by category e.g., cars, food, clothes (Zeithaml, 1988). Price becomes less important as an indicator when there are other factors that also influence the objective quality, like image. If a company wants to offer products with a good price-quality relationship, they should close the gap between objective and perceived quality. This means that the company should offer the quality that the consumers expect. Additionally, pricing is one of the considerations which influences the choice of buying food. Price reduction on healthier food like fruit and vegetables have shown an increase on healthier food sales (French, 2003).

5.3.3 Current food trends and consequences

When assessing the impact that food has on the environment or human health, an important aspect to consider is where resources are bought or which type of products are used. In the last decades, an upcoming trend was visible in the consumer behaviour towards food; consumers cared more and more about what they ate, where it came from, who produced it and how it was produced. All of these aspects, in one way or another, affected the end product and therefore its impact on the environment and human health. An overview of the four most common aspects which consumers care about is given below.

5.3.3.1 Local versus imported food

One of the green movement's recent trends of the consumer behaviour is the tendency to buy locally grown foods. A general belief is that local products do not need to be transported for long distances and therefore they contribute less to the global warming effect, caused by CO₂ emissions. This sounds logical at first sight; however, many studies have been conducted to investigate the role of these so-called food miles in the emission of CO₂. A study by Weber and Matthews (2008) showed that by reducing food miles and acquiring locally grown produce, we can indeed impact on greenhouse gas emissions at a rate of 4-5%, which is equal to 1600 km/year of food transport. They also support that a shift from red meat or dairy products consumption to fish/chicken/vegetables consumption would result in a similar or higher reduction of the greenhouse gas emissions, as the beef (and other ruminant) industries have high impacts on the environment through the emission of methane (Weber & Matthews, 2008). Similarly, a study by Coley et al. (2009) describes that locally grown produce is favourable only

in situations where the consumer has to travel less than a roundtrip of 7,4 km to acquire the products. This study states that mass-import may be more advantageous for the environment, since in that case food miles are shared with a great number of products. Furthermore, the authors emphasize the need for a broader look at the production cycle, storage and transport, including food miles (Coley, Howard, & Winter, 2009). A study by Saunders et al. (2008) focussing on the dairy, beef and sheep industry, confirms this as well. Their results indicate that beef and sheep products produced in New Zealand, including their transportation, are respectively two and four times as efficient as the same industries in the UK (Saunders, Barber, & Taylor, 2006). A second study conducted by the same authors further emphasized the need to look further than the narrow concept of food miles and focus more on the whole production process through life cycle assessment (LCA) instead (Saunders & Barber, 2008).

With regard to food miles, it can be concluded that it is not advantageous when the product is grown very closely to the consumer, so that the consumer will not exceed 7,4 kilometres to acquire the produce. Furthermore, it is better to assess the full life cycle of the product including production, transportation in food miles, packaging and storage to get an insight of a certain product's impact on the environment. As studies have indicated, a local product is not always the environmentally friendly option, where the assessment of the full process has been taken into account.

5.3.3.2 Organic versus non-organic food

Whether organic food is healthier than conventional food or not has been a topic of debate for the last decades. Since the second world war, a slow growth in the availability of organic food has occurred in the western world. Especially in the last decades, the green movement that has been discussed previously has given special attention to organic foods. However, to many people, it is not totally clear what organic food actually means. A detailed description of the guidelines for organic production systems is given by the FAO (2014) on their website (FAO, 2014). To give a complete description of organic agriculture and production guidelines is beyond the scope of this project and therefore, we will only give a short description of the most important aspects. In general, organic crops are crops that are grown with non-synthetic fertilizers and under very strict guidelines for (non-synthetic) pesticide use. Wherever it is possible, pests are controlled in a biological way and by the integrated pest management (IPM) procedure. In livestock, the organic nature mainly lies with the organic origin of feedstock and the absence of any synthetic, chemical and antibiotic use of that. Furthermore, organic guidelines prohibit the use of genetically modified organisms (GMO's) (FAO, 2014). Many studies have been conducted to find out how consumers perceive organic food and what drives them to keep buying organic products. Harper and Makatouni (2002) did a broad-scale research in which they categorized four focus groups out of which two contained organic buyers and the other two contained non-organic buyers. The focus groups were given the chance to express their feelings about food in general and organic food specifically. The results clearly indicated that there were three types of buyers; first, organic buyers that expressed a concern for ethics, food safety and health in general and therefore they bought organic food; secondly, a group of people that shared the concern for ethics, food safety and health and therefore did not buy organic food (but sometimes they bought other products, such as free-range products); lastly, a group that expressed no concern for food safety, health or ethics and therefore did not buy organic or free-range products (Harper & Makatouni, 2002). This study has showed that organic buyers are more concerned about their health, animal welfare and food ethics (Harper &

Makatouni, 2002). Additionally, the study has indicated that organic buyers are more likely to be vegetarian (Harper & Makatouni, 2002). This study has made very clear that people who buy organic products think that they are indeed eating healthier and their choice is better for the environment and animal welfare. The question raised is if this is really the case. Differences in nutritional make-up between organic and conventional products have been the topic of debate for many decades. Unfortunately, it is very hard to compare many studies because of the nature of their designs. Studies that measure nutrients by the dry-weight process, for example, cannot be compared to studies that measure nutrients in fresh-weight crops (Bourn, 1994; Magkos, Arvaniti, & Zampelas, 2003; Worthington, 1998). Additionally, it has been shown that plants differ in their nutritional make-up per cultivar, crop-age and soil type (Magkos et al., 2003). Several reviews have compared conventional and organic food based on the existing literature. Even though none of them drew definitive conclusions favouring one or the other type of food production, there are some minor conclusions that can be drawn. Firstly, it has been well-recognized that some organic vegetables and cereals contain a lower level of proteins but these proteins are of higher quality (Lairon, 2010; Magkos et al., 2003; Williams, 2002); a direct effect of the high-nitrogen fertilizers that are applied in conventional farming systems is that they lead to more free amino-acids that are not necessary in human diets (Magkos et al., 2003). A second important conclusion is that leaf vegetables of organic origin contain a higher concentration of ascorbic acid (vitamin C) compared to conventional crops, which might be due to the higher amount of moisture that can be found in the conventional crops (Lairon, 2010; Magkos et al., 2003; Williams, 2002). Williams (2002) reviewed several studies that had looked into the effect of organic feeding in animals; however, results are contradicting; some studies indicate greater weight gain in rats while others show no differences in weight gain at all; in rabbits, some studies show higher fertility rates and lower mortality rates (Williams, 2002). One has to keep in mind that these studies are based on animals and cannot be directly extrapolated to humans, since human physiology differs a lot from that of lab animals. In general, the scientific consensus is that conventional crops and organic crops do not differ with each other much in terms of good health and that a well-balanced and varied diet is much more important for maintaining good health than choosing a fully organic diet. For the environment, however, organic crops can be a good choice. Even though the production costs and prices are higher for organic products and the yields are lower than those of the conventional systems, organic farming has a lower impact on the environment in most cases. Pimentel et al. (2005) conclude that among others by using little or no pesticides, organic farming promotes higher soil organic matter, offers better water conservation in the soil and needs a lower fossil energy input. Additionally, organic farming results in higher biodiversity in and on the soil and fewer pest problems. In the future, conventional farming systems may incorporate parts of the organic methods in order to reduce their impact on the environment or increase quality (Pimentel, Hepperly, Hanson, Douds, & Seidel, 2005).

5.3.3.3 Processed versus fresh products

In the past century, industrialization has led to an increased use of processed foods (C. A. Monteiro, Moubarac, Cannon, Ng, & Popkin, 2013), something that is well illustrated by the current-day supermarkets, where a high percentage of the products are processed or pre-cooked. Processed foods might seem interesting and time-saving both for households and restaurants in a time where more and more emphasis lies on pursuing careers and making money. This was also confirmed by a study in Brazil; as income rose, so did the share of processed foodstuffs in the diet of Brazilians (Carlos Augusto Monteiro, Levy, Claro, Castro, &

Cannon, 2010). The question whether the increased intake of processed foods has any effects on humans' health has been studied thoroughly. For example, a 20 year-long study on 120.877 US men and women indicated that the increased intake of processed foods, containing high levels of starch, fats and sugars, led to an increased weight gain whereas the intake of fresh fruit, vegetables and nuts led to a decreased weight gain, even when the intake was increased (Mozaffarian, Hao, Rimm, Willett, & Hu, 2011). Much of this can be explained by the high-fibre content of fresh products since these are digested less quickly and therefore reduce the intake of more food at a later stage and lead to a lower, total, caloric intake per day (Mozaffarian et al., 2011). This explanation is also confirmed by a study conducted by Kutoš et al. (2003), which showed a decrease of fibre content and a rise of resistant starch content in beans when they were processed; this suggests for a more thorough food composition table on processed foods, due to the fact that there is a huge difference in processed and fresh goods (Kutoš, Golob, Kač, & Plestenjak, 2003). Monteiro et al. (2010) have proposed a new system of classification for food products; group 1 contains unprocessed foods; group 2 contains processed culinary ingredients such as oils, table sugar and spices and group 3 contains ultra-processed foods, such as carbonated soft-drinks, candies and pre-cooked meals and sauces. Their study emphasizes that it is not a problem to consume processed foods *per se*, but that it is a matter of proportion and balance among the three food groups and that the danger lies on the increasing shift towards processed, fatty, sweet and starchy foods from group 3; the latter foods have led to a global 'industry epidemic' characterized by an increase of obesity levels and non-communicable diseases. They furthermore propose that immediate action be taken by those that are responsible for food and nutrition policies in order to reverse the trend towards a global food-processed society (Carlos Augusto Monteiro et al., 2010). Moodie et al. (2013) also stress this need for strict governmental policies regarding processed foods as well as alcohol and tobacco (Moodie et al., 2013). Regarding consumers' opinions, research has indicated that the consumer perception of processed foods also changes towards a lower recognition and increased difficulty in controlling the composition of foods and diets (Mennell, Murcott, & Van Otterloo, 1992). Therefore, it might be wise for restaurants and canteens to take the amount of processed food served into account and maybe reconsider their menus.

5.3.3.4 *Cosmetic standards*

Our western standards have made it more and more uncommon to accept fresh produce with sub-optimal cosmetic standards, leading to a substantial source of food waste (Godfray et al., 2010). A study by Pimentel et al. (1993) points out that most damages that occur in produce are a direct result of insect feeding or insect residues, leading to a lower cosmetic appearance. Therefore, the pursuit of the highest standards in cosmetic appearance of fruit and vegetables requires a significantly higher amount of insecticide than fruit and vegetables with a lower standard of cosmetic appearance (Pimentel, Kirby, & Shroff, 1993). The impacts of the agricultural pesticide use on the environment and human health are extensive and have been described elsewhere in this review. Interestingly, the same study also describes the lack of adverse health effects of eating insect residues or damaged produce (Pimentel et al., 1993). Unfortunately, it is the demand for perfect products that leads to a large proportion of perfectly edible and nutritious food being labelled as unacceptable by food distributors. Strongly stated, one could say that by choosing only products with a clean cosmetic appearance, one contributes to the global food waste problem as well as other environment-related problems. Therefore, supporting initiatives that work with products of sub-optimal appearance may be taken into consideration.

5.4 Behavioural and cultural factors

Nowadays, more and more secondary schools, high schools and universities are incorporating restaurants at their premises to facilitate students in terms of saving time for studying instead of cooking every day, serving healthy food of a great variety and supporting staff, who work at the school/university, by providing them with foods. However, not all students eat at the faculty on a daily basis because of many reasons. The behaviour of students concerning eating habits varies significantly world-wide due to factors such as culture, nationality, religion, nutrition, allergies, health, exercise, leisure time and socioeconomic status. Here we will present a brief overview of the student behaviour concerning food intake through a conglomerate of surveys worldwide. All the aforementioned factors will be illustrated in cases of students in universities and schools at a global level.

5.4.1 *Cultural habits*

To begin with, Wageningen University is a multi-national university and research centre which welcomes students from more than a hundred countries all over the world. Consequently, students come from diverse cultural, social and educational backgrounds and their food habits vary considerably. Each year, students from Europe, Asia, Africa, North and South America as well as Oceania travel to pursue their academic and professional ambitions and careers.

The contemporary food culture represents the total sum of values, ideas, practices, preparations, techniques, actors and everything else that allows us to make sense of the world of food. Shared and learned behaviours can also be modified and unlearned, which is called socialization.

Eating behaviour is not only influenced by the gustatory properties of the food itself, but also by the smell, appearance, expectations by marketing communications and even by country of origin. Culture plays a major role in developing food and taste preferences. Globalization has influenced consumption patterns. Due to globalization, indigenous foods are accessible to a wide consumer market. Furthermore, recipes are influenced by different cultures and regions of the world. However, cultural and food preferences are still interconnected; food is crucial in traditions and different cultural habits (Wright, Nancarrow, & Kwok, 2001).

Research has been done to show if there are differences in meal patterns among American, Dutch and French students. It has showed that the Dutch students eat smaller portions, but they eat more often (de Castro, Bellisle, Feunekes, Dalix, & De Graaf, 1997). The Dutch students eat 53% more meals than the American ones and 45% more meals than the French ones (de Castro et al., 1997)). Furthermore, the Dutch students eat a larger meal in the evening than during the day (de Castro et al., 1997). The meal size of the French students is larger in the beginning of the afternoon than the Dutch one or the American one, but there is no increase in the meal size in the evening (de Castro et al., 1997). The study has been done with students, but these patterns are related to the different cultures of them (de Castro et al., 1997).

Asian students from China, Hong Kong, Taiwan, Japan or Korea who immigrated to the United States changed their food habits by eating more sweets, fruit and dairy products and less vegetables (Pan, Dixon, Himgburg, & Huffman, 1999). Another study has shown the increase of fatty food eating and the decrease of fibres eating by Asian immigrants to the United States (Yang & Read, 1996). The diet of Asians at their home-countries includes eating low-fat and high-fibre foods. This ratio is still kept relatively the same by Asian immigrants (Yang & Read, 1996).

5.4.2 Preferences

Plate waste is influenced by the persons who consume the meal and their associations with the meal. The relation between these two factors is hard to predict. To minimize food waste, it can help to assess consumers' needs: how much they consume and the acceptance of the menu(s) offered. Furthermore, by incorporating the food preferences of students and including knowledge about what kind of foods are usually rejected or accepted, will reduce the plate waste because food preferences play a key role in determining how much consumers eat. Consequently, food preferences will lead to a higher satisfaction of the students (Ferreira, Martins, & Ada Rocha, 2012). More strategies to reduce plate waste are improving the appearance and quality of the food (Ferreira, Martins, & Ada Rocha, 2012). Furthermore, it can help to offer various choices to consumers. This is because they select themselves what they want to eat and this can lead to less food waste (Ferreira, Martins, & Ada Rocha, 2012). Wansink (2004) has also mentioned that a preferable meal is correlated with greater consumption. However, people can also overeat unlikely foods as much as they do with their favourite ones.

A study has found that food waste has also increased because of the differences in students' appetites (energy needs, the meals have not matched with the preferences of the students and their serving time). Some ways to reduce food waste include using the "offer" versus "serve" provision for the meals' service, rescheduling lunch hours, improving the quality and condition of food and tailoring serving sizes (Guthrie, 2002). According to Guthrie (2002), girls and younger students have a higher percentage of food waste on their plate(s).

5.4.3 Student behaviour

While "proper nutrition reduces the risk of osteoporosis, hypertension and cardiovascular diseases", many students follow an unhealthy nutrition by consuming snacks more often and not having breakfast daily (Lartey et al., 2009). In a survey conducted in the Western Kentucky University (USA), the main barriers to healthy eating of international students were the lack of ethnic foods, lack of time, transportation difficulties and lack of money in spite of the fact that most of them were in favour of healthy eating (Lartey et al., 2009). Low probability of illnesses, high energy levels, ameliorated educational performance and lower levels of cholesterol are some of the benefits of following a healthy nutrition.

Over the three decades between 1980s and 2010s, there has been noticed an important reduction in the home-made food and a gradual increase of food consumption outside home both in adolescents and young adults (Fahlman et al., 2010). Vegetables, fruit and foods including fibres are consumed less and less because of the fast food industry and the modern lifestyle of young people. Research has shown that students coming from low socioeconomic conditions display insufficient consumption of vegetables and fruit while refined sugars and fats are included in their food preferences more and more in comparison to students coming from a wealthier socioeconomic status (Fahlman et al., 2010). Consequently, these students are at a higher risk of experiencing morbidity and they are more vulnerable to illnesses and obesity. In a research conducted in 40 metropolitan middle schools of Detroit (Michigan) concerning dietary knowledge, food consumption behaviour and self-efficacy, black students preferred eating meats, fried food and empty-calorie food more than the white counterparts (Fahlman et al., 2010). Dairy products, fruit, vegetables and grains were preferred more by white students of higher socioeconomic statuses. Furthermore, their knowledge about meals that should be

consumed mostly, what kind and quantity of meals should be eaten per day, interconnections between food consumption behaviour and diseases, and foods rich in vitamins and energy, was more limited than the awareness of white students (Fahlman et al., 2010). Some of the reasons might lie on the fact that many black students, coming from low-income families, could not afford nutritious food or they simply did not comprehend dietary guidelines. As a result, they preferred eating fast food in very cheap restaurants which were located at poor neighbourhoods. Finally, in terms of self-efficacy, black students were much more dissatisfied with consuming soft drinks less and eating healthfully at a fast-food luncheonette-rathskeller than white students (Fahlman et al., 2010). Consequently, proper educational interventions on dietary behaviour and food consumption could help students follow a healthier way of life since a lot of bad food habits adopted in childhood keep going in adulthood.

There are many times in the lives of late adolescents and young adults that the balance between the pleasure, need for food on the one hand and worry about their appearance, health impacts of obesity, following a not proper diet on the other hand, is not kept steady (Rozin et al., 2003). Women are most of the times the victims of such fluctuations in the food intake resulting in anorexia or bulimia in extreme occasions. However, not only the gender of young adults plays a significant role in food consumption, but also their nationality. For instance, a great deal of Americans avoid consuming foods which are high in fats and they tend to identify fats with toxins no matter if fats are high or low in their food intake (Rozin et al., 2003). This might have lethal effects in the long run, especially if they follow a diet which is fat-free. Moreover, unlike Europe, American students are more or less influenced by the same media such as television, magazines, papers, films since they all speak the same language and as a result their food consumption behaviour is much more uniform. To be more specific, in sharp contrast to Americans, French young adults follow diets and consume foods without being obsessed about their health or measuring calories, nutrients and toxins (Rozin et al., 2003). They seem to enjoy eating food as a social activity and pleasure of senses instead. However, only French women are a bit more concerned in terms of their weight and health issues than men (Rozin et al., 2003). Last but not least, the French mainstream is following a moderate food consumption pattern via smaller portions of meals, choosing from a greater variety of food and spending more time on eating in contrast to the American diet where people pay more attention to excess and perfectionism (Rozin et al., 2003).

It is undoubted that healthful eating as well as exercising regularly become of less priority as students are enrolled in the university most of the times. Phenomena such as consumption of low-quality food, inactivity and fast rates of weight gain are prevalent in students' daily lives. Factors causing these sorts of problems may include excess alcohol drinking, partying very often late at night when calorie-empty foods are more available, overeating because of stress or higher ability to tolerate much more alcohol later, much less surveillance of their family and deprivation of sleep (Nelson et al., 2009). In a research that took place among students in the public Midwestern University of Minnesota (USA) in 2006, many factors regarding diet, weight control and physical activity were identified (Nelson et al., 2009). First of all, healthful food choices proved to be more expensive than poor-quality food offered on campus. Secondly, snack consumption, drinking much coffee quantities so that students could make it through the day and eating very late at nights were reported quite frequently by the students in spite of the fact that they were aware of those unhealthful habits (Nelson et al., 2009). Consumption of junk food, purchase of foods from the restaurants of the campus as well as excess alcohol drinking were

also mentioned for reasons of socializing with other students and stimulation (Nelson et al., 2009). Furthermore, some students expressed their dissatisfaction of leading a sedentary life because of sitting in front of a computer many hours per day and heavy university workload, resulting in eating fast food more often, sleeping more hours than doing sports and very limited time to plan or cook their own meals every day (Nelson et al., 2009). Finally, many students stored food in their dormitories both for preparing meals or eating snacks as they could not access a full-equipped kitchen easily and consequently they used microwave ovens to prepare their meals (Nelson et al., 2009). With regard to physical activity, plenty of students stated that the bad weather of the winter as well as difficulty in having a friend with whom they would exercise played an important role of not having any stimulus for sports (Nelson et al., 2009).

Nevertheless, because of the prevalent food industrialization of our century and the modern way of life, more and more consumers have changed their attitudes by buying organic and environmentally sustainable food of local production. They do so by firmly believing that the organic food is tastier, healthier and protects the environment and animal well-being, promotes the local economy of agriculture and livestock and ensures food safety (Pelletier et al., 2013). In a recent investigation which took place in a community college as well as a public University in the Twin Cities of Minnesota (USA), around half of the students, who highly expressed their interest on organic and non-processed food, used to eat more fruit, vegetables and food rich in fibres while they consumed added sugars, beverages and fat much less than the students who were more indifferent about alternative productions of food (Pelletier et al., 2013). Additionally, the more environmentally-conscious students used to have breakfast one extra day a week and reduced junk-food consumption by 50% in sharp contrast to the rest of the students (Pelletier et al., 2013). As a result, we can conclude that students, who were more aware of sustainable production practices of food, followed a more wholesome diet in their daily lives.

Both examples that were mentioned above clearly depict that a great percentage of students are willing to lead a healthier way of life concerning food products and physical activity. Therefore, many factors inhibiting this desire have to be overruled or maybe overcome totally. Catering companies at the premises of the university should take into account students' food preferences for lunch and dinner daily so as to keep pace with their tastes and diets. Many inquiries could be done in colleges and universities so that both students will be satisfactory and restaurants will make enough profits.

Another factor, which must also be taken into account concerning students' behaviour on food consumption, is food allergy. Food allergy has alarmed many people since this incident has been widening during the last 20 years all over the world (Greenhawt et al., 2009). The most vulnerable group of people are adolescents since they might ignore owning self-injectable epinephrine (SIE), continue consuming foods which probably have an allergen, forget to notify friends that they do have a certain kind of food allergy or how to behave and remedy it in case of an emergency (Greenhawt et al., 2009). In a study that took place in the University of Michigan (USA) among undergraduate students who were older than eighteen years, the main food allergies that were stated by the students included milk, tree nut, shellfish, peanut and fish whereas wheat, soy and egg were of secondary importance (Greenhawt et al., 2009). The main food allergens were stated among students who experienced anaphylaxis symptoms against those who did not have any similar symptoms (Greenhawt et al., 2009). Despite the fact that food allergy is a serious matter that should concern all people, a great deal of university students reported that their behaviour was risk-taking for many reasons such as: no record of serious

reaction, not frequency of the same symptoms, not considering eating whatever kind of food to be a hazardous action, belief that the food did not have enough quantity of allergen so that any sort of reaction could be triggered, confidence that they could handle any reaction by themselves, belief that they could eat around the allergen, showing unconcern, the last reaction took place long time ago (Greenhawt et al., 2009). Apart from that, unfortunately, the health services of the campus, the dining services of the university and any close contacts of the students were not informed of the food allergies that students might have had (Greenhawt et al., 2009). Consequently, we can conclude that catering companies and dining services in universities can reap the benefits of notifying the ingredient content of the food served, amending the food preparation process to obviate cross-contamination and selling foods which are allergen-free as well (Greenhawt et al., 2009). Moreover, the medicinal services of the university could be informed via questionnaires about the students' food allergies before the arrival of the students to the university. In this way, they will ensure that SIE medical devices are used consistently.

Students' behaviour on food consumption also depends heavily on vegetarianism which has become prevalent over the last decades. Vegetarianism is a dietary model where people mainly consume plants, fruit, vegetables, legumes and avoid eating most of the animal products or all of them. Food habits, weight control and health behaviour are crucially influenced by vegetarianism both in adolescents and young adults. For instance, vegetarianism is also approved as a healthy nutritive practice and adopted by religions such as Christianity, Buddhism and Hinduism (Perry et al., 2001). In particular, in a survey which took place in 31 public schools (middle and high schools) in the Twin Cities in Minnesota (USA), adolescent vegetarians comprised around 6% of the total sample (Perry et al., 2001). Vegetarians consisted more of female students (not black ones) who were conscious about their body and weight, discontented with their bodies and students who followed weight control diets, both healthy ones and unhealthy ones (Perry et al., 2001). The majority of vegetarians had been told by a doctor that they had had a certain kind of eating disorder and had more probabilities of having thought and tried to commit a suicide (Perry et al., 2001). On the other hand, vegetarian male students proved to be a group of high risk in terms of following an unwholesome weight control diet (Perry et al., 2001). There were subtle differences among different ethnic groups of vegetarians whereas teenagers who also consumed chicken and fish (semi-vegetarians) were at a higher risk than those who did not eat meat and fish (restricted vegetarians) at all (Perry et al., 2001). Moreover, recent inquiries of vegetarianism among adults have recommended that following a vegetarian diet can contribute to human longevity as well as prevent chronic diseases such as cancer and cardiovascular problems (Perry et al., 2001). Besides that, vegetarians can follow their dietary model much longer than people who struggle to adhere to traditional diets regarding weight loss (Perry et al., 2001). There are many reasons that push adolescents and young adults to become vegetarians. Some of them include health, family or cultural reasons, assertion of their independence, proof of their identity, creating intimacy with their peers, rebellion against the mainstream and great emphasis and focus on their appearance which has to be more attractive to the opposite sex and be in accordance with the current fashion trends (Perry et al., 2001). Finally, this survey revealed that vegetarian students were more likely to follow extreme weight loss diets involving diet pills, laxatives, throwing up food in order to lose some kilograms and thinking of committing a suicide (Perry et al., 2001). Despite the fact that vegetarianism in adults has shown positive and healthy results, vegetarianism among teenagers might become a point of reference where "healthy" food attitudes can be adopted and lead to

unsafe weight control practices (Perry et al., 2001). Therefore, education could play a crucial role and advise adolescents on healthy patterns of becoming a vegetarian.

A similar research that was conducted in the regions of Hamilton-Wentworth and Niagara of Ontario (Canada) among students of high schools in 1999, the percentage of female vegetarians was 6,5 %, male vegetarians was 1 % and the overall percentage of vegetarians was approximately 4 % (Greene-Finestone et al., 2005). One third of the vegetarians were semi-vegetarians while the rest of them were lacto-ovo vegetarians (more restricted vegetarians) (Greene-Finestone et al., 2005). We focused on adolescent vegetarianism because the teenage dietary patterns can influence both social and physical welfare of adolescents' adult life later on. Furthermore, dietary practices are affiliated with the growth of teenagers and the espousal of long-lasting eating habits (Greene-Finestone et al., 2005). With regard to the above mentioned survey, it was found that low-fat milk drinking was preferred to full-fat milk consumption while purchase of beverages and foods containing sweeteners and sugars was quite prevalent among school students in Ontario (Greene-Finestone et al., 2005). Thus, we firmly recommend that proper education on nutrition and health patterns of people from a very early age be adopted by primary, secondary, high schools and universities.

From both investigations mentioned above, we can deduce that teenage vegetarianism is principally a female trend that is supported because of health, family, society, environmental and animal well-being reasons. Concerning influences, peers and family seem to mostly prompt or withhold adolescents to become a vegetarian (Worsley et al., 1998). However, vegetarianism also originates from the personal values of teenagers (Worsley et al., 1998). To be more specific, consumption of red meat is strongly related to tradition and power values while on the other hand, the environmental wave, which has emerged in conservative historic periods, has affected teenagers to adopt vegetarianism to express their innovative and radical values at an ecumenical extent (Worsley et al., 1998). These values may attract adolescent women who experience constraints in making life choices by their families and social prejudices and stereotypes (Worsley et al., 1998). An extra factor that illustrates the adoption of vegetarianism among teenagers is the traits of an adolescent's personality (Worsley et al., 1998). To be more precise, teenagers, who are more open-minded and present emotional variations, will probably avoid ingesting red meat (Worsley et al., 1998). Moreover, women, who are usually more empathic than men and correlate their food intake with their body shape, are more likely to develop a negative aspect of consuming red meat (Worsley et al., 1998).

All suggestions for the incorporation of seminars and courses about nutrition and health in the education can also be underpinned by a survey that took place in public schools (middle ones, junior-senior high ones and high ones) in Minnesota, where data were collected between 2002 and 2006 concerning the adoption of policies and student behaviour on food consumption (Nanney et al., 2014). The research showed that students who studied at schools which added policies on healthy food consumption ameliorated their dietary attitudes regardless of any social or family trends, in stark contrast to students at schools which did not add any relevant policies (Nanney et al., 2014). Particularly, there was an important rise of 7% in students' daily eating of vegetables and fruit and a decline of 8% in the daily consumption of sweet drinks' glasses (soda, sports drinks) (Nanney et al., 2014). In addition to that, there was not an important growth both in sedentary activity hours per week (computers, video games, TV, DVD, video watching) and vigorous exercise days a week (Nanney et al., 2014). Last but not least, there was not a

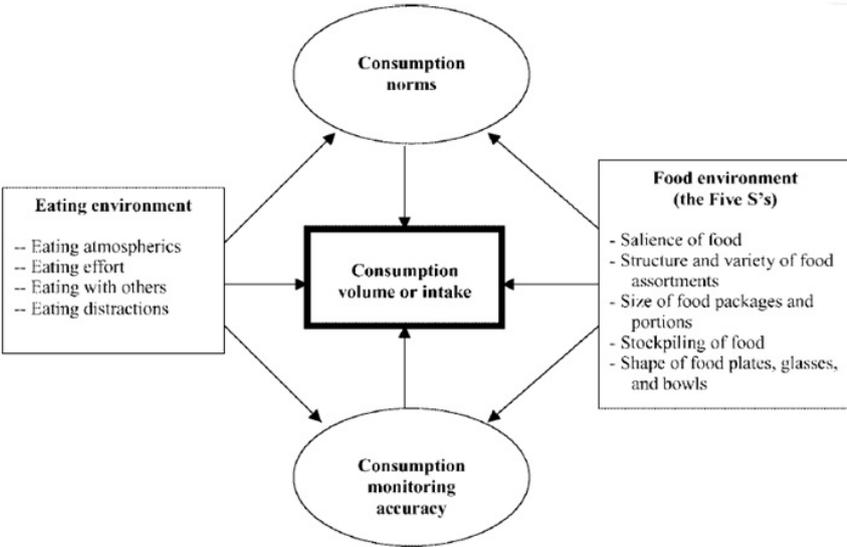
considerable decrease in the mean Body Mass Index (BMI) of students with the addition of these policies (Nanney et al., 2014).

5.5 The eating environment

It is well supported by many studies that the human behaviour is influenced by the environment. There are many different environments that affect human behaviour (Story, Neumark-Sztainer, & French, 2002). This part of the literature study focuses on the physical and social environments of the restaurant at the Forum building. These environments include factors which concern the atmosphere in the restaurant, the social interaction and the way the food is provided influencing the consumption of the food served (Wansink, 2004). Based on the food consumption, the food waste can be identified. Since this research focuses on the amount of food waste, only the factors that influence the food consumption are taken into account; food choice decisions will not be taken into account.

Wansink (2004) divided the environment concerning food consumption into two separated environments during his study. These are the eating environment and the food environment, as can be seen in figure 1. According to Wansink (2004), both environments contribute to the food consumption volume in a direct or indirect way.

Figure 1: Antecedents and mediators of food consumption volume



When people eat, many features of the food such as the colour and taste influence the satisfaction of the consumers; there are also some other factors (Edwards & Gustafsson, 2008). Eating is influenced by activities, experiences taking place in the relevant environment and the social setting of the environment. These circumstances affect the perception of a particular food item and consumption of a meal. Consequently, this can affect the acceptability and the amount of the food eaten. A comfortable surrounding might increase the volume of food consumed, whereas a tense surrounding might increase people’s nervousness and thereby decrease the food consumption (Stroebele & De Castro, 2004).

The eating environment consists of the factors which are associated with the food consumption but they are independent of food. This contains various factors such as the room, atmospherics, eating effort of obtaining food, presence of other people, distractions and time of consumption

(Stroebele & De Castro, 2004) (Wansink, 2004). Edwardson and Gustafsson (2008) have also mentioned factors like the room, the atmosphere in the room, the social interactions and the features of the food.

5.5.1.1 The room

The first factor is the room. Most of the time, people consume food in a room. To increase the amount of food people eat, it is very important to make them feel comfortable inside the room. This level of comfort can be created by improving the decoration of the room; plants, pictures and proper placement of the furniture are some examples. Table 1 shows the guidelines on how to create an environment according to Hotaling (1990). The final step to create an appealing ambience is the presence of other people in the restaurant as they create more warmth (Hotaling, 1990).

Create a quiet, calm and pleasant atmosphere.	
Look at the aesthetic appeal of the dining area:	Put tablecloths or mats on all tables.
	Put centrepieces on all tables.
	Place name cards on each table.
	Select pleasant pictures for the walls.
	Add colour/contrast using live or silk plants.
	During meals, encourage socialization among customers by having a relish tray passed at each table.
	Employ a family-style dining or allow individuals to select/order their meals just prior to service.
	Take all food items of the trays and place them directly on the table.
The dining service should be non-rushed. Allow enough time for meals (30-50 min).	
The dining area needs adequate lighting but try to avoid bright light or glare.	
Keep the dining area free from congestion.	
Seat individuals in small groups (4-6 people) rather than at long tables.	
Designate seating. Be consistent. Choose appropriate companionship.	
Prevent lengthy waiting periods for meals.	
Choose and turn on age-appropriate background music.	
Prior to meals, encourage group activities.	
Turn off the televisions during meals.	
Mind the distance between the table surface and the client's mouth so that it will not be more than 10-15cm.	

5.5.1.2 Atmospheric

The atmospheric are the characteristics of the ambience such as the temperature, lighting, smell and noise. These factors influence the eating environment and eating behaviour of people (Stroebele & De Castro, 2004). The factors of the ambience can trigger sensations among consumers, which might increase or decrease food consumption.

5.5.1.3 Temperature

The temperature has an effect on food consumption in different ways. The temperature of the food has an influence on the amount eaten. Hot foods increase the appetite of people and the food intake (Stroebele & De Castro, 2004). The temperature of the surrounding has an effect on the consumption behaviour because people consume more if they feel cold than in hot temperatures (Wansink, 2004).

5.5.1.4 Lighting

The lighting influences the consumption behaviour indirectly and partly because it makes the surrounding more comfortable and enjoyable. Bright lights activate human beings while warm lights make people feel more relaxed. Thus, by using warm lights in dining areas people tend to stay longer, which leads to increased food consumption (Stroebele & De Castro, 2004).

5.5.1.5 Sounds

The sounds also influence the amount of food that people eat indirectly because they change the mood and stimuli of people. This might affect the amount of food that is consumed. For example, music, both soft and loud, can increase food consumption in different ways (Wansink, 2004). Soft music can make consumers spend more time when having dinner rather than when fast music is played (Caldwell & Hibbert, 1999).

5.5.1.6 Smell

The smells can influence food consumption directly. It is not only about the smell of the meals, but also the smell of the environment. Unpleasant smells are likely to decrease the duration of the meal eating and this can lead to a smaller amount of food consumption. According to Wansink (2004), the reverse is not proven yet. So, a pleasant smell does not necessarily lead to a bigger amount of food consumption.

In addition to the above factors, the person who serves the food has also an influence on the atmosphere of the room. In a commercial situation, this person should try to fulfil the guests' needs in the best possible way. To realize this, the staff members need to work professionally within the room context; this requires some knowledge about the style, design and art of decoration, which should be the basis on how the room is going to be decorated (Edwards & Gustafsson, 2008). The temperature, lighting, sounds, smells, colours and design of the room can have an impact on meal eating and this may have been one of the key factors behind the different experiences of customers' food consumption of the same meal in hospitals, schools, army catering facilities and commercial restaurants (Edwards & Gustafsson, 2008).

5.5.1.7 Effort of obtaining food

Part of the eating environment is the eating effort. If food consumption is easier and effortless, this will result in more food consumption whereas increased effort decreases consumption (Wansink, 2004). Effort in the article of Wansink (2004) is associated to “the ease, access or convenience with which a food can be consumed.” Effort has one of the most significant effects on the consumption of people. The amount of energy that people use for obtaining a certain food product influences which foods people prefer and the amount of food that they will consume. (Wansink, 2004). Effort is also related to the reason why people choose to eat outside their home and why they choose fast food or take-away meals. Convenience is one of the most important attributes of fast and take-away foods and services and is essential in determining people’s food preferences. They choose fast and take-away foods because people want to save time and fast foods as well as take-away foods easily fit into the busy lives of people. Convenience includes aspects of saving time, less effort and a decrease of effort necessary for food provisioning and cooking skills. This results in that people have more time and energy for other personal things such as professional success in their jobs (van der Horst, Brunner, & Siegrist, 2011). In another article, convenience food products are defined “as those that help consumers minimize time as well as physical and mental effort required for food preparation, consumption, and cleanup” (Brunner, van der Horst, & Siegrist, 2010).

To be more specific, the main drivers for people to buy take-away food include people with high levels of stress in their daily lives, people who experience time pressure, people who like organizing social events by inviting friends and relatives to enjoy a lunch or a supper together, adventurous people who like eating outside or travelling to foreign countries searching for original ethnic meals (novelty) and finally, people who just do not delight preparing and cooking for themselves alone (de Boer et al., 2004). On the other hand, factors that prevent people from buying take-away foods contain perceptions such as “the value for money” and “junk food-easy to prepare”, cheap prices which probably indicate food of low quality, the inadequate or absent freshness of the foods and healthier eating habits (de Boer et al., 2004). The different time schedule of consuming food in a family usually prompts people to buy ready meals instead of take-away ones (de Boer et al., 2004).

Generally speaking, buying preferences are much more related to take-away predilections whereas liking and choosing predilections have little relation to take-away choices (Wichchukit & O'Mahony, 2011). In other words, according to a survey that took place in Kasetsart University of Thailand among students, staff and campus visitors during open days over five months, it was inferred that there wasn't a large accordance between the food that consumers took away and the food that they stated they liked more or they would probably choose (Wichchukit & O'Mahony, 2011). To elaborate on it more, liking choices proved to be similar to the choosing preferences whereas both were greatly different from take-away choices (Wichchukit & O'Mahony, 2011). This probably has to do with the fact that when we like or choose something to eat we only think of ourselves, while when we take-away food we also have to consider other people/friends.

5.5.1.8 Social interactions

Concerning the social influences of consumption, Wansink (2004) stated that the presence of people can have an effect on the intake of food. The type of effect depends on whom you consume the meal with. Overall, an environment with more people stimulates consumption. This means that individual's tendency is to eat more when other people are around. As Klesges et al. (1984) have stated, men and women eat more when they are with other people than when they eat alone. They also showed a positive relation between meal duration and group size. So, this means that the more people are present, the bigger the amount of food consumed. However, according to Hotaling (1990), small groups of 4 to 6 people encourage socialization much more than tables of 8 to 10 persons. At big tables, it is hard to have a conversation with all the people, so some people will get isolated. The consumption mainly increases when people eat along with familiar people because they make the surrounding more comfortable and relaxing; by doing this, the individual monitoring of consumption will decrease and people will eat more (Wansink, 2004). However, teenagers and adolescents are also influenced by their peers concerning food consumption; they will copy the eating habits of these people. They will see the portion that is eaten by a friend as a normal standard and they will act in the same way (Stroebele & De Castro, 2004). Eating with unfamiliar people can decrease food consumptions because the self-monitoring and awareness is high. According to De Castro (1994), food consumption is 33% bigger if you eat with one person than eating alone. The effect of other people on the environment is obvious regardless of time of the day, place or types of meal (De Castro, 1994). The interaction factor also includes the interaction between customers and service staff. If they interact with the consumers during the process of meal consumption, they can definitely influence the amount of food people eat (Edwards & Gustafsson, 2008).

5.5.1.9 Distractions

Distractions during eating a meal can influence the consumption. Distractions can include watching television, reading or talking. People tend to eat more when they are distracted because the distractions make them eat for a longer time or decrease consumers' ability to monitor how much they ate (Wansink, 2004).

5.5.1.10 Time of consumption

The amount of the food that people eat is affected by the time of consumption. This can be the time since the last meal, the time of the day or the season. This is due to the fact that most people adjust their meal sizes in accordance with the period of time. Specific types of food are preferred at specific hours of the day, so the time of consumption influences the type of the food consumed (Stroebele & De Castro, 2004) Holidays or exam weeks are indicative examples of different time periods. Holidays will normally encourage overconsumption, long eating durations but low eating effort so many leftovers will result in food waste (Wansink, 2004). These situations are mainly personal and they are not comparable with situations taking place at schools. An important time a year for the school restaurants is the exam week. Exam weeks, most of the time, lead students to stress and this stress affects their eating behaviour.

According to several studies, snacking behaviour increases with stress and consumption of normal meals decreases during stressful periods (Oliver & Wardle, 1999; Zellner et al., 2006). The study of Zellner et al. (2006) also states that stress causes a change from the consumption of healthy low-fat foods to less healthy high-fat foods. During his study, 73% of the respondents indicated that they overate when they were stressed. 64% of the respondents indicated that when they were stressed they ate sweet foods. More females than males reported a higher food

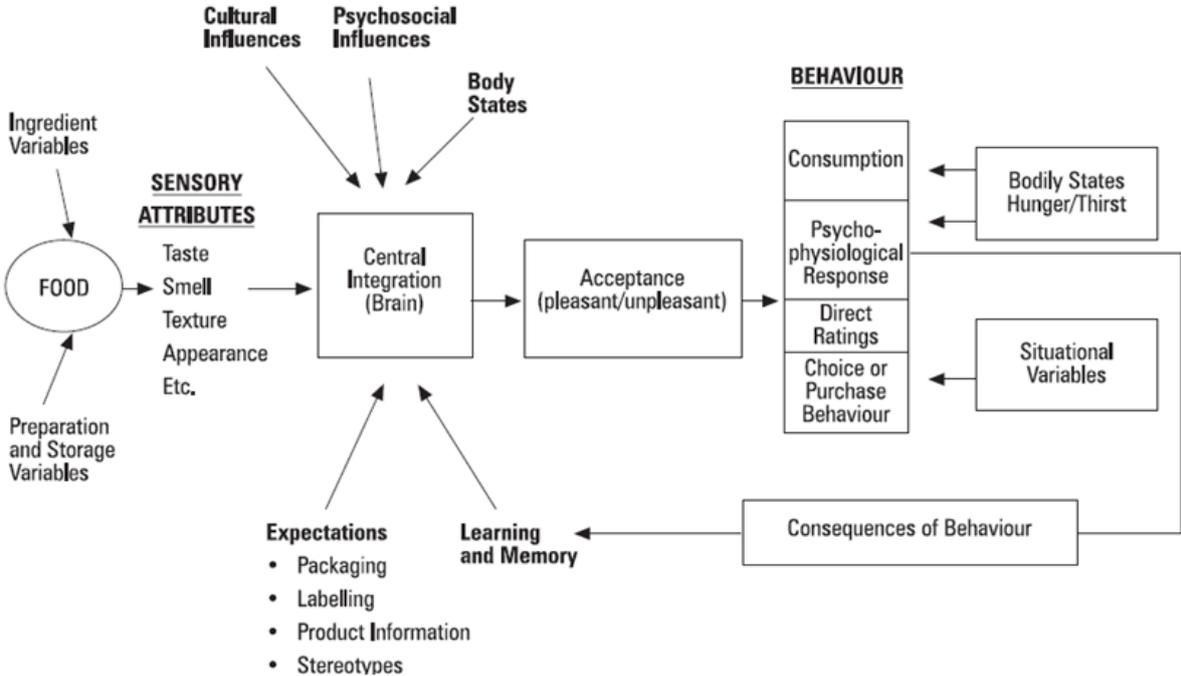
intake when they were stressed because these sweet foods made them feel better (Zellner et al., 2006). A study among 145 ivy-league undergraduate students found that non-athletes and females were more stressed. Stressed students have less healthy behaviours and more bad habits such as eating junk food (Hudd et al., 2000).

5.6 The food environment

The food environment is related with the way of providing and presenting the food. This environment entails the salience, structure and variety of food assortments, portion sizes and the way the food is served (plate-ware) (Wansink, 2004). Each part of the food environment will be explained on the next pages.

This section is related to features of the food product, the appearance and the way the products are prepared. The way food visually looks influences the acceptance of food. Sensory properties are really important in relation to the acceptance and likability of a food product. The visual appearance affects the way people look at a certain food product. Appearance includes some basic sensory properties like colour, opacity gloss, visual structure, visual texture and perceived flavour. This is because the first thing people do when looking at a product or a meal is observing and thinking about how the meal would taste; “the first taste is most of the time with the eye”. The taste perception can change because of this observation (Nazlin, 1995).

Figure 2: Schematic model of food-related behaviours (Nazlin, 1995).



The acceptance of food is very complicated and interdisciplinary. Figure 2 explains that ingredients, preparation and storage variables represent the meal or food product. Figure 2 also displays the importance of sensory attributes which affect the acceptance of a product, namely if people find the product pleasant or unpleasant. In the end, this affects the consumption (the amount of food eaten). Furthermore, this model explains the importance of the context (body state, cultural environment and the feelings and expectations) in relation to the consumption of food. This context influences the acceptance of food and consequently eating behaviour (Nazlin, 1995).

5.6.1.1 Salience of food

The salience of food means the way the food is presented. If this is done in a good way and the food looks tempting, then seeing the food can stimulate people to consume it. The visual exposure of food to consumers increases the intake. Seeing or smelling food can even increase hunger (Wansink, 2004).

The whole appearance, consequently, affects the acceptance of a product and especially colour has a strong influence on satisfaction. Furthermore, sensory properties like texture and smell have a penetrating effect on consumer perception and acceptance. These sensory properties are influenced by individual's own sensations of taste, smell, information from labelling and images, attitudes, memory from previous experience, price, prestige, nutritional content, health belief, familiarity and brand loyalty (Nazlin, 1995)

5.6.1.2 Structure of the food

The structure and variety of food also affect the amount of food consumed (Rolls & Rolls, 1997). It is only the perceptions of the variety that can influence the consumption and not just the actual variety (Kahn & Wansink, 2004). This is because people believe there is more variety and this will make them more satisfied about the actual assortment. The perceived variety can be changed by organisation, symmetry or entropy (Kahn & Wansink, 2004).

5.6.1.3 Variety of food

The variety of food seduces people to buy all the available food items; that is why it is harder for them to stop ordering food. The variety of food can be shown in several ways such as offering the food in different colours, which increases the food intake (Stroebele & De Castro, 2004).

5.6.1.4 Portion sizes

It is well supported that portion sizes influence people's food consumption. According to Wansink (2004), this is because people see the portion as a normal consumption norm. They see it as the amount that is appropriate to consume. Even if people do not clean their plates, the larger portions give them the possibility to consume more than when they had a smaller portion. In addition to that, the size of plates can also influence the amount of food eaten. Big plates will lead to an underestimation of the portion size and therefore people will eat more. Larger portions of a meal also increase the amount of food that is eaten. If there is an option to choose smaller portions of food, then less food will be consumed (Stroebele & De Castro, 2004).

5.6.1.5 Plate-ware

Changing the plate-ware can affect the experience of the food among consumers. A study by Wansink and Cheney focusing on the size of the serving plates, showed that small environmental factors can have a big effect on the food intake. Large serving plates led to a 56% greater intake (N=40). This increase of food intake is explained by the fact that people assume that the size of

the plate is an appropriate amount to consume, so they serve themselves bigger portions and they consume more (Wansink & Cheney, 2005). Another study confirms that the size of dinnerware influences the amount of food served and consumed by consumers (Van Ittersum & Wansink, 2012). Genschow et al. (2012) have claimed that consumers eat less when the food is presented/served on a red plate. This is due to the culturally learned association of the red colour with danger and stop. Thus, if consumption needs to increase, you should not serve food on a red plate. As stated by Harrar and Spence (2013), the influences of colour on the flavour perception are related to what the colour induces to our mood.

5.7 Relevance for canteens

Food waste in canteens can have numerous reasons, e.g. the planning of the meals, the consumers' food taste and instructions of the staff. Food waste in canteens can arise during different stages of the production process from food products acquisition, storage, preparation distribution, to consumer satisfaction. Food waste also depends on the type of kitchen tools and materials used, the training of the kitchen staff and cooking methods (Ferreira, Martins, & Ada Rocha, 2012). A research, which investigated food waste in a university canteen in Portugal, suggests that food waste can be decreased by making the quality of the served food better and links this to food preference of the consumers (Ferreira, Martins, & Ada Rocha, 2012).

Usually, in a catering company food waste is mainly caused either by unserved prepared food or not consumed food left at the plate(s) (Ferreira, Martins, & Ada Rocha, 2012). Furthermore, food waste can also be caused by the deterioration of raw materials' quality, wrong provision of quantity, insufficient training of the food staff, fluctuations in the consumers' numbers and preferences as well as insufficient amount of distributed food at plates (Ferreira, Martins, & Ada Rocha, 2012). As a result, food waste reduction options have to be invented so as to tackle this thorny problem of our era. Hereby, we present some recommendations which can be of utmost concernment.

Initially, according to a research conducted in a university dining room, where plenty of meals were served per day in a buffet in 2010, they measured liquid and solid waste of plates for one week both with the use of trays and with a tray-less system suggested as a possible strategy to minimize food waste (Thiagarajah & Getty, 2013). There was a grave reduction in solid waste per client while the decrease of liquid waste was insignificant (Thiagarajah & Getty, 2013). Moreover, the majority of the staff working in the university preferred the tray-less strategy since it reduced food waste regardless of the fact that breakage of dishes and cleaning of the tables became more often after this switch took place (Thiagarajah & Getty, 2013). Consequently, when students used trays, they tended to buy more foods than they actually needed whereas if they didn't use trays, they would become more cautious (Thiagarajah & Getty, 2013). In this way, they either ate less or discarded less food waste. The employees of the university reported that their work was either not affected or made much easier after the introduction of the tray-less strategy (Thiagarajah & Getty, 2013). Additionally, people working at the grill stated that food cooking became more facile since students bought less amounts of food (Thiagarajah & Getty, 2013). However, we do not know if students would get used to this tray-less system over time.

Secondly, another solution to the food waste problem could be serving food on small trolleys (Ofei et al., 2014). According to a study, which took place in a Danish University Hospital, it was concluded that food waste was reduced as patients could choose their courses and their portion

sizes from the trolley directly (Ofei et al., 2014). More than 65% of hospitals in Denmark have espoused the trolley food service since 2003 (Ofei et al., 2014). As a result, catering and dining services could adopt a similar method to minimize their plate waste. Thirdly, possible strategies for catering services to avoid food waste are booking of courses in advance, making analyses about a forecasted course and cooking and serving this food relied on their forecast, special training of the food staff on plate techniques, standardised utensils' usage, offering more food quantities per person (Ferreira, Martins, & Ada Rocha, 2012). Besides that, ameliorating the appearance and quality of the foods served, promoting self-service with respect to the students' appetite and preferences are some suggestions that could also be followed so that food services can decrease their plate waste (Ferreira, Martins, & Ada Rocha, 2012). Greater diversity of portion sizes to choose, cooking of meals which are palatable, affordable and have less energy density, making questionnaires to trace the meal preferences and food satisfaction of customers in order that the menu will be amended properly to meet the customers' demands and desires, are some extra recommendations that could be adopted (Ferreira, Martins, & Ada Rocha, 2012). Only this way will the waste/consumption index be reduced and we will also shed light on the relation between the actual needs of customers and sufficiency of food, the appropriateness of individual food amounts served and the menus' acceptability (Ferreira, Martins, & Ada Rocha, 2012). Profitability and sustainability of the companies will be secured much more if the aforementioned proposals will be followed.

What's more, messaging campaigns can assess the beliefs of university students concerning food waste and sustainability and analyse their attitude in terms of the food waste issue (Whitehair et al., 2013; Lipinski et al., 2013). In particular, in a survey which was conducted among 540 university students, it was deduced that prompt-type posters showing messages of the food waste problem led to a 15% decrease in food waste (Whitehair et al., 2013). On the other hand, feedback-based posters based on data about food waste weight, did not trigger an extra behavioural change in comparison to the previous one (Whitehair et al., 2013). In this way, food managers can also ameliorate their operations' sustainability. Thereafter, reminding a student of his/her credence via a poster can stimulate an attitude shift. Last but not least, some further strategies that we suggest on food waste mitigation are a larger production and consumption of seasonal products, a great boost of local products to empower the local economy sustainably, less use of energy-intensive products and more focus on nutrition education (Caputo et al., 2014).

5.8 Conclusion literature review

In this section there will be drawn conclusions of the literature review. These might be used as a crucial input for suggestions of improvement for the food services in the catering company Cormet. For Cormet, food waste reduction is important because of environmental and human consequences. Concerning the environment every part that goes to waste will result in an avoidable impact on our planet and its ecosystems. Concerning the society the ethical part is about famine and the availability of a multitude of food which can create more food waste. Furthermore, canteens can encourage people to eat healthier. This can influence the overall health of the society.

Regarding the macrosystem factors literature has shown that the behaviour of consumer can be influenced by several factors. First of all, advertising can influence the choices of consumers. Thus, promotion of organic food can increase the sales of these products, which will be of value for Wageningen University, because they are very sustainability-minded. The price is a decision

variable that effects the purchase behaviour of consumers; it influences whether consumers will purchase the product or not. If a company wants to offer products with a good price-quality relationship, they should close the gap between objective and perceived quality. This means that the company should offer the quality that the consumers expect (Chang & Wildt, 1994). Price and promotion are both an indicator for the quality of the product.

If we look deeper into different kind of food types there are several trends going on. Focusing on the local versus imported food, it is better to assess the full life cycle of the product including production, transportation in food miles, packaging and storage to get an insight of a certain product's impact on the environment. As studies have indicated, a local product is not always the environmentally friendly option, where the assessment of the full process has been taken into account. For the environment, however, organic crops can be a good choice. Even though the production costs and prices are higher for organic products and the yields are lower than those of the conventional systems, organic farming has a lower impact on the environment in most cases. Nowadays consumers have the possibility to purchase processed instead of fresh food. However, processed food contains high levels of starch, fats and sugars. This led to an increased weight gain whereas the intake of fresh fruit, vegetables and nuts led to a decreased weight gain, even when the intake was increased (Mozaffarian, Hao, Rimm, Willett, & Hu, 2011). Therefore, it might be wise for restaurants and canteens to take the amount of processed food served into account and maybe reconsider their menus. Additionally, because more consumers have changed their attitudes by buying organic and environmentally sustainable food of local production. Catering companies should take into account students' food preferences for lunch and dinner daily so as to keep pace with their tastes and diets.

The behaviour of students concerning eating habits varies significantly world-wide due to factors such as culture, nationality, religion, nutrition, allergies, health, exercise, leisure time, socioeconomic status. Since these factors influence the eating habits they can also influence the amount of food waste. To minimize food waste it can help to assess consumers' needs concerning; how much they want to consume and the acceptance of the menu(s) offered. This is also what is measured in this research later on. More strategies to reduce food waste are improving the appearance and quality of the food, offering various choices to consumers and incorporating the food preferences of the students (Ferreira, Martins, & Ada Rocha, 2012). Additionally Guthrie (2002) also mentioned some ways to reduce food waste; using "offer" versus "serve" provision for the meals' service, rescheduling lunch hours, improving the quality and condition of food and tailoring serving sizes (Guthrie, 2002).

A comfortable environment (surroundings) might increase the volume of food consumed, whereas a tense surrounding might increase people's nervousness and thereby decrease the food consumption (Stroebele & De Castro, 2004). Various factors such as the room, atmospherics, eating effort of obtaining food, presence of other people, distractions and time of consumption influence the eating habits (Stroebele & De Castro, 2004; Wansink, 2004). The effect of other people in the environment is obvious regardless of time of the day, place or types of meal (De Castro, 1994). Overall, an environment with more people stimulates consumption. However, distractions during the consumption of a meal can also influence the intake. According to several studies, snacking behaviour increases with stress and consumption of normal meals decreases during stressful periods like exam weeks (Oliver & Wardle, 1999; Zellner et al., 2006). If food consumption is easier and effortless, this will result in more food consumption whereas increased effort decreases consumption (Wansink, 2004). Effort in the article of Wansink (2004)

is associated to “the ease, access or convenience with which a food can be consumed”. Nowadays people want to save time and therefore fast food as well as take-away foods easily fit into the busy lives of people.

The food environment entails the salience, structure and variety of food assortments, portion sizes and the way the food is served (plate-ware) (Wansink, 2004). The way food looks visually, influences the acceptance of food.

Food waste in catering companies is caused by unserved prepared food or not consumed food left at the plate. Furthermore food waste can also be caused by the deterioration of raw materials’ quality, wrong provision of quantity, insufficient training of the food staff, fluctuations in the consumers’ numbers and preferences as well as insufficient amount of distributed food at plates. Food waste in canteens can be reduced by several ways: tray-less system, serve food on trolleys, booking of courses in advance, and meeting the demands of the consumers by promoting self-service with respect to the students appetite and preferences, diversity of portion sizes, offer meal rating cards.

Our field research has focused on the food waste that is generated at the consumer level and at the kitchen level (serving loss and preparation loss), in order to get an overview of the current state of food waste at the Cornet company restaurant in the Forum building at Wageningen University.

6 Materials and methods

6.1.1 Phase I & II: food waste collection & consumer and kitchen observations

For our data gathering methodology, we refer to Engström and Carlsson-Kanyama (2004) with minor modifications. In their study, 5 types of losses were recorded (storage loss, preparation loss, serving loss, leftovers and plate waste). In agreement with our commissioner, our study focuses on serving loss, leftovers and plate waste. Serving loss and leftovers were combined as kitchen food waste. The study measured food waste for 2 days on 'regular food days'. Since in the Cormet restaurant the menu changes daily (no regular food days), we measured food waste for a longer period of time (10 days). Engström and Carlsson-Kanyama divided food waste into three major categories; meat, fish/ rice, potato, pasta / vegetables. Since the nature of the food served in Cormet's restaurant is a bit more varied, we separated it into more categories (on request of our commissioner), which can be found in Table 2. In the aforementioned study, all the plate waste (consumer data) was measured as a fixed number of meals that was served. At Cormet company, this is not the case as customer numbers vary each day. Therefore, we did not gather all the food waste generated by the consumers, but instead calculated an average which could be extrapolated to the amount of customers of that day.

Category	Description
Sandwiches	This category is meant for the prepared sandwiches.
Warm snacks	This category covers all the warm snacks that are prepared in the kitchen (Kroket, frikandel, panini, turkish pizza etc.).
Potatoes/rice/pasta	This category is meant for the potato/rice/pasta component of the cooked meals.
Cooked vegetables (or sauce)	This category is meant for the cooked vegetables and the sauce (eg. Pasta sauce, goulash).
Salads	This category covers the cold salad that is served on the side of the cooked meals as well as in the salad bar.
Meat or fish	This category is meant for the meat or fish component of the cooked meals.
Chinese food	This category will be used for leftovers from the Chinese vendor at Cormet.
Soup	This category covers soups only.
Other food waste	This category is meant for the food that is impossible to be separated (eg. rice mixed with sauce, mashed potatoes with gravy, etc.).

6.1.1.1 Phase I: consumer food waste

During the two weeks (17-30 November, 2014), food waste was collected at the Cormet food court in the Forum building of Wageningen University. In order to get a good overview of the food that is wasted, a food separating station/site was prepared, which consisted of a table with

30x20x8 cm boxes for each of the customer categories of the food we collected (see also Table 2). The station was installed next to one of the (food) waste bins in the food court’s seating area (see Figure 3). The station was manned by three persons, one of whom categorized the customers that brought back their plates and two of whom separated the food waste. During the lunch hours from Monday till Friday (12:00-13:30 p.m.) and dinner hours from Monday till Thursday (17:00-19:00 p.m.), the food waste was collected from the people that brought back their plates to that specific waste bin. The food waste was separated into the collection boxes. All the people that brought back their plates were counted and categorized as man or woman, food waste consumer or no food waste consumer, resulting in four categories. The food waste was weighed per category and thrown away afterwards.

6.1.1.2 Phase II: consumer observation

Figure 3: Food waste collection station next to the collection bin **Figure 4: Observation bin 1**



Figure 5: Observation bin 2

Figure 6: Floor plan of first floor of the Forum building



During the first week of the data collection, one person also observed a second waste bin, which was located next to the seating area of the food court at the Forum building as well (see Figure 4). This was done without attracting the attention of the consumers so as to investigate the role

of a possible bias at the collection bin. Customers at this bin were categorized as it is shown in Table 2. Special attention was given to customers that moved from the collection bin to the observation bin in order to avoid the collection bin, which could be regarded as bias.

A second person observed a second observation bin (see Figure 5) similarly. This bin was located further away from the restaurant, near the stairway of the Forum library.

These observations were made to see if our collection bin showed a similar observation pattern in comparison to the other two collection bins. An overview of the location of the bins around the restaurant can be found in the floor plan of the Forum building's first floor (collection bin (C), Observation bin (O1 and O2), see Figure 6).

6.1.1.3 Phase I: kitchen food waste

To get an overview of the food waste content in the organic waste bins of the kitchen, the organic waste was searched thoroughly for edible leftovers for two consecutive days. From these data, an estimate was made for the organic waste bins for the rest of the days. These bins mainly contain inedible organic waste such as orange peels, cucumber stems and egg shells, making it hard for us to separate. The bins are also used to throw away leftovers at the end of the shift. For the sake of work ease, leftovers were collected before they were thrown in these bins as much as possible.

In order not to obstruct the kitchen staff during their work (and prevent biased work conditions as much as possible) and get the most accurate estimate of food waste, the kitchen waste was collected at 14:00 and 19:00 after every collection shift. The staff was kindly asked to keep any food waste separate from other waste until it was collected by our team. Where possible, food waste was separated into categories which can be found in Table 2. The separated food waste was weighed per category and thrown away later on.

6.1.1.4 Phase II: kitchen observation

In order to be able to give advice about certain aspects of the kitchen work, it was necessary to get a clear insight in the working methods and attitudes used by the staff. Therefore, the kitchen was observed for two days (Monday and Tuesday) during the second week of the data collection. Special attention was given to the preparation of sandwiches and hot snacks and the turnover rates.

6.1.1.5 Phase I: Grand Café food waste

In the Grand Café, at the end of each day at 17:00 p.m., the organic food waste was collected. The Grand Café staff kindly collected this waste for us in a separate bin. Food waste weight was measured as a total assortment here, since it concerned mostly cakes, pastries, sandwiches as well as leftovers of mint leaves. Food waste was compared to the staff's loss archive which was kept up-to-date during each shift.

6.1.1.6 Phase I: organised lunches banqueting department food waste

On the commissioner's request, food waste was also collected after organized lunches at the Grand Café in the Forum building. This was mainly done to investigate whether or not the recently introduced 'doggy-bag-principle' was used by customers. The staff kindly collected the leftovers of sandwiches in a plastic bag. The sandwiches were counted and weighed after collection took place.

6.1.2 Phase III: questionnaires among lunchtime and dinnertime customers

For gathering information about the reasons why people throw away their leftovers, a questionnaire was constructed (see Figure 7) and handed out during lunch (week 3 of research, when waste was no longer collected) and dinner (week 2 of research, during waste collecting period). This questionnaire was also constructed to get ideas of possible improvements of the current food waste situation. The questionnaire consisted of nine questions. The first three questions were asked to get more information about the individual data of the consumers. Question four was conducted to get an idea whether people left any food on their plate(s) or not; subsequently, questions five and six were conducted to give us an idea why consumers left edible food on their plate(s) in case they did leave leftovers as well as what sorts of changes they would make in order to eat the whole meal. Questions seven and eight were conducted to get ideas about possible improvements related to the taste and portions' size of Cormet food. For the seventh and eighth question, likert scales were used; likert scales are often used to measure attitudes (attitudinal scales). This likert scale ranged from 1-7; this range was chosen because this is the most preferable range to measure attitudes (Jamieson, 2004). The last question was added to give the consumers room for making any other remarks, either positive or negative, related to the food of Cormet company. The questionnaires were handed out to consumers who had already finished their meal in order to not influence the amount of food waste on their plate(s). In order to get accurate and valid answers, the questionnaires were handed out to 50 consumers in every lunch for one week between 12.30 p.m. and 13.30 p.m. For also getting accurate and valid answers of the dinners, the questionnaires were handed out to 25 consumers in each dinner from Monday till Thursday between 17.00 p.m. and 18.00 p.m. This survey resulted in 351 questionnaires in total that were handed out during lunch and dinner; particularly, 251 questionnaires were answered during lunch and 100 of them were answered during dinner. The questionnaires were handed out to 186 men and 165 women.

After collecting the questionnaires, chi-square analyses, t-tests and logistic regressions were conducted. All statistical analyses were performed in SPSS version 22.0 (IBM Corporation).

Figure 7: Questionnaire

Cormet survey: Reducing Food Waste.

For Cormet catering, we are doing a survey to investigate food waste in their restaurant and to find out how consumers feel about Cormet's food. We will use the outcome of this survey in our advice towards Cormet on how they can reduce food waste.

- 1) What is your age?
- 2) What is your gender?
- 3) From which continent do you originate?
- 4) Did you leave any edible food leftovers that you bought at Cormet today?
- 5) If yes, why did you leave edible leftovers today?
- 6) What changes would you suggest in order for you to finish the whole meal?
- 7) On a scale of 1 to 7 (1 being not at all, 4 being neutral, 7 being excellent), how much do you like the taste of the meal you purchased today?
1 2 3 4 5 6 7
- 8) On a scale of 1 to 7 (1 being too small, 4 being neutral, 7 being too big), how would you grade the portion size?
1 2 3 4 5 6 7
- 9) Any other remarks, positive or negative?

Thank you for your cooperation.

7 Results

7.1.1 Phase I: consumers

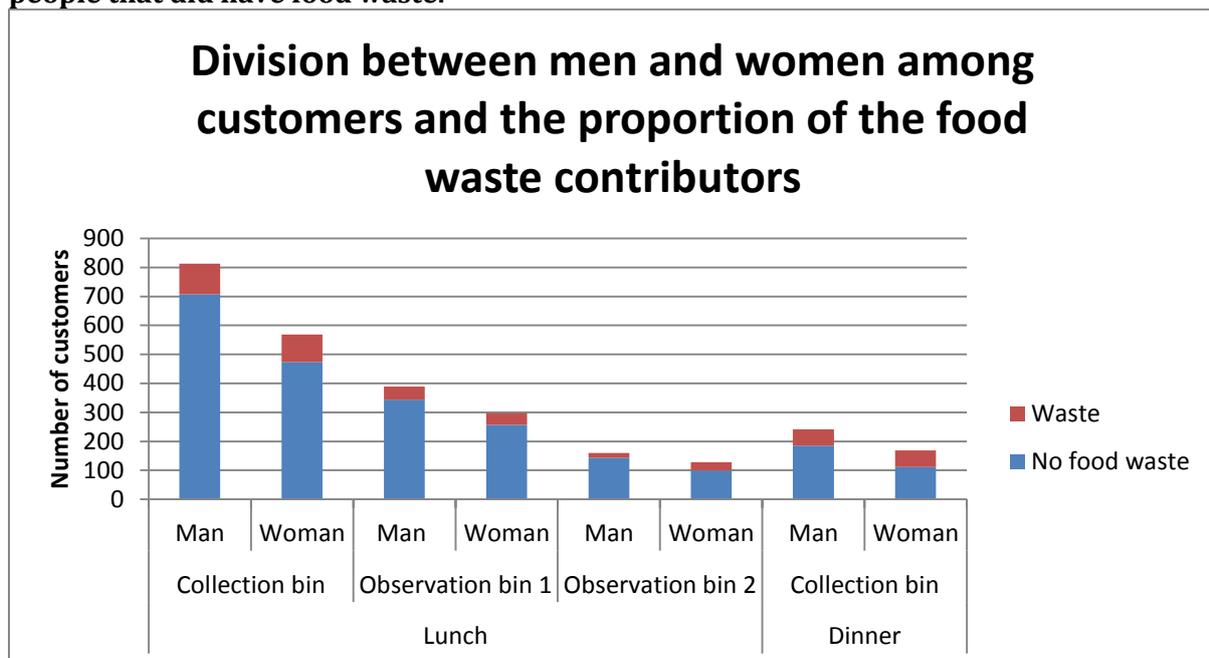
Both during lunch and dinner time, clear patterns were visible. The results of our food waste collection experiment, are the averages of two weeks of data being collected both during lunch and dinner shifts at the Cormet restaurant in the Forum building of Wageningen University. These averages are a good representation of the food waste that is occurring at the consumer level in the Cormet restaurant.

7.1.1.1 Lunch:

The total amount of lunch food waste generated by the customers whom we observed during the course of the two weeks of data collection is 14959 grams, which was wasted by a total amount of 1381 observed customers. This means that, on average, each person accounts for 10,8 grams of food waste per day. This average could be multiplied by the total amount of customers who have lunch per day, giving an overview of the total daily food waste on the consumer side in Cormet restaurant.

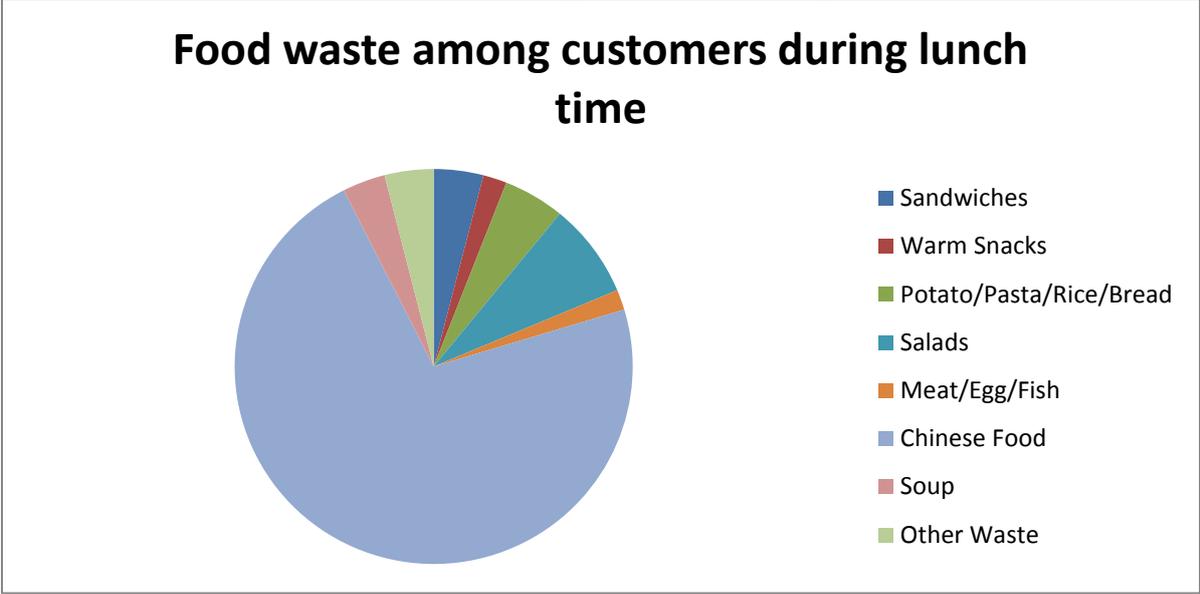
Interestingly, it was only a fairly low percentage of people that caused the amount of food waste during lunch. On average, 13,03% of the men and 16,55% of the women, that we counted during these two weeks, were responsible for the total waste we collected as it can be seen in the left two columns in Figure 8. Exact numbers of customers per category per day can be found in Table S1 in the Appendix.

Figure 8: Bar chart showing the division between men and women for the collection bin and the observation bins during lunch and dinner shifts. Blue parts indicate the proportion of people that did not have food waste; red parts indicate the proportion of people that did have food waste.



If we look a bit further into the type of the food that is wasted, things get more and more interesting. As it can be deduced from Figure 9, food from the Chinese vendor at the Forum building accounts for almost 75% of the total food waste. For Cormet company, this is positive news as this food is not prepared in their own kitchen. The other categories hardly contribute to food waste except for the salad category. Salads are rather lightweight although they account for the second biggest share of the food waste. Furthermore, it is clear that in the other categories, not much food is wasted. We observed minor amounts of warm snacks, sandwiches, potato/pasta/rice, meat/egg/fish and other waste. A detailed outline of the exact amounts of food waste can be found in Table S2 in the Appendix.

Figure 9: Pie chart representing the proportions of each food category in the total amount of the food waste that was collected among consumers during lunch.



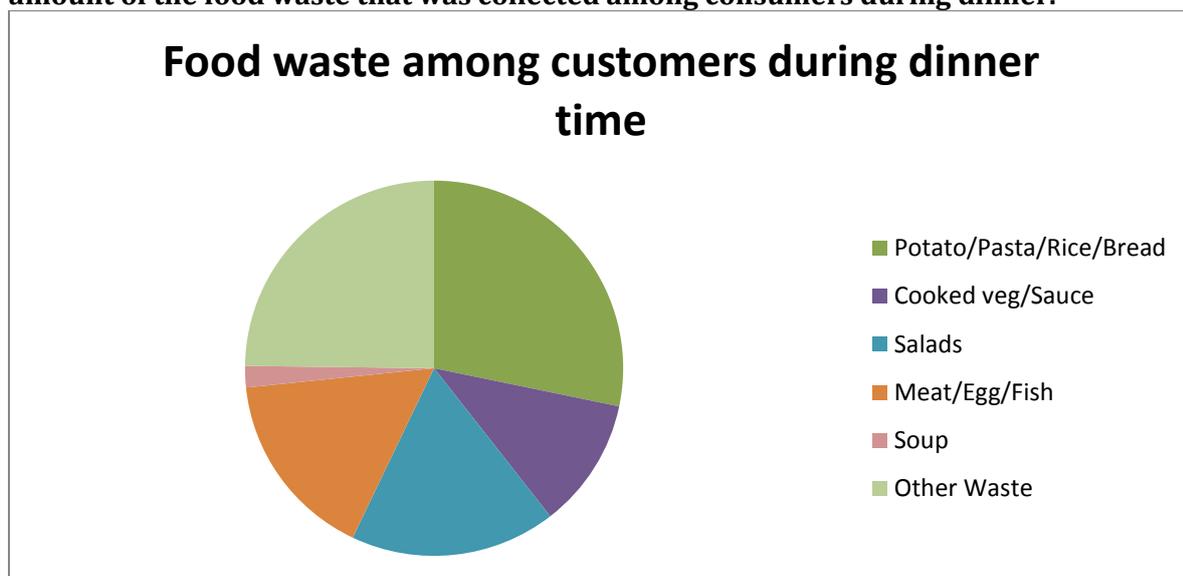
7.1.1.2 Dinner:

Over the two weeks that food waste was collected, a total of 10156 grams was obtained during the dinner shifts. For this total, we observed 410 customers that brought their plates to the plate cart near our collection bin. On average, this means that 24,77 grams of food per customer is wasted each evening, which is almost 2,3 times higher than the average food waste of lunch. By multiplying this average with the number of customers who have dinner per day, an overview of the total daily consumer food waste can be obtained for each evening.

As it can be seen in Figure 8 in the right two columns, not all the persons that were observed also wasted food. In general, 34,3% of women wasted food versus 23,23% of men.

During the evening, all the meals are prepared by Cormet; so, here it is much more interesting to see which components are wasted. As it can be seen in Figure 10, over 50% of the food waste consists of potato/pasta/rice and other waste. Other waste usually consisted of meal components that could not be separated, such as lasagna or pasta with sauce. A large proportion of these two categories are the carbohydrate component of the served meals, which indicates that for most consumers this part of the meal is too large. The cooked vegetables, salads and meat/egg/fish have similar shares in the amount of food waste. The cooked vegetables consist mostly of cooked green beans, which were served for only one day. One can say that, in general, the waste of vegetables and sauce is rather low. Similarly, the waste of meat/egg/fish mostly consists of stewed beef and chicken saté, which were served for two days only. When meat is served with sauce, people tend to waste more of it. Salads are a consistent part of the waste; on days that salads were served, a lot of salad was wasted. Soup hardly contributes to the total amount of food waste; first, because we observed that fewer people eat soup during the dinner but also the soup portions are smaller than the cooked meals. A full overview of the exact amounts of food wasted per category on each collection day can be found in Table S4 in the Appendix.

Figure 10: Pie chart representing the proportions of each food category in the total amount of the food waste that was collected among consumers during dinner.



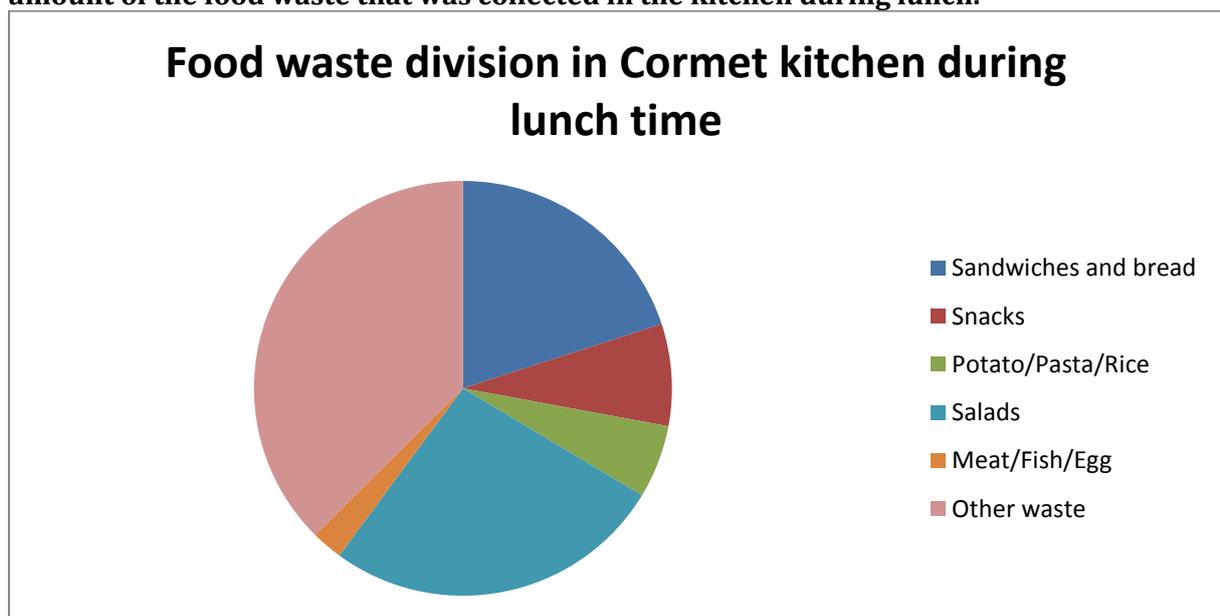
7.1.2 Phase I: Kitchen

In order not to obstruct the kitchen staff during their work, we asked them not to throw away leftovers at the end of their shift. This gave us better opportunities to separate the food precisely. During the first two days, we analysed the edible food leftovers in the organic waste bins in the Cormet kitchen. These organic bins are mainly used to dispose of orange peels, egg shells, cucumber stems and other inedible waste. However, we also found that many edible parts of lettuce, tomato and rocket salad were thrown in these bins. These edible leftovers were collected and weighed as salad leftovers. This gave us an average of 1500 grams of salad leftovers. This is the waste that is produced every day during the preparation of meals and salads. Therefore, this estimate was used for the organic waste bins every day.

7.1.2.1 Lunch:

When all the food waste types were combined, the two weeks of food collection in the kitchen resulted in 51061 grams of food waste and an average of 5,1 kilograms per day. As it can be seen in Figure 11, around one-third of this total waste is “other waste” which includes inseparable waste such as pasta with sauce or mashed potatoes with sauerkraut. Both aforementioned products were served once and here; as a result, a large part of the prepared food was not sold and resulted in food waste. The large share of salad consists of the previously explained estimate of salad leftovers in the organic bin as well as leftovers of the salad side dish on some menus. The sandwiches represent a relatively large share; however, it should be taken into account that the sales of sandwiches (as any other sales) are largely affected by the amount of customers that show up. For reasons that are not clear either to the staff or to us, during the second day of data collection, a very low number of customers showed up resulting in a rather large amount of leftovers of sandwiches whereas this number is fairly low generally. Snacks, meat/fish/egg and potato/pasta/rice waste have relatively low rates in these figures, partially because the other waste section also consists of these categories if they could not be separated. A detailed overview of the exact amount of food wasted in the kitchen per day during lunch can be found in Table S3 in the Appendix.

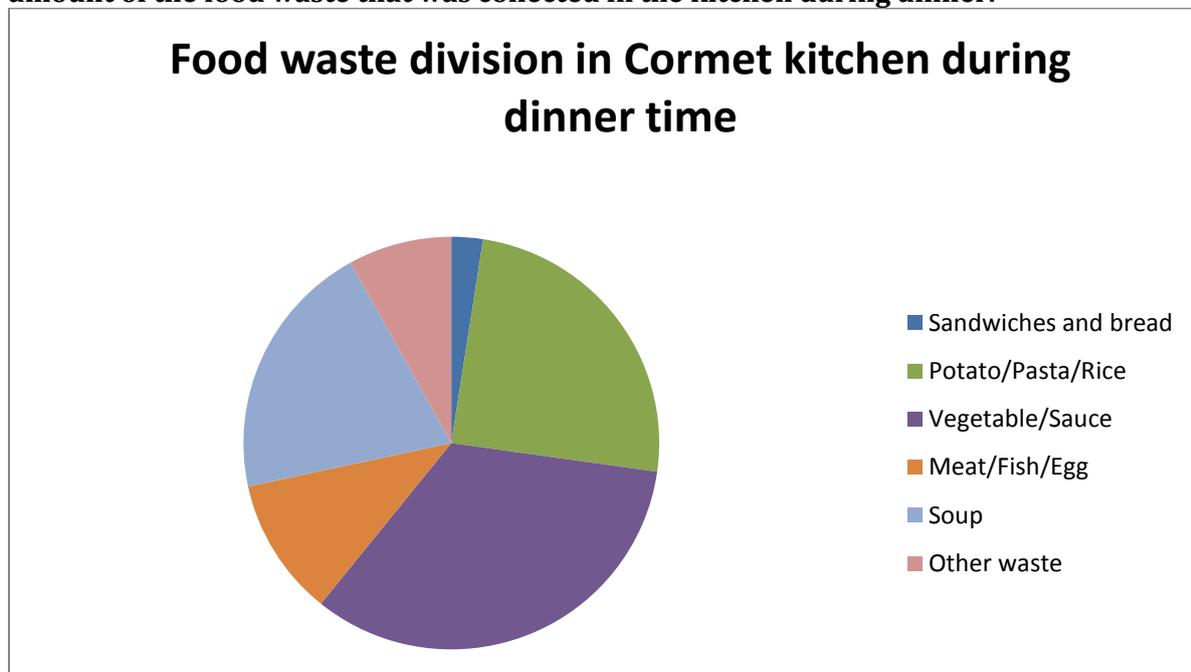
Figure 11: Pie chart representing the proportions of each food category in the total amount of the food waste that was collected in the kitchen during lunch.



7.1.2.2 Dinner:

During the dinner hours, 42848 grams of food were wasted in the kitchen leading to an average of 5,4 kilograms of waste per day (food is served in the evenings 4 days per week). When we take a closer look at the make-up of this food waste (see Figure 12), we see that potato/rice/pasta and vegetable/sauce make up just over half of all waste. This is an important observation, because the other waste is much smaller (usually containing large shares of these components). However, potatoes and pre-cooked vegetables will not be refrigerated and used for another menu whereas many of the other waste products can be used again. Another obvious thing is the share of soup, almost one-quarter of the total. This soup is served during lunch and sold during evening hours as well; consequently, there is a lot of soup that goes to waste. Sandwiches make up a very small part, mainly bread buns that are sold with the soup. Meat/fish/egg accounts for a small share of the total waste due to the strict planning of preparation of this category. A detailed overview of the exact amount of food wasted in the kitchen per day during dinner can be found in Table S5 in the Appendix.

Figure 12: Pie chart representing the proportions of each food category in the total amount of the food waste that was collected in the kitchen during dinner.



7.1.3 Phase II: Observations

During kitchen observations, we observed that in general, all the kitchen staff have their own ways of doing certain tasks. There are no standardized methods or guidelines of doing things. Also, there is no 'final hour', where no more sandwiches or hot snacks are prepared on-demand only. We did observe that all kitchen staff work hard and really work on reducing food waste as much as they can. They seem to take it close at heart, which is positive for a company to keep a sustainable attitude and work ethics. Especially near the end of the lunch shifts, there could be more guidelines concerning heating of hot snacks and preparing sandwiches. It seems as if some kitchen staff prepare only 'panini-ready' sandwiches, which can be refrigerated after the shift and reused on a later moment in time, whereas another part is not aware of this and prepares all kinds of sandwiches (that might end up in the garbage bin after the shift). We also observed that

a big emphasis lies with the unhealthy fast food part of the kitchen. Turkish pizzas and hot snacks are prepared continuously, whereas healthier options are unavailable.

7.1.4 Phase I: banqueting department

Three out of the ten collection days, there were no lunches organized at the Grand Café. So there was no food waste at all. On only one day out of ten, a group used the doggy bag system that is offered by Cormet company. Here, there were no leftovers. On one other day, there was a no-show resulting in 29 uneaten sandwiches. On the five remaining days, food waste ranged from 5-14 sandwiches. An exact overview of the amount of food waste for each day can be found in Table S6 in the Appendix.

7.1.5 Phase I: Grand Café

In the Grand Café, the leftovers mainly depend on the amount of customers that buy food at the end of the day. Results here varied a lot from no waste on several days, to several sandwiches or cakes per day. It is unnecessary to calculate averages because most of the results are also dependent on the staff members that work during the day (sales skills, planning skills etc.) and therefore vary from day to day. A detailed overview of the total amount of waste per day can be found in Table S7 in the Appendix.

7.1.6 Phase III: questionnaires

During week 5 and 6 of this project, we handed out questionnaires among students in the restaurant. In the first week, 100 questionnaires were handed out during dinner time. In total, 251 questionnaires were handed out during lunch time in the second week. In total, we gathered 351 questionnaires, out of which 186 were answered by men and 165 were answered by women. Moreover, 65 people had leftovers and 286 ate their whole meal. All relevant tables can be found in Appendix II.

7.1.6.1 Gender and leftovers

First of all, a chi-square test between gender and leftovers (Yes/No) shows that there is a marginal significant difference (P-value between 0,05 and 0,10) between the women with leftovers and men with leftovers (P:0,076). There seems to be a difference, however, this should be taken with some caution. During the dinner, 22% (n=100) had leftovers. During lunch, this was 17,1% (n=251). Only during lunch there is a significant difference (P:0,013) between men and women. Here 23,3% of the women had leftovers and 11,5% of the men had leftovers.

7.1.6.2 Age and leftovers

A logistic regression analysis between leftovers (Yes/No) and age shows that there is a significant difference between these two variables (P: 0,007). The slope of 0,081 shows that there is a positive relation between age and leftovers. This means that younger people have more leftovers than older people. The category of younger people ranges till the age of 30; for people at the age of 30 and elder ones, food waste is less. This is especially the case during lunch, because the difference is significant (P:0,008).

7.1.6.3 Origin and leftovers

Furthermore, the correlation between leftovers and place of origin was tested with a chi-square test. Of all 351 participants, 212 came from Europe and 111 came from Asia. That is the reason why the chi-square test is only executed on these two groups. The groups from South America, North America, Africa and Oceania together consist of only 27 people; this resulted in a table of the chi-square test, whereby 50% of the cells had too few participants. To draw some good conclusions, the test is only done for European and Asian people. The difference between these two groups is significant (P:0,019). Overall, Asian people cause more food waste than European people; this is 25,2% versus 14,6% respectively. For the lunch, there is a marginal significant difference (P:0,063) between European leftovers and between Asian leftovers, where Asians waste slightly more than Europeans.

7.1.6.4 Taste and leftovers

Food taste has been measured with the question: “how much do you like the taste of the meal you purchased?” This question had to be answered using a Likert scale calibrated from 1 to 7. The number 1 stands for “not at all”, 4 stands for “neutral” and 7 stands for “excellent.” A logistic regression analysis revealed that in general, the consumers graded the taste of the meal with a 4,75 on a Likert scale from 1 to 7. If we compare the averages between lunches and dinners, the lunch is graded higher with a 4,89, while the average of the dinner is a 4,40. Overall, the taste and leftovers are correlated (P:0,000). The slope of 0,547 shows that the better the taste, the less food is wasted. The slope of the relation between taste and leftovers during dinner is 1,058 and during lunch is 0,332. This means that the taste of the food has a bigger influence on the food that is wasted during the dinner than during lunch.

7.1.6.5 Portion size and leftovers

The portion size has been measured with the question: “how would you grade the portion size?” This question also had to be answered using a Likert scale calibrated from 1 to 7. Number 1 stands for “too small”, 4 stands for “neutral” and 7 stands for “too big.” The general mean is 4,38. Overall, the portion size during dinner is considered bigger (4,48) than during lunch (4,34). There is a significant difference (P:0,000) between portion size and leftovers. The slope of -0,567 shows the bigger the portion size, the more food waste is generated. The slopes for lunch and dinner are almost the same as the general slope; these are -0,616 and -0,582 respectively and they are significant.

7.1.6.6 Remarks and leftovers

During the survey, several remarks were mentioned repeatedly. Based on those remarks, 6 categories were made. These categories are: bad taste, composition, portion size, pricing, no opinion and multiple remarks. The latter is a category which includes more than one remark concerning the bad taste, composition, portion size and pricing. Out of the 65 people who had leftovers, 44,4% of them gave a remark about the taste of the meal. This means that most food is wasted by people who do not like the taste of the food. However, if you look at the numbers, most people (78 people) mentioned something about the composition of the meal. The composition is about the composition of the meal, such as more vegetables and about the variety

of the meals during the week. The data concerning the remarks are analysed separately for lunch and dinner but the findings are the same. For both meals, most leftovers are generated by people who make remarks about the taste. For lunch, this figure is 45,45% and for dinner it is 42,9%. In both cases, most people gave a remark about the composition; for lunch, this was 20,7% and for dinner it was 26%.

7.1.6.7 Portion size and gender

A t-test between men and women and their opinion about the portion size showed a significant difference (P:0,001). The portion size for men is neutral, since the mean is 4.15. However, the respective mean for women is 4,65; women experience their meal to be bigger in comparison to men. The difference is significant (P:0,001). This is also the case for dinner and lunch separately.

8 Discussion and conclusion

Our team was assigned the task to find out the current state of food waste in Cormet restaurant in the Forum building of Wageningen University. No previous data were available; however, Cormet already followed strict regulations and guidelines regarding food waste. Therefore, it would be interesting to see how much food was actually wasted at their restaurant. Furthermore, Cormet requested for recommendations from our team on how they could further improve the current situation, where necessary.

Globally, roughly one-third of all the food that is produced for human consumption is wasted or lost during the entire process from production to people's dining tables (Cederberg et al., 2011). For Cormet company, it would be interesting to see where they are placed on this waste scale. One-third, or 33% wastage of all food would be considered to be an average according to the aforementioned global numbers. Cormet company on its website, they state that they serve approximately 750 guests during lunch hours (Cormet, 2014). Our study indicated that each lunch time, each and every customer wasted an average of 10,8 grams of food. The average total amount of food waste generated in the kitchen resulted in an average of 6,8 grams of food waste per customer. This was added to the portion size for our calculations. We estimated that each customer consumed an average of 200 grams in the Cormet restaurant (an average that is slightly more than one sandwich and slightly less than a hot meal). In this hypothetical scenario, the combined waste of consumer side and kitchen would account for 8,51% of food waste per person during lunch. During dinner, fewer customers eat at the restaurant. Cormet prepares food for around 100 customers each day. However, on average, around 60 customers show up every day. Our results have shown that each of these customers wastes on average of 24.77 grams of food. The kitchen waste that was generated is about 89.27 grams per person. This is added to the portion size for our calculation. During dinner, portion sizes are fixed at 500 grams, which makes it relatively easy to estimate the percentage of food that is wasted. Per person, roughly 19.35% of the food is wasted per portion per day.

The results of our measurements and calculations have shown that both during lunch and dinner, Cormet does well on the global average food waste scale. Their percentages for food waste during lunch and dinner lie well below 33%. Still, we see a rather big difference between the lunchtime data and the dinnertime data. Dinnertime meals account for more than two times the waste of the lunchtime meals. Why is this? More importantly, could this current state be further improved?

First of all, results may be misleading in some parts and might need a short clarification. For example, during lunch, there is never any soup waste, even though a lot of it is sold during lunch breaks. The soup leftovers are sold in the evening as well; however, sales are much lower here. Soups account for almost a quarter of the dinnertime kitchen waste, even though it is mostly generated by the lunch shift. The same goes for sandwiches, which are sold in the form of soup breads. The sales are rather low in the evening, so this results in another (small) share of food waste that makes the differences between lunchtime and dinnertime data bigger than they should be.

One should bear in mind that during dinner hours, Cormet prepares food for 100 customers. They have done so for the past year. It was only after the introduction of a new method of cooking, that the visitor numbers have plunged. The new method of cooking contains a lot of pre-cooked materials, which might influence the appearance and the taste of a meal. It is without

a doubt that this new method of cooking has played a role in the decreased interest of customers in the evening meals. Furthermore, if the past numbers were reached again, there would be minimal food waste in the kitchen during evening hours, since most of the food would be sold.

During lunch, we saw a lot of food waste on the consumer side. Our results clearly showed that almost three-quarters of this waste was accounted for Chinese food. The Chinese vendor at the Forum building is a separate business that closely cooperates with Cormet company. However, the food itself is not prepared by the Cormet kitchen. Only one quarter of the food waste by consumers is coming from Cormet kitchen. However, on the kitchen side, all the food waste is coming from Cormet, since the Chinese vendor does not leave any food waste, because their meals are sold out on most days.

It is hard to give a clear advice about improvements for the meals of Cormet kitchen. Especially on the kitchen side, it is difficult to estimate the amount of customers to prepare meals for. When a standard amount of food is prepared each day and for whatever reason, customers do not show up, a lot of food waste is generated. Here, our advice is to try and limit the amount of portions that are heated. During lunch and dinner, Cormet uses larger trays for the cooked meals whereas smaller trays are also available. Why shall we not prepare two small trays instead of a big one? When smaller trays are used, it is easier to anticipate customer numbers. In busy moments, you may prepare two trays while in quiet moments, you may prepare just one. A refrigerated tray can be used at a later day, whereas a heated tray often cannot be used in the same way due to cosmetic and quality reasons (burnt cheese topping, dried out pasta or rice after re-heating). During lunch, an option for hot snacks and sandwiches would be on-demand service during the last 45 minutes of the lunch shift. In this way, ingredients can be kept refrigerated and leftovers and food waste are severely limited.

Another thing to consider is the style and quality of the meal. For example, when canned vegetables are served, fewer people show up and the people that show up waste more. In some cases, it is quite obvious whether the customers liked the meals or not.

Many staff members indicated that they had heard complaints about many meals in the dinner shifts. Our advice is to hear the customers, listen to their complaints and advice. Many people will keep coming whether or not they like the food, because they do not have other options. However, word-of-mouth as well as other advertising may play an important role in increasing customer numbers during dinnertime. Studies have shown that customers are more prone to use word-of-mouth advertising after a positive restaurant experience and positive service experiences (Jeong & Jang, 2011). On the other hand, a study by Zeelenberg et al. (2007) indicated that customers are quick to use negative word of mouth after a bad experience so as to warn others for a similarly bad experience or strengthen social bonds (Zeelenberg et al., 2007). Additionally, studies have shown that diversification of a restaurant's products as well as easy-to-reach restaurant information (eg. Website) play an important role in the decision to visit a certain dining place again (Soriano, 2002). Handing grading forms or short questionnaires out along with each meal could give a great insight for the chef on what to improve or keep as it is.

Additionally, we would advise Cormet to be more pro-active in promoting their services. Many customers may not be aware of Cormet's website; in the restaurant of the Forum building, in general, promotion concerning the website, the (dinner) menu or special deals is not always very obvious. On top of that, Cormet company is using organic ingredients and often local

products. There are only very few places where these are advertised, where they are easily overlooked while they should be a major message to convey to the customers. The question that remains is why they do not advertise their sustainable attitude more explicitly. This could play an important role in attracting some attention for the dinner hours and increasing the dropped number of visitors. Increasing the number of visitors back to the old level would severely reduce the amount of waste that is generated in the kitchen during dinners.

Our personal observations at four other canteens on the campus have shown that there are different ways to advertise the products. We mainly focused on the advertisement of organic food, because several customers indicated that they wanted to eat organic food, despite the fact that Cormet already serves organic food; which is an interesting observation. Advertisement can be done in several easy ways. In the other canteens, it was mainly done with pictures and posters on the wall above the products or hand-written labels in front of the products. This attracts the attention of the consumers and makes them aware of the availability of organic food. Another point that we saw was the difference in the promotion of the dinner. For example, in other canteens there was a big sign which mentioned the dinner time. Additionally, the available products and meals were mentioned on a blackboard on the entrances of the canteens. Besides that, we saw that the preparation of fresh food for dinner appeals consumers. Our advice to Cormet is to improve the promotion of their meals in the evening and especially the organic food that they serve, because organic food is a preferable food item and can appeal more consumers.

Regarding improvements, consumers are at a different level than the kitchen staff; influencing their behaviour is a very difficult task. One of the possibilities is to respond to the observed patterns. The first clear pattern that we observed and was possible to directly work on, was the waste of salad among consumers. Many people wasted the salad that was served as a side dish with most of the hot meals. Our suggestion would be to make the side salad optional.

A second pattern was the consistent large share of Chinese food waste at the consumer side of the restaurant. Here, bear in mind that the Chinese vendor has a very high turnover rate, serving several hundreds of meals each day. Consequently, the share of food that is wasted by consumers, as a direct result, may also be bigger. It is quite hard to get insight in why this share is so much bigger compared to the standard meals offered by Cormet during lunch. It is likely that several factors play a role including taste, culture differences of the target-customers and composition of the meals. Here, our surveys during lunch hours could give a better insight in customers' expectations and opinions.

To identify the opinions of the consumers about the meals served by Cormet, we handed out questionnaires to 351 people during lunchtime and dinnertime. Based on the results of the questionnaires, we can conclude where food waste is generated mostly and why. First of all, the analyses of the questionnaires showed that there was a relationship between gender and leftovers; however, further research is necessary to state this explicitly. The age of people has an influence on whether people leave food on their plate or not. Results showed that younger people (<30 years) had more leftovers than older people (> 30 years). Our advice is that Cormet company should interact with people concerning their food preferences and meal sizes. Another suggestion is that Cormet company should offer smaller and bigger portion size options.

The questionnaires were completed by people from 6 different continents; the majority of questionnaires were filled in by European and Asian people. A comparison between these two

continents showed that Asian people caused more food waste. Concerning lunch, further research is necessary to be done to fully confirm this. The taste of food has also an influence on the food that is wasted in a positive way. This means that the more the consumers enjoy the meal, the less food is wasted. Results showed that the taste had a bigger influence on the food that was wasted during dinner. Additionally, food waste is also generated by the portion size; the bigger the portion size, the more food is wasted. Overall, the results showed that most of the people wasted food because of the bad taste of the meals. However, the majority of people had a remark about the composition of the meals. The main suggestions that people made were: more vegetables, more fresh food, more options for hot meals in terms of variety during the weeks. Additionally, several consumers made remarks about salads such as choosing their own dressings and eating less onions or olives. We would advise Cormet company to make the salad optional so that people can see for themselves if they want a salad along with their hot meals or not. This will reduce the amount of salad that is thrown away. Besides that, some other remarks also pointed out that people preferred a take-away option for hot meals such as doggy bags. Consumers were also interested in listening to music while eating, enjoying a better atmosphere, changing restaurant's opening hours (longer time), choosing more spices, not using plastic cutlery.

In conclusion, we can say that Cormet is already working hard to keep food waste as low as possible. During lunch, at the consumer level, results have indicated that there is relatively little food waste that originates from the Cormet kitchen, however, quite a bit of food waste was generated by consumers buying food from the Chinese vendor at the Forum. In the kitchen at lunch hours, there is some waste generated, but mainly this happens because for some reason visitors are lower on a certain day, which is difficult to anticipate to. As described in the action plan, there are some solutions that can be incorporated easily, which are mainly concerning planning of the sandwich and hot snack preparations and the type of hot meals served. During dinner, there is a much higher waste generated, which is sad, because it is very easy to see where it originated. Dinner is always prepared for around 100 customers, but lately, these numbers rarely show up for dinner. If 100 customers would show up every day, the problem would probably be much lower. Here, the important aspect lies not so much with preventing food waste, but with increasing the customer numbers back to the old level. This would eliminate a bit part of the food waste that we measured in our field research. Our questionnaires have indicated that people are not fully satisfied with the meals that are served during dinners at Cormet. We propose several actions in our action plan that concern the customer satisfaction and the company's image. By listening to the customers, adapting to their preferences and maintaining a good image, the company might be able to attract more customers, which should lead to lower numbers of food waste. For Cormet company, food waste leads to food for thought and some easily applicable additions to their business strategy.

9 Acknowledgements

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11 Appendix I

Date	Collection bin (lunch)				Collection bin (dinner)				Observation bin 1				Observation bin 2			
	Men		Women		Men		Women		Men		Women		Men		Women	
	Was te	No-was te	Was te	No-was te	Was te	No-was te	Was te	No-was te	Was te	No-was te	Was te	No-was te	Was te	No-was te	Was te	No-was te
17/11/2014	17	78	7	46	7	18	13	16	10	90	11	64	-	-	-	-
18/11/2014	14	82	18	52	3	24	3	14	14	56	5	55	3	18	30	15
19/11/2014	4	14	6	16	6	26	6	18	10	41	8	30	8	66	8	29
20/11/2014	9	86	7	58	14	19	12	5	5	78	5	61	3	30	11	24
21/11/2014	9	72	10	54	-	-	-	-	6	79	12	47	3	29	7	31
24/11/2014	15	68	11	49	8	18	5	15	-	-	-	-	-	-	-	-
25/11/2014	8	82	9	53	8	22	10	12	-	-	-	-	-	-	-	-
26/11/2014	12	69	9	50	3	33	3	18	-	-	-	-	-	-	-	-
27/11/2014	7	78	8	50	7	25	6	13	-	-	-	-	-	-	-	-
28/11/2014	11	78	9	46	-	-	-	-	-	-	-	-	-	-	-	-

Table S2: Overview of the food waste (in grams) per day at the consumer side of the restaurant during lunch.

Date	Sandwiches	Warm Snacks	Potato/Rice/ Pasta	Hot vegetable/ sauce	Salad	Meat/Fish/ Egg	Chinese Food	Soup	Other waste	Menu
17/11/2014	111	0	1098	0	238	0	1014	31	0	Omelette
18/11/2014	27	0	0	0	49	0	2516	193	0	Lasagna
19/11/2014	0	0	200	0	109	0	885	228	14	Fish and Chips
20/11/2014	129	0	8	0	50	0	973	0	479	Nasi/Pasta meat/Fries
21/11/2014	93	0	187	0	183	0	586	0	102	Stew/Fries/Shawlick
24/11/2014	197	113	0	0	215	40	1225	70	0	Omelette
25/11/2014	12	0	0	0	53	0	1190	0	0	Sauerkraut/Pasta meat
26/11/2014	0	47	42	0	85	0	1029	0	0	Fish and Chips
27/11/2014	16	75	0	0	36	0	1076	0	0	Spaghetti/Salad
28/11/2014	17	53	307	0	143	209	304	0	0	Fries/Burger/Salad

Table S3: Overview of the food waste (in grams) per day at the kitchen side of the restaurant during lunch.

Date	Sandwiches	Warm Snacks	Potato/Rice/ Pasta	Hot vegetable/ sauce	Salad	Meat/Fish/ Egg	Chinese Food	Soup	Other waste	Menu
17/11/2014	1200	280	831		1500	892	0	0	1292	Omelette
18/11/2014	1950	560	0		1500	0	0	0	6673	Lasagna
19/11/2014	450	490	0		1500	0	0	0	0	Fish and Chips
20/11/2014	0	140	100		1500	0	0	0	0	Nasi/Pasta meat/Fries
21/11/2014	3300	140	100		1500	0	0	0	590	Stew/Fries/Shawlick
24/11/2014	450	140	0		1500	0	0	0	0	Omelette
25/11/2014	300	910	0		1500	348	0	0	7600	Sauerkraut/Pasta meat
26/11/2014	750	770	500		1500	0	0	0	0	Fish and Chips
27/11/2014	1350	280	1381		1500	0	0	0	0	Spaghetti/Salad
28/11/2014	450	350	0		1500	0	0	0	2985	Fries/Burger/Salad

Table S4: Overview of the food waste (in grams) per day at the consumer side of the restaurant during dinner.

Date	Sandwiches	Warm Snacks	Potato/Rice/ Pasta	Hot vegetable/ sauce	Salad	Meat/Fish/ Egg	Chinese Food	Soup	Other waste	Menu
17/11/2014	0	0	1095	0	0	167	0	0	90	Green beans and potato
18/11/2014	0	0	0	0	0	0	0	14	367	Curry with rice
19/11/2014	0	0	396	0	0	119	0	79	0	Couscous chicken
20/11/2014	0	0	293	0	544	954	0	0	0	Stew and fries
24/11/2014	0	0	0	0	631	106	0	94	1503	Sauerkraut
25/11/2014	0	0	292	0	614	0	0	0	500	Pasta beef/Lasagne
26/11/2014	0	0	338	0	0	0	0	0	59	Nasi sate chicken
27/11/2014	0	0	456	0	0	307	0	0	0	Fries with sliced chicken

Table S5: Overview of the food waste (in grams) per day at the kitchen side of the restaurant during dinner.

Date	Sandwiches	Warm Snacks	Potato/Rice/ Pasta	Hot vegetable/ sauce	Salad	Meat/Fish/ Egg	Chinese Food	Soup	Other waste	Menu
17/11/2014	0	0	1003	7685	0	70	0	0	280	Green beans and potato
18/11/2014	0	0	6442	6700	0	0	0	0	814	Curry with rice
19/11/2014	0	0	1505	0	0	361	0	0	337	Couscous chicken
20/11/2014	0	0	100	0	0	1500	0	1428	0	Stew and fries
24/11/2014	0	0	0	0	0	2308	0	828	1522	Sauerkraut
25/11/2014	0	0	964	0	0	0	0	2971	500	Pasta beef/Lasagne
26/11/2014	0	0	300	0	0	200	0	1627	0	Nasi sate chicken
27/11/2014	0	0	300	0	0	200	0	1853	0	Fries with sliced chicken

Table S6: Overview daily food waste at the banqueting-organized lunches.

Date	Number of sandwiches
17/11/2014	14
18/11/2014	12
19/11/2014	5
20/11/2014	10
21/11/2014	No lunch
24/11/2014	29 (no-show)
25/11/2014	No lunch
26/11/2014	9
27/11/2014	0 (doggy bag used)
28/11/2014	No lunch

Table S7: Overview daily food waste at the Grand Café.	
Date	Number of sandwiches/ciabatta/cakes
17/11/2014	0/0/0
18/11/2014	1.5/0/0
19/11/2014	0/0/0
20/11/2014	0/0/0
21/11/2014	1/3/4
24/11/2014	2/0/0
25/11/2014	3/1/1
26/11/2014	0/8/0
27/11/2014	2/0/0
28/11/2014	5/0/0

12 Appendix II (SPSS)

1. Chi-Square leftover * gender in general, lunch and dinner

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3,148 ^a	1	,076		
Continuity Correction ^b	2,678	1	,102		
Likelihood Ratio	3,146	1	,076		
Fisher's Exact Test				,098	,051
Linear-by-Linear Association	3,139	1	,076		
N of Valid Cases	351				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 30,56.

b. Computed only for a 2x2 table

Chi-Square Tests^a

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6,229 ^b	1	,013		
Continuity Correction ^c	5,420	1	,020		
Likelihood Ratio	6,286	1	,012		
Fisher's Exact Test				,018	,010
Linear-by-Linear Association	6,205	1	,013		
N of Valid Cases	251				

a. Consumptiontype = Lunch

b. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 20,56.

c. Computed only for a 2x2 table

Chi-Square Tests^a

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,191 ^b	1	,662		
Continuity Correction ^c	,038	1	,846		
Likelihood Ratio	,192	1	,662		
Fisher's Exact Test				,809	,425
Linear-by-Linear Association	,189	1	,664		
N of Valid Cases	100				

a. Consumptiontype = Dinner

b. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 9,90.

c. Computed only for a 2x2 table

2. Logistic regression leftover * age in general lunch

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	Age	,081	,030	7,393	1	,007	1,085
	Constant	-,554	,731	,575	1	,448	,575

a. Variable(s) entered on step 1: Age.

Variables in the Equation^a

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^b	Age	,099	,038	6,925	1	,008	1,104
	Constant	-,944	,924	1,043	1	,307	,389

a. Consumptiontype = Lunch

b. Variable(s) entered on step 1: Age.

3. Chi-square leftovers * origin in general and lunch

Origin * Leftovers Crosstabulation

		Leftovers		Total	
		Yes	No		
Origin	Europe	Count	31	181	212
		% within Origin	14,6%	85,4%	100,0%
Asia	Count	28	83	111	
		% within Origin	25,2%	74,8%	100,0%
Total	Count	59	264	323	
		% within Origin	18,3%	81,7%	100,0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,486 ^a	1	,019		
Continuity Correction ^b	4,798	1	,028		
Likelihood Ratio	5,299	1	,021		
Fisher's Exact Test				,023	,015
Linear-by-Linear Association	5,469	1	,019		
N of Valid Cases	323				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 20,28.

b. Computed only for a 2x2 table

Origin * Leftovers Crosstabulation^a

		Leftovers		Total	
		Yes	No		
Origin	Europe	Count	19	124	143
		% within Origin	13,3%	86,7%	100,0%
	Asia	Count	19	64	83
		% within Origin	22,9%	77,1%	100,0%
Total		Count	38	188	226
		% within Origin	16,8%	83,2%	100,0%

a. Consumptiontype = Lunch

Chi-Square Tests^a

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3,464 ^b	1	,063		
Continuity Correction ^c	2,811	1	,094		
Likelihood Ratio	3,366	1	,067		
Fisher's Exact Test				,068	,048
Linear-by-Linear Association	3,449	1	,063		
N of Valid Cases	226				

a. Consumptiontype = Lunch

b. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 13,96.

c. Computed only for a 2x2 table

4. Mean taste of food in general, lunch and dinner

Statistics

Taste		
N	Valid	351
	Missing	0
Mean		4,75
Minimum		1
Maximum		7

Statistics^a

Taste		
N	Valid	251
	Missing	0
Mean		4,89
Minimum		1
Maximum		7

a. Consumptiontype = Lunch

Statistics^a

Taste		
N	Valid	100
	Missing	0
Mean		4,40
Minimum		1
Maximum		7

a. Consumptiontype = Dinner

5. Mean portion size of food general, lunch and dinner

Statistics			Statistics ^a			Statistics ^a		
Portionsize			Portionsize			Portionsize		
N	Valid	351	N	Valid	251	N	Valid	100
	Missing	0		Missing	0		Missing	0
Mean		4,38	Mean		4,34	Mean		4,48
Minimum		1	Minimum		1	Minimum		1
Maximum		7	Maximum		7	Maximum		7

a. Consumptiontype = Lunch

a. Consumptiontype = Dinner

6. Logistic regression between leftovers and taste and portion size (Likert scale)

Variables in the Equation						
	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a						
Taste	,547	,123	19,797	1	,000	1,727
Portionsize	-,567	,126	20,302	1	,000	,567
Constant	1,600	,644	6,180	1	,013	4,955

a. Variable(s) entered on step 1: Taste, Portionsize.

Variables in the Equation ^a						
	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^b						
Taste	1,058	,272	15,101	1	,000	2,881
Portionsize	-,616	,246	6,266	1	,012	,540
Constant	-,202	1,114	,033	1	,856	,817

a. Consumptiontype = Dinner

b. Variable(s) entered on step 1: Taste, Portionsize.

Variables in the Equation ^a						
	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^b						
Taste	,332	,151	4,822	1	,028	1,394
Portionsize	-,582	,152	14,594	1	,000	,559
Constant	2,670	,853	9,801	1	,002	14,443

a. Consumptiontype = Lunch

b. Variable(s) entered on step 1: Taste, Portionsize.

7. Leftovers and remarks general, lunch and dinner

remarktype * Leftovers Crosstabulation

			Leftovers		Total
			Yes	No	
bad taste	Count		16	20	36
	% within remarktype		44,4%	55,6%	100,0%
Composition	Count		17	61	78
	% within remarktype		21,8%	78,2%	100,0%
Portion size	Count		7	28	35
	% within remarktype		20,0%	80,0%	100,0%
Pricing	Count		2	19	21
	% within remarktype		9,5%	90,5%	100,0%
No opinion	Count		4	129	133
	% within remarktype		3,0%	97,0%	100,0%
Multiple remarks	Count		19	29	48
	% within remarktype		39,6%	60,4%	100,0%
Total	Count		65	286	351
	% within remarktype		18,5%	81,5%	100,0%

remarktype * Leftovers Crosstabulation^a

			Leftovers		Total
			Yes	No	
remarktype	bad taste	Count	10	12	22
		% within remarktype	45,5%	54,5%	100,0%
	Composition	Count	11	41	52
		% within remarktype	21,2%	78,8%	100,0%
	Portion size	Count	6	20	26
		% within remarktype	23,1%	76,9%	100,0%
	Pricing	Count	2	16	18
		% within remarktype	11,1%	88,9%	100,0%
	No opinion	Count	4	96	100
		% within remarktype	4,0%	96,0%	100,0%
	Multiple remarks	Count	10	23	33
		% within remarktype	30,3%	69,7%	100,0%
	Total	Count	43	208	251
		% within remarktype	17,1%	82,9%	100,0%

a. Consumptiontype = Lunch

remarktype * Leftovers Crosstabulation^a

			Leftovers		Total
			Yes	No	
remarktype	bad taste	Count	6	8	14
		% within remarktype	42,9%	57,1%	100,0%
	Composition	Count	6	20	26
		% within remarktype	23,1%	76,9%	100,0%
	Portion size	Count	1	8	9
		% within remarktype	11,1%	88,9%	100,0%
	Pricing	Count	0	3	3
		% within remarktype	0,0%	100,0%	100,0%
	No opinion	Count	0	33	33
		% within remarktype	0,0%	100,0%	100,0%
	Multiple remarks	Count	9	6	15
		% within remarktype	60,0%	40,0%	100,0%
	Total	Count	22	78	100
		% within remarktype	22,0%	78,0%	100,0%

a. Consumptiontype = Dinner

8. T-test Portion and gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Portionsize	Man	186	4,15	1,491	,109
	Woman	165	4,65	1,239	,096

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper	
Portionsize	Equal variances assumed	5,455	,020	-3,415	349	,001	-,503	,147	-,793	-,213
	Equal variances not assumed			-3,453	347,550	,001	-,503	,146	-,790	-,217

Group Statistics^a

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Portionsize	Man	131	4,13	1,526	,133
	Woman	120	4,58	1,179	,108

Independent Samples Test^a

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper	
Portionsize	Equal variances assumed	8,081	,005	-2,570	249	,011	-,445	,173	-,786	-,104
	Equal variances not assumed			-2,599	242,223	,010	-,445	,171	-,783	-,108

a. Consumptiontype = Lunch

a. Consumptiontype = Lunch

Group Statistics^a

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Portionsize	Man	55	4,18	1,415	,191
	Woman	45	4,84	1,381	,206

Independent Samples Test^a

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper	
Portionsize	Equal variances assumed	,087	,768	-2,355	98	,021	-,663	,281	-1,221	-,104
	Equal variances not assumed			-2,360	94,973	,020	-,663	,281	-1,220	-,105

a. Consumptiontype = Dinner

a. Consumptiontype = Dinner