UNIVERSITY OF TWENTE.

Food Waste Produced through End-Users

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A Communication Strategy to reduce Household Bakery Waste

Bachelor Thesis:

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Abstract

There is an enormous amount of food waste that is thrown away each day. Mainly the end-consumer plays a large factor in this wasting behaviour. Evidence shows that there is a lack of knowledge over the consequences and that lifestyle is another reason for wasting food. The purpose of this study was to examine the effect of an information strategy on consumers attitude, subjective norm, perceived behavioural control and intention to reduce bakery waste. Furthermore, the moderating effect of past attention towards reducing bakery waste was examined. This was done within an in-between group experiment that was spread via the online platform 'Qualtric'. In November 2015, 162 participants attended the treatment group, which saw an information sheet as manipulation, and a further 179 participants attended the control group. Results indicated that there was no effect on the participants attitude, subjective norm, perceived behavioural control and intention to reduce bakery waste. Furthermore, no moderator effect of past attention towards reducing bakery waste was found. But correlations confirmed a positive relation between all measured variables. The result shows that a single measure does not work to make consumers change their food wasting behaviour. This study can help to get insights in the strategies to design information in a more effective way.

Samenvatting

Er is een enorme hoeveelheid voedselafval dat elke dag wordt weggegooid. Vooral de consument speelt een grote rol bij deze verspilling. Een van de redenen is het gebrek aan kennis over de gevolgen, een andere reden betreft de levensstijl. Het doel van deze studie is om het effect van een informatie strategie op de houding, de subjectieve norm, de waargenomen gedragscontrole en de intentie van consumenten in betrekking tot bakkerij afval te onderzoeken. Verder is er het moderatie effect onderzocht van de factor ‘’eerdere aandacht om bakkerij afval te verminderen’’. Dit is gedaan door middel van een in-between groep experiment dat werd verspreid via het online forum 'Qualtrics'. In november 2015 vormden 162 deelnemers de treatment groep. Als manipulatie kregen zij een informatieblad te zien. De overige 179 deelnemers vormen de controlegroep. Resultaten tonen aan dat er geen effect op de houding, subjectieve norm, waargenomen gedragscontrole en intentie van de deelnemers is om de bakkerij afval te verminderen is. Verder is er geen moderatie effect van eerdere aandacht om bakkerij afval te verminderen gevonden. Echter zijn er wel positieve correlaties tussen alle variabelen gevonden. Het resultaat van dit onderzoek toont aan dat een enkele maatregel niet genoeg is om het verspillende gedrag van consumenten in betrekking tot voedsel te veranderen. Dit onderzoek kan helpen bij het inzicht verkrijgen om informatie strategieën op een meer effectieve manier te ontwerpen.

Content

Introduction

The Problem of Food Waste

Describing the Problem

During the last years, the conservation of our environment and the consequences from polluting behaviour increasingly became the focus of attention. One important factor, which has an influence on the deterioration of our environment, is food waste. Food losses and food waste are important problems in today's society. In Germany, it is estimated that approximately 18 Million tonnes of food is thrown away each year. With the help of an experiment, we examine to what extent this can be influences with an information sheet.

Before describing the problem of food waste, a distinction needs to be made between food losses and food waste. Food losses mainly occur within the harvest and production chain and have their origin in technological and infrastructural conditions. Whereas food waste is defined as food that is qualitatively good and ready for consumption, but not consumed (Noleppa & Cartsburg, 2015). Food waste includes food scraps from agricultural production and food processing from large-scale consumers and private households and raw and processed food, which would still be for human consumption (Kranert et al., 2012). In addition, the term 'consumer' needs to be defined precisely. A consumer can be an individual-end user, but the term also contains large-scale consumers as is meant by restaurants, canteens, hospitals and retirement homes. Often food is thrown away because especially the individual-end consumers *lack knowledge* about how to store the different food articles, how much to cook for how many persons or just do not plan in an adequate way (Selzer, 2010).

There are different stages along the value chain where food is thrown away. It starts with the production and ends with the large-scale consumer or in households. In German households 39% of the 18 m tonnes, that are thrown away along the whole value chain, are done through the end consumer. Converted into tonnes these 39% are 7.2 m tonnes of food, which are in the end user's trash can. A further differentiation is necessary between food waste that can be avoided because it is still edible and food waste, which cannot be avoided; like peels, cores and bones. About 70% of the 7.2 m tonnes of food that is thrown away in German households, thus 5 m tonnes could be avoided through the end-user (Noleppa & Cartsburg, 2015). When the amount above is distributed to the German population of 81 m habitants, it becomes visible that each person could avoid throwing away *62 kg* per year. This

amount is the largest one compared to the possible avoided food waste in the other stages of the value chain (Noleppa & Cartsburg, 2015).

Political Position

Although this topic is an important one, already a few years on the political agenda, with the aim to reduce food waste to 50% by 2020, until now there are no precise, scientifically based data about the food, which is thrown away. The numbers given above are only estimated numbers. It becomes clear that different sources use slightly varying numbers. Kranert et al. (2012) gives an estimated value between 71.0 kg and 92.2 kg of food waste per person, drinks included and states that 65% of it, thus 46.2 kg to 59.9 kg could be avoided from being thrown away by the consumer. These numbers are similar to the values of the study by Cofresco Frischhalteprodukte GmbH & Co. KG (Cofresco Frischhalteprodukte Europa, 2011) which gives a value of 80kg wasted food per person, but drinks excluded. In that study, it is stated that consumers estimate themselves to throw away 6% of their purchased groceries. According to their diary, they throw away 21% of their foods, thus an underestimation of 15%. All these different studies have in common that they see a big potential to reduce food waste at the household level.

Throwing away 39% of the food that is thrown away in total, end-consumers can have an impact on food availability and the environment through changing their behaviour. Already existing campaigns therefore mostly concentrate on end-consumer's behaviour and less on other steps in the value chain.

In 2012 after the German *Bundestag*, the federal diet, decided that the amount of food losses and food waste should be diminished by 50% by 2020, the Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz (BMELV) commissioned the University of Stuttgart to do research on the topic of food waste. Kranert et al. (2012) estimated the German food waste with the help of statistics, literature, surveys, expert conversations and random sampling research on the individual household sector. Nevertheless, until now the German government has not developed cornet policy proposals as to how to reach the aim of a reduction of 50% by 2020.

Reasons for Food Waste

To be able to do something against food waste, it is first important to better understand the reasons for food waste. Influenced by the surplus supply people in industrialized countries consume a lot more than necessary (WRAP 2006). In Germany, there is always a surplus of

edibles available. The supermarkets are usually full, even a few hours before public holidays the consumers expect full shelves. The reasons for the large amount of food waste are multifaceted and numerous. Within the Waste & Resources Action Programme (WRAP) a qualitative consumer research was done. In that study four main causes for wasting food are given: supermarkets, poor planning/food management, personal choice & lifestyle and lack of skill (WRAP, 2007). Other important reasons found in the literature are health concerns, inconvenience and loss of economic and personal value of food, over shopping (WRAP, 2006), preparing too much food in general (WRAP, 2008), the expiry date (Food Standards Agency, 2008) which is according to Selzer (2008) mostly only a decision criterion but not the reason, cooking skills and improper storage (Pfau & Piekarski, 2003). Kranert et al. (2012) conclude that the alienation from our food makes it easier to dispose it. This is thus a problem that exists in todays industrialized society. It becomes more and more normal that machines produce our food. Food is less and less produced by our own hands. Through this process, we forget the origins of food, we do not know how it is produced and what it contains (Glanz, 2009). However, there are differences between the amounts of waste from person to person. Some produce less food waste, others more. Now, we have it about differences on the individual level. Different studies come to slightly different results in the amount of waste that is produced and they also give different explanations for these variations in food waste. A study from Lea and Worsley (2008) states, that older people produce less food waste. Older people have a more conscious handling with food. The war generation and their children mostly know more about the right storage, learnt how to cook with leftovers better and are still influenced by the 1940's when food was scarce. It further seems that families with small children throw more food away. Children often cause parents to buy more and at home, they change their eating appetite and want something different or do not finish their meals (Glanz, 2009).

Consequences of Food Waste

Looking at the continuing population grow, scarcity of natural resources and the climate change, indicates that a rethink in respect to the discarding of food articles is necessary. The large amount of food waste does not only have an influence on our environment but its consequences are especially influencing the food prices in developing countries. Food waste is next to climate change, droughts and distribution problems one part of the problem, which leads to hunger in the world. A product group where the scarcity and

the high prices are visible is grain. The flour prices are jointly responsible for the food crises in African countries (Thurn, 2011). In Europe, people expect that the food supply is always good. A bakery produces about 20% more than they will sell, just to present always a full shelf to their customers.

Industrialized countries have the resources to buy up surplus grain for their overestimated needs, therefore creating a scarcity on the market and hence the stock market prices rise. We can afford this, but in underdeveloped countries, the proportion of scarcity grain is great, whereby prices dramatically rise so that poor people are not able to buy bread. According to the film: Taste the Waste, "our trashing indirectly leads to hunger in the world". The FAO informs that about 925 million people are suffering from hunger and malnutrition. This is twelve percent of the 7.3 billion people living on our planet (PRB, 2015) and the gap between surplus on the one hand and malnutrition on the other side is still growing (Lipinski et al., 2013). However, there are not only ethical and social reasons to do something against food waste. There are also economic and environmental disadvantages produced through the waste. The public waste disposal system has become more expensive for the household during the last decades (Wille et al., 2002). So food does not only cost the consumer something when he/she buys it (approximately 235, - euros per person, per year), but also when he/she throws it away. Further, the discards have different impacts on our environment along the whole value chain, during production, harvest and transportation. Many resources are used so that the end product stays in the consumer's kitchen. When we throw away a product all the resources like water, petrol for transportation and agricultural land is wasted (WWF, 2015). All these consequences show that food waste is a problem that is worth it, to work on it. There is a need for behaviour change.

Factors that have an Influence on Food Waste

It is necessary to have a closer look at the factors that play a role in wasting food. Many different factors are said to have a role on consumer's behaviour. First demographical variables like gender, age, work, living alone, having children and socio economic status are said to have an influence on food waste (Miafodzyeva & Brandt, 2013). These are proximal determinants, that mean that they are close to the individual and mostly not changeable or difficult to change. Glanz (2009) mentions the "personal attitudes towards edibles, cooking and eating habits, shopping behaviour and storage of edibles" (Glanz, 2009, p. 33) of consumers to play an important role on the intention to reduce food waste. These are

individual differences in behaviour; so-called distal determinants can be changed through life experience or manipulated through an intervention campaign.

Strategy of Intervention to Reduce Food Waste

Theory of Planned Behaviour

To work on the distal determinants, the theory of planned behaviour will be used. The theory of planned behaviour is a model developed by Ajzen (1991) to better understand factors that play on human behaviour. According to Ajzen (1991), three factors: attitude, subjective norm and perceived behavioural control are able to produce an intention, which is necessary to make people behave in a certain way. This theory is according to Janssen et al., (2010) able to explain intrapersonal factors that motivate environmentally relevant behaviour and thus food waste behaviour to a certain degree. Ajzen (1991) specifies that the intention and human behaviour itself can be predicted by analysing the three independent factors (see Figure 1). Attitude is the person's relation towards the behaviour of interest. Subjective norm refers to the belief about what others think about the behaviour in question. Subjective norm is said to be important especially in peer groups since it is quite important for most people to act according to other people's ideas. Perceived behavioural control is the perception of having the control over ones behaviour in a certain situation. If the perceived control is high, attitude is positive and your surrounding supports the person in question, the probably that the behaviour is executed is high.

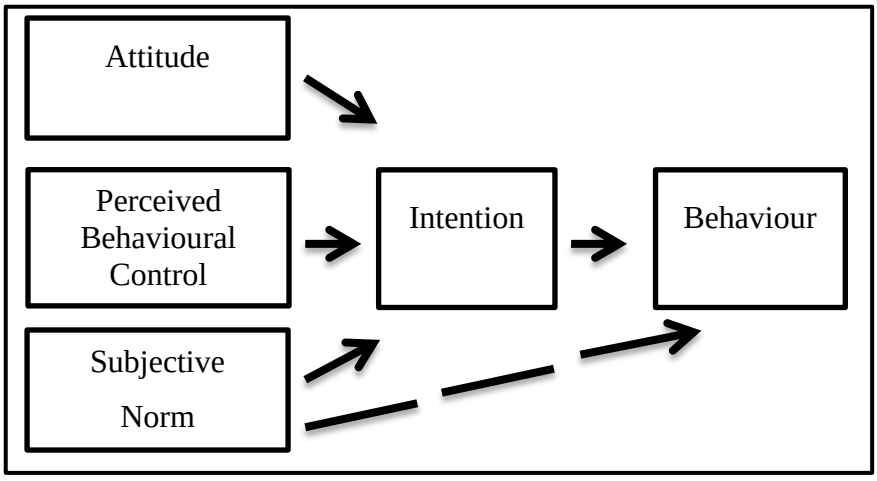

Figure 1. Theory of planned behaviour (Ajzen, 1991)

Communicating the Problem of Food Waste

To work on behaviour change, a better impression of how to communicate the food waste problem and to learn how to make people reduce their food waste is important. The communication strategy is restricted to the aspect that our discards have on social factors. However, environmental factors also play a major role, only the social disadvantages are addressed in this study. These social factors affect the feelings of readers and also try to change their attitude on the emotional level by creating a bad conscience. According to Domasio (1994), emotions are able to shape attitudes and behaviours and increase accuracy and efficiency of decision-making.

Until know there is little evidence over which communication strategies are useful to change people's wasting behaviour (Sharp, Giorgi & Wilson, 2010), but the need for such strategies is high (Barnett et al., 2011). Whitehair, Shanklin and colleagues (2013) did a research on the effect of information material on wasting behaviour. They compared two different information channels effect on consumers in a university dining facility. Results indicated that a short message to make people aware of the topic, was enough to make them reduce their food waste. "An additional feddback-based message […] [was not stimulating] beyond that of the prompt message" (p. 63). There are some models, which can help designing a communication strategy, but there is no one technique that can help changing behaviour. In this study the Defra 4Es intervention model (Defra, 2008) is used to set up the information sheet. According to the Department for Environment, Food and Rural Affairs (Defra), a governmental department in the United Kingdom, that is occupied with all questions concerning food and environment (Wikipedia, 2015), influencing is most effective when measures are combined from across the following four broad categories of policy tools (Cox et al., 2010).

- **Enable**: make it easier to act (remove barriers/ensure ability to act/build understanding)
- **Encourage**: give the right signals (incentives to encourage and distinctives to ensure your target audience respondents)
- **Engage**: get people involved (work with trusted intermediaries)
- **Exemplify**: demonstrate shared responsibility (lead by example; consistency in policies; demonstrate others are acting)

The aim of the communication strategy is to influence the three factors of the theory of planned behaviour that cause the intention to change behaviour. These factors are said to have

an influence on the intention to change behaviour. To change the attitude of the German adults, it is first necessary to inform participants about the existing problem, next they should receive information about why this is a problem. Increased knowledge can be able to change someone's attitude concerning food waste reduction. Therefore, the consequences of the problem need to be explained. This is done with the example of starving people in Africa, to reach people on the emotional level. The information sheet therefore will explain the problem, its consequences on the social level and then give suggestions about how consumers can afford to diminish their own bakery waste. This is done with action proposals and the explanation of their practicality.

Existing Campaigns

In this paragraph, already existing campaigns which try to change consumers awareness and behaviour are described. The BMELV developed an initiative called 'Zu gut für die Tonne', translated too good for the bin, which is an information campaign against throwing away valuable food. The motto of the campaign is „Jedes achte Lebensmittel, das wir kaufen, werfen wir weg. Du kannst das ändern". Which means: Every eighth food article that we buy is disposed. You can change this! (BMELV, 2012, p. 4). The website of the campaign offers different information about the topic food waste. It comprises of recipes for cooking with leftovers so that they are used again and don't end up in the trash can. To motivate others taking part in their initiative, the BMELV developed the 'Bundespreis', a prize from the government for ideas concerning the topic of food waste. They further inform people about the right storage of the food articles, about the difference between *best-before date* and *date of expiry* and they developed an app so that all these information's are also available on smartphones. There are other initiatives to reduce food waste, which are developed by some non-governmental organizations (NGO's). An example is the World Wildlife Fund (WWF), which developed the 'WWF-Verbraucherkampagne #iamnature', a consumer campaign, which aims to make people rethink and reverse their everyday life (WWF, 2015). It is an interactive website, where people can get personalized tips about how to reduce food waste. Another method to do something against food waste is dumpster diving. The people who are dumpster diving save discarded foods, thrown away by supermarkets or enterprises, from the waste. Since dumpster diving, also called skip diving is illegal in Germany the initiative 'Foodsharing' was founded. Foodsharing.de is a platform where consumers can share their food articles, which they cannot or will not use anymore. There are

so called "foodsavers", which are in contact with supermarkets and go there in the evening to collect the food, which cannot be sold anymore during the next day. 'Slow food Deutschland e.V'. another enterprise that is concerned with the topic of food. This NGO works together with the 'Zu gut für die Tonne' initiative; but they also developed their own motto called 'Teller statt Tonne' which means plate instead of rubbish bin (Slow Food Deutschland e.V., 2015). Ursula Hudson from Slow food Deutschland criticises the concept of the BMELV. She writes that the core problem is ignored. The value we have in our German society for our food is not high enough. At the moment quantity seems to be more important than quality. They further state that a fundamental reform on all stages of the food system is necessary to change the 'prevailing nutritional and production model' (Slow Food Deutschland e.V., 2012). She writes that "more than a treatment of symptoms" needs to be done. There is a growing interest in the topic of food waste. It is important to find solutions so that we can feed the people of our planet.

The Present Study

The current study only concentrates on the individual-end user because the most food waste can be avoided in the households, through the consumer. It intents on the preventable bakery waste produced by German end-consumers. It is the aim to test whether a communication strategy is effective to make consumers develop the intention to reduce their bakery waste.

Bakery products quickly change their consistency. As soon as the consistency changes, it is not seen as fresh anymore. Nowadays old bread is hardly used in recipes. Since every product group needs to be stored in different ways, some in the freezer, some in the fridge and others at room temperature, this study concentrates on bakery products. The intervention will give suggestions about how to deal with bakery products. Bakery products are made out of grain such as wheat, spelt, rye, barley and many others. Next to vegetable and fruits, grain is the most wasted product group. Kranert et al. (2012) gives an amount of 20% from the overall wasted food; whereas WWF (2015) estimate the percentage of grain products at 16% of the total food waste.

The changeable factors that is concentrated on, are distal determinants that can be influenced through an intervention campaign. The theory of planned behaviour deals with some of this changeable determinants. Based on this theory, used to test the communication strategy about bakery waste, the following research model (see figure 2) is explored. A further

variable, *Past attention towards reducing bakery waste*, is added to the theory, hereby the research model of this study is constructed. The additional factor is added, because it is expected that the influence of the information sheet is stronger on people that did not pay attention to reducing their own bakery waste so far.

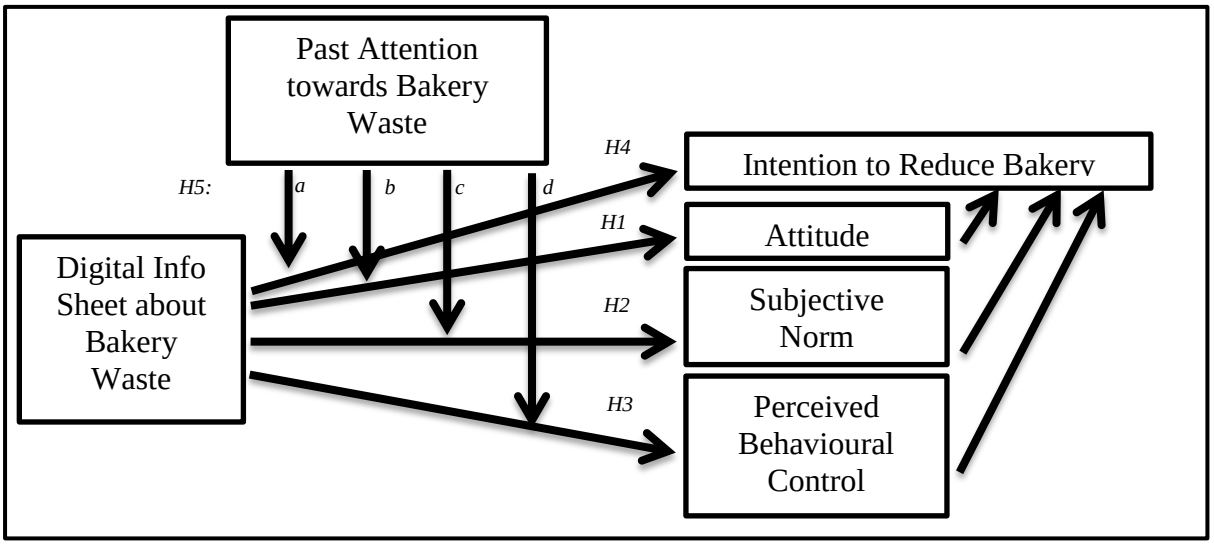

Figure 2. Research model

For a communication strategy, it is first necessary to inform the people about the problem. When having a look at the reasons why people waste food, it becomes clear that many people lack knowledge (Miafodzyev & Brand, 2013) about the problem of food waste and about the right handling with all the different food articles. Some food articles need to be stored dark, others need to be stored cold, some have to be thrown away after the date of expiry, and others can still be used years after the expiration date without someone getting sick after eating it. It always depends on the food category. For changing people's behaviour, they need the motivation to do so. A motivational change can be reached through giving information and thus changing the knowledge people have. However, knowledge alone is often not enough to make people behave in a different way. Emotional involvement is as important as knowledge about the problem (Kollmus & Agyemann, 2002).

To follow the aim of the study a communication strategy in form of a digital information sheet that influences consumer's behaviour towards reducing bakery waste will be created. Consumers should not only understand the problem, but also develop the intention to save grain products and then act according to this intention. Therefore, they will receive a message with information on bakery waste, where some advice is given about how to reduce

bakery waste. The emotional message of this information sheet is that children in underdeveloped countries are starving.

Hypotheses

According to the research model and the research question, the following hypotheses are formulated:

H_1: *After reading the information sheet about bakery product waste with explanations of the consequences and activity suggestions, respondents have a stronger* ***attitude*** *towards reducing bakery waste than participants who did not see the information sheet (main effect).*

H_2: *After reading the information sheet about bakery product waste with explanations of the consequences and activity suggestions, respondents have a more positive* ***subjective norm*** *towards reducing bakery waste than participants who did not see the information sheet (main effect).*

H_3*: After reading the information sheet about bakery product waste with explanations of the consequences and activity suggestions, respondents have a more positive* ***perceived behavioural control*** *to decimate their bakery waste than participants who did not see the information sheet (main effect).*

H_4: *After reading the information sheet about bakery product waste with explanations of its consequences and activity suggestions, respondents have a stronger* ***intention*** *to decimate their bakery waste than participants who did not see the information sheet (main effect).*

What might also be interesting is whether people that are already interested in the topic of bakery waste and are attentive to reduce their food waste or don't produce any food waste, are less influenced by the manipulation than people who do not care for bakery waste so far. To test this, the following interaction effect will be tested:

H_5: *The expected effects (on attitude (a), subjective norm (b), perceived behavioural control(c) and intention (d)) will be more pronounced for participants, that were not attentive in the topic of bakery product waste so far (interaction effect).*

Methodology

Participants

Respondents of this study were adult people, living in Germany or having German as their first language (exclusion criteria, one of these criteria had to be fulfilled). Approximately 550 participants were approached via Facebook and a few via email. Three hundred forty two of them participated in the study. Most filled in all the questions of the online experiment, but 34 of them stopped just before the last question, which was a voluntary question for those who wanted to give their opinion, remarks or suggestions (response rate 62% = number of sent links/number responses). One person had to be excluded because of the exclusion criteria described above. Of those 341 participants left, 162 participants were randomly assigned to the info group and 179 to the control group.

The sample of participants is a convenience sample mainly consisting of young people (M = 27 years old SD = 7.86, minimum = 18, maximum = 91). The sample consists of 289 women and 52 men (15%). Most of them visited a secondary school and 130 had had higher education. Three hundred twenty six participants are actually living in Germany and twelve people in the Netherlands. Most of the respondents were living in a shared apartment, namely 33%, whereas 27% was living with a partner. Fourteen percent of the respondents were living with family and 20% was living alone. Since it was an online questionnaire, via the online platform “Qualtrics”, only participants who had a computer or a smartphone available could fill in the questions.

Randomization Check

Participants were randomly assigned to one of the two conditions. To test whether the two groups of participants were significantly different from each other, a randomization check was executed. A chi-squared test showed that the determinants gender $X^2(6, N=340) = 0.70$, $p = .40$, first language $X^2(3, N=340) = 0.95$, $p = .81$, place of living $X^2(2, N=340) = 0.44$, $p = .81$ and living situation $X^2(6, N=340) = 8.32$, $p = .22$, were equally distributed over the two groups (see Table 1) also highest graduation, for which a Mann-Whitney U test was used was equally distributed $Z = -0.81$, $p = .41$. There was no significant difference between the two groups.

Nevertheless, with an alpha of five percent there was a difference in the t- test between the two groups with reference to age $t(1,339) = -2.01$, $p = .04$. When the outliers (persons older than 60) are kept of (only one person), it can be seen (Table 2), that the two groups do not significantly differ from each other concerning age $t(1,338) = -1.77$, $p = .80$).

Table 1

Chi-Squared Test for Descriptive Statistics

	X^2	*p*
Gender	0.07	.40
First language	0.95	.81
Place of living	0.44	.81
Living situation	8.32	.22

Note. 2-tailed, X^2 = Chi-square-score, *p* = probability.

Table 2

Means and Standard Deviations of Age in the Two Conditions

	Total (*n* = 340)		Info group (*n* = 162)		Control group (*n* = 178)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*t*	*p*
Age	26.82	7.06	26.11	6.83	27.82	8.62	-1.77	0.80

Note. N = number of cases *M* = Mean, *SD* = standard deviation, *t* = t-distribution, *p* = probability.

Experimental Design

This current study was an online study between-group experiments in the German language. A questionnaire could be filled in on a computer or on a smartphone. Participation was voluntary and no reward was given. The data was anonymized so that no conclusion of individuals could be done. In this experiment, there were two conditions to which respondents were randomly assigned; an info group and a control group. The info group received a manipulation in the form of a communication strategy about bakery waste. This was presented in the form of a digital information sheet. The group that got to see the information sheet is described as the info group in the following process.

Measuring Instrument

In this experiment, the two conditions (info condition vs control condition) served as the independent variable. Respondents were influenced through reading the communication strategy. Further, the past behaviour towards wasting bakery products was looked at. The attitude, subjective norm, perceived behavioural control and intention towards reducing

bakery waste served as dependent variables. The questionnaire (see Appendix A) was developed to measure people's intention to reduce baking waste after reading a communication strategy about the problem.

Past Behaviour towards Baking Products

The first questions of the questionnaire were about the past behaviour towards baking products. It was asked how many baking products the respondent consumes, how often the person buys baking products and then it was asked whether the person was already attentive to the topic of reducing baking waste.

Evaluation Items

To evaluate the communication strategy six items were given. Those six items asked for the participant's opinion about the information sheet. The first thesis asks whether the information sheet was stimulating the subject or not, the second thesis asks whether it was able to change the thoughts about bakery products, the third was a thesis that said that the topic on the information sheet is relevant, then a thesis that asks whether the poser made thinking followed, next a thesis that asks whether the information sheet was able to make the topic important was given and as last participants had to evaluate on the negative formulated thesis "The topic of bakery product waste is not interesting for me".

Attitude

The attitude scale was meant to measure people's relation and opinion about the reduction of bakery waste. The attitude towards baking waste was measured with ten items on a Seven-Point-Likert scale that runs from *I do not agree at all* to *I totally agree*. This scale was intended to measure how participants perceived the problem of bakery waste. Example: "It is personally important to me to avoid bakery waste". Cronbach's alpha was sufficiently reliable ($\alpha = .82$, *N* of items = 7). Of the seven items, two were formulated in a negative way, so that respondents had to read attentively every single statement. There was one single factor within the attitude scale. It explained 50 % of the variance, with an eigenvalue greater than one.

Subjective Norm

The subjective norm scale was intended to measure the participants perceived social pressure to reduce bakery waste. The subjective norm towards reducing baking waste was measured with seven items. Participants had to choose on a Seven-Point-Likert scale from *I do not agree at all* to *I totally agree* how much they agreed with each of the seven statements. This was measured with items like: "People that are important to me have a negative attitude towards bakery waste". Cronbach's alpha was sufficiently reliable, (α =.75, *N* of items = 5). Factor analysis showed that there was one factor, which could explain 52 % of the variance of this scale; eigenvalue greater than one.

Perceived Behavioural Control

The perceived behavioural control scale was intended to measure the participants' perceived ability to reduce bakery waste. Perceived behavioural control towards reducing baking waste was measured by means of seven items on a Seven-Point-Likert scale from *I do not agree at all* to *I totally agree*. It was measured with items like: "I feel able to reduce my bakery waste during the next weeks". Reliability of the scale was sufficiently (α = .71, *N* of items = 5). Factor analysis indicated that there was one factor which was able to explain 48 % of the variance; eigenvalue greater than one.

Intention

The intention scale was intended to measure participants tendency to really execute the desired behaviour. The dependent variable, the intention towards reducing baking waste was measured with ten items on a Seven-Point-Likert scale from *I do not agree at all* to *I totally agree*. Example: "In the future I'll freeze my bread if it is too much for my use". Cronbach's alpha was sufficiently reliable, (α =.76, *N* of items = 7). Factor analysis showed that there was one factor, which could explain 43 % of the variance of this scale; eigenvalue greater than one.

Demographic Variables

At the end of the survey, participants were asked to fill in some questions about their socio economic background. They were asked their age, their gender, their education, their first language, their place of living and their living situation. Except age, all these questions

were nominal questions. As a last step, participants could give their opinion, feedback or suggestions about the survey.

Manipulation

To make the manipulation work, the introduction/briefing of the questionnaire was as neutral as possible, trying to give all necessary information without influencing the participant. Next, the participants received three questions concerning their actual behaviour towards their present behaviour with baking products. They were asked how many baking products they consumed, how often they bought them and if they were already concerned with diminishing food waste. Depending on the group, participants were assigned to, some of them next viewed the communication strategy with hard facts about the problem of food waste, the consequences our discard has on poverty in African countries and on the grain prices and suggestions about how to reduce bakery waste during planning, shopping, cooking, storing and keeping leftovers. The behaviour suggestions were tips for each step in which consumers could reduce wasting food. It was concerned with planning, buying, storing, cooking and dealing with leftovers. The digital information sheet was a vertical DIN A4 Page with a headline, with general information about the problem on the left side and with suggestions about what each consumer can do, on the right side. Above the two texts, there were two pictures. One of them shows a garbage can full with baking waste and the other picture shows a thin African child with an empty bowl that sits in front of a trashcan from Europe full of food waste.

Procedure

Starting the 29 October 2015 participants filled in the online experiment via "Qualtrics". Completing the questionnaire took about twelve minutes, depending on whether people saw the information sheet or not. First for both conditions an introduction text with all relevant information was given. Next participants had to agree with the informed consent and then start with questions concerning their past behaviour. It was asked how often they consume baking products, how often they buy them and if they already paid attention to their bakery waste. Then the info group saw the information sheet with the hint to read it carefully because of the following questions concerning the content. Next, the info group had to evaluate the information sheet by answering 6 items on a Seven-Point-Likert scale from "I do not agree at all" to "I totally agree". Participants in the control group directly got to see the

items about attitude, subjective norm, perceived behavioural control and intention without having seen the information sheet. The info group saw the questions after having seen the information sheet and evaluating it. These questions had to be filled in by the info group and by the control group. Then demographic variables (age, gender, education, language, place of residence and living situation) had to be answered by both groups. All those questions were obligatory to finish the questionnaire. Only the last question, where participants could give suggestions and remarks was optional. At the end of the questionnaire, participants were thanked, informed about the aim of the study and debriefed.

Analysis Procedure

The website "Qualtrics" gathered the results of the questionnaire. The results then could be analysed via the statistical program IBM SPSS. Before starting the analysis of the data, the data had to be checked to avoid mistakes and biases. It was checked that all participants were indeed living in Germany or had German as their first language. Next, all negative items had to be transcoded and then the reliabilities of the subscales were checked and new variables with the total mean per subscale were created. After that, it was looked at the distribution of the data. The means of all scales were normal distributed, so that the analysis could start.

Results

Descriptive Statistics

The aim of this study was to test a communication strategy's effect on the attitude, subjective norm, perceived behavioural control and intention to produce less baking waste. Before presenting the results of the hypotheses, some general information about the data is given. The means and standard deviations of the different subscales can be found in Table 3. Participants have a positive attitude about reducing their bakery waste (M = 5.84, SD = 0.92) ; they think that others in their surrounding expected them to reduce their bakery waste eventually (M = 4.84, SD = 0.98); they feel that they can reduce their bakery waste (M = 5.69, SD = 0.90) and they have the intention to reduce their bakery waste(M = 5.65, SD = 0.87). Having a closer look at the past behaviour of participants, it can be observed that 79% of the participants indicated that they were already engaged with reducing bakery waste during the last month (M = 5.09, SD = 1.35). Only 17% indicated that they were not yet busy with avoiding bakery waste.

Table 3

Means and Standard Deviations of Attitude, Subjective Norm, Perceived Behavioural Control, Intention and Past Attention to Reduce Bakery Waste

	Total (N = 340)		Info group (n = 162)		Control group (n = 178)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*
Attitude	5.84	0.92	5.82	0.96	5.85	0.89	0.09	.77
Subjective Norm	4.84	0.98	4.90	0.96	4.80	0.99	0.85	.36
Perceived Behavioural Control	5.69	0.80	5.75	0.85	5.63	0.95	1.64	.20
Intention	5.65	0.87	5.62	0.85	5.67	0.89	0.25	.62
Attention	5.09	1.35	5.09	1.35	5.09	1.35	0.00	.98

Note. n= number of cases M = Mean, SD = standard deviation, F = Fisher's F ratio, p = probability.

To check whether the manipulation was really looked at through the info group, the time that both groups spend on the questionnaire was looked at. This between-subject test was done with the 309 respondents that completely filled in the survey. Six outliers were ignored, because they spend more than 60 minutes on the questionnaire. The result showed that the info group (M = 10.94, SD = 6.43) spend averaged 1.7 minutes on the information sheet.

To test whether the research model (see Figure 2) makes sense, correlations between the different factors were tested (see Table 4). Correlations confirmed the relationship between the dependent variables. As expected, attitude, subjective norm and perceived behavioural control were positively correlated to the intention reducing bakery waste. Furthermore, those factors also correlated positively with each other. Especially the relationship between attitude and intention (r = .65) and between perceived behavioural control and intention (r = .66) was strong. The past attention towards reducing bakery waste also correlated positively with the dependent variables of the model.

Table 4

Correlations of Attitude, Subjective Norm, Perceived Behavioural Control and Intention to Reduce Bakery Waste

	N	Attitude	Subjective norm	Perceived behavioural control	Intention	Attention
Attitude	340	-	-	-	-	-
Subjective norm	340	.38*	-	-	-	-
Perceived Behavioural control	340	.46*	.28*	-	-	-
Intention	340	.65*	.36*	.66*	-	-
Attention	340	.56*	.20*	.36*	.44*	-

Note. *$p < .001$, 2-tailed, *N*= number of responses.

The evaluation of the information sheet made visible that people find the topic of the information sheet relevant (*M* = 6.26, *SD* = 1.13) and that the topic of the information sheet made people think, but participants don not indicate that the information sheet changed their way of thinking (*M* = 3.32, *SD* = 1.64).

Hypotheses Testing

Main Effects

Beforehand it was predicted that participants who read the digital information sheet about bakery waste have a more positive attitude towards reducing their bakery waste than

participants that did not read the information sheet. It was also expected that the group of participants that read the information sheet, has a stronger subjective norm, a better perceived behavioural control and a higher intention towards reducing bakery waste. Results do not confirm these hypotheses. One-way ANOVA do not show any significant results concerning hypotheses 1-4. On the mean level per subscales are no differences between the two conditions (see Table 3). Participant's attitude (Hypothesis 1) is not more positive after reading the information sheet than participant's attitude that did not read the information sheet $F(1,338) = 0.14$, $p = .70$. Furthermore the information sheet has no significant effect on participant's subjective norm (Hypothesis 2) $F(1,338) = 0.86$, $p = .35$ nor on participants perceived behavioural control (Hypothesis 3) $F(1,338) = 1.41$, $p = .24$ nor on their intention (Hypothesis 4) to reduce bakery waste $F(1,338) = 0.34$, $p = .56$. This means that there is no evidence that the information sheet had effect on the person's attitude towards bakery waste, the subjective norm, perceived behavioural control and intention to minimize bakery waste.

Moderator Analysis

Although no significant causation was found between the information sheet and the dependent variables: attitude, subjective norm, perceived behavioural control and intention a moderator analysis was executed. This was done because it was expected that the communication strategy is not working for people that already payed attention to reducing their bakery waste. It was expected that it could still work for people who did not know anything about reducing food waste and was not occupied with avoiding food waste so far. Further correlations between independent and dependent variables were tested. There was a predictive connection found between all variables (see Table 4). That is why an interaction effect is possible. It was expected that the main effects described above are more pronounced for participants that were not attentive to reducing bakery waste in the past (interaction effect). Even there are no significant main effect hypotheses 5 is tested. It was expected that the effect is not significant because people already had knowledge about avoiding food waste. It was expected that the effect of the information sheet on attitude (H_5a) is stronger for people that did not pay attention to avoiding bakery waste so far. Moderator analysis with the centred independent variables (see Table 5) did not show the expected effect ($\beta = .02$, $p = .61$).

Table 5

The Interaction Effect from Information and Past Attention on Attitude

	Model 1				Model 2				Model 3			
	B	*SE*	β	*p*	*B*	*SE*	β	*p*	*B*	*SE*	β	*p*
Information	.03	.10	.02	.77	.03	.08	.02	.71	.03	.08	.02	.71
Attention					.38	.03	.56	.00	.38	.03	.56	.00
Information*Attention									.03	.06	.02	.61
R^2		.00				.31				.31		
R^2 Change		.00				.31				.00		

Note. *B* = regression coefficient, *SE(B)* = standard error, β = regression coefficient, *p* = significance, R^2 = coefficient of determination.

In addition, the effect on subjective norm (H_5b) was expected to be stronger for people that did not pay attention to avoiding bakery waste so far. Moderator analysis (see Table 6) did not show significant results concerning subjective norm (β = -.05, *p* = .34).

Table 6

The Interaction Effect from Information and Past Attention on Subjective Norm

	Model 1				Model 2				Model 3			
	B	*SE*	β	*p*	*B*	*SE*	β	*p*	*B*	*SE*	β	*p*
Information	-.10	.11	-.05	.36	-.10	.10	-.05	.35	-.10	.10	-.05	.35
Attention					.14	.04	.20	.00	.12	.04	.20	.00
Information*Attention									-.07	.08	-.05	.34
R^2		.00				.04				.05		
R^2 Change		.00				.04				.00		

Note. *B* = regression coefficient, *SE(B)* = standard error, β = regression coefficient, *p* = significance, R^2 = coefficient of determination.

Next, the moderator effect of past attention and condition on perceived behavioural control (H_5c) was tested within a moderator analysis (see Table 7). There are no significant results found (β = .06, p = .24).

Table 7

The Interaction Effect from Information and Past Attention on Perceived Behavioural Control

	Model 1				Model 2				Model 3			
	B	*SE*	β	*p*	*B*	*SE*	β	*p*	*B*	*SE*	β	*p*
Information	-.23	.10	-.07	.20	-.12	.09	-.07	.18	-.12	.09	-.07	.18
Attention					.24	.03	.36	.00	.24	.03	.36	.00
Information*Attention									.08	.07	.06	.24
R^2	.01				.13				.14			
R^2 Change	.00				.13				.00			

Note. *B* = regression coefficient, *SE(B)* = standard error, β = regression coefficient, *p* = significance, R^2 = coefficient of determination.

The last part of hypothesis H_5 is the interaction effect of condition and past attention on the intention to reduce bakery waste (H_5d). Also within this moderator analysis (see Table 8), no significant results are found (β = .01, *p* = .91).

Table 8

The Interaction Effect from Information and Past Attention on Intention

	Model 1				Model 2				Model 3			
	B	*SE*	β	*p*	*B*	*SE*	β	*p*	*B*	*SE*	β	*p*
Information	.05	.10	.03	.62	.05	.09	.03	.57	.05	.09	.03	.57
Attention					.29	.03	.44	.00	.29	.03	.44	.00
Information*Attention									.01	.06	.01	.91
R^2	.00				.20				.20			
R^2 Change	.00				.20				.00			

Note. *B* = regression coefficient, *SE(B)* = standard error, β = regression coefficient, *p* = significance, R^2 = coefficient of determination.

With respect to the moderator analysis, it is concluded that there is no interaction effect of the variable past attention on the dependent variables. This means that the information sheet does not influence peoples attitude, subjective norm, perceived behavioural control nor intention, even not when people did not pay attention to avoiding bakery waste in the paste.

Discussion

Each year an enormous amount of food is thrown away, this amount urgently needs to be diminished because it effects our environment and it has influence on poverty in underdeveloped countries. There is a need for a change in behaviour in our developed society. The main concern is the large amounts of food waste, produced by German consumers is worth reducing. Such a behaviour change can be reached through intervention campaigns, but until know there is little evidence over which communication strategies are useful to change people's wasting behaviours (Sharp, Giorgi & Wilson, 2010). Barnett and others (2011) claim that "The need for improved strategies and tools for communication about food risks and benefits is […] paramount" (Barnett et al., 2011, p. 1).

This study was conducted to examine the effect of a communication strategy of German consumers on their intention to reduce bakery waste. An attempt was made to change participant's attitude, subjective norm, perceived behavioural control and intention to reduce bakery waste with the help of an online information sheet. To test whether the developed information sheet is able to change the four factors described above, a between group experiment was done. There was no difference between the two groups found. This means that the information sheet has no influence on attitude, subjective norm, perceived behavioural control and intention to reduce bakery waste.

As it can be seen from the results section, no hypothesis is confirmed. There is no effect of the developed information sheet on attitude, subjective norm, perceived behavioural control and intention. There is also no interaction effect with past attention. This means that the digital information sheet is not able to change either people's attitude, nor subjective norm, perceived behavioural control and intention. There is also no effect on people that were not attentive to avoiding bakery waste in the past. The theory of planned behaviour states that attitude, subjective norm and perceived behavioural control are able to change someone's intention. In this current study, there are positive correlations between all these factors, which show, that there is indeed a relationship, but there is no causation on those factors through the information sheet.

To the researchers knowledge there are no studies, which examine the effect of an information sheet on consumers reducing bakery waste. For this reason and for the reason that the manipulation and the questionnaire are developed by the researcher and never used before, it is difficult to compare the results with those of other studies. However, there is one study from Whitehair and others (2013) who found that, a short message is enough to make people

reduce their wasting behaviour and that a more personalized feedback-based message is not able to make people further reduce their food waste. They concluded that making people aware of the topic is useful improving people's behaviour. Their result can give a further explanation why the manipulation of this study was not working as expected. It is possible that the briefing (introduction) of the questionnaire was already enough to make participants aware of the food waste problem and that there was no additional effect of the information sheet on participants that saw it.

In the period of this bachelor thesis there was not the possibility to invest more time in creating a pilot test in order to get a more reliable and valid scale. The main emphasis was not the development of the questionnaire, but to test whether the information sheet has an effect on the intentions of German consumers to reduce their bakery waste.

In the literature it is said that it is important to enable, engage and encourage (Sharp, Giorgi & Wilson, 2010) people within an intervention campaign to change their behaviour. This was done with the information sheet as good as possible with a single digital information sheet. Sharp, Giorgi and Wilson (2010) also states that a collection "of measures that will have impact" (p. 256). The information sheet alone was not able to change people's intention towards reducing bakery waste. Until now, there is little evidence about what kind of intervention works to make people reduce their bakery waste. The study of Sharp, Giorgi and Wilson (2010) examines different interventions that are intended to change people's wasting behaviour. Within the construction of the digital information sheet, the Defra 4Es behaviour change framework (enable, engage, encourage, exemplify) (Cox, et al., 2010) was looked at to develop an instrument that is as effective as possible. However, within an information sheet it is difficult to enable people's behaviour. To really implement such a model, an intervention that goes deeper is necessary. According to the literature (Sharp, Giorgi and Wilson, 2010) feedback, helplines, guidance and support projects are useful. Evidence shows, that user-centered design techniques as individual interviews and usability testing, are most successful in successfully communicate risks (Fischhoff, 2012). Also Festinger (1957) claims that a unique information strategy is not enough to create permanent change. These sources give the indication that the information sheet alone was not convincing. According to Festinger (1957) other simple campaigns, like a film would not be able to change human behaviour permanently. In the framework of this bachelor thesis, a more pronounced information strategy would have cost too much time and was therefore not implemented.

As it can be seen in the result section, respondents looked at the information sheet for an average of 1.7 minutes. It is possible to read the information sheet during this time, if you are quick reader, but it is almost impossible to internalize its content in less than two minutes. This indicates, that another reason that the information sheet had no effect on its readers, could be that is was not read carefully. An explanation for this could be the length of the text, which was one page, or the message, which was not able to make people feel personally involved. It is possible to do further research with a more personalized story of a family living with hunger.

Further points regarding the validity of the study have to be addressed. First, it should be mentioned that no specific target group was chosen. The respondents of this sample were mostly highly educated women between 20 and 30 years old. This means, that the respondents are not representing the average consumer. There were more women; they were educated to a higher level and younger than the average consumer was. Young adults between 18 and 25 years are still forming their attitude towards many issues. In contrast to older people, they are easier to influence, especially by using the affective level to persuade them (Fischhoff, 2012). Older people are already shaped by more years of experience and they are already used to a certain way of dealing with food, which is more difficult to change than the attitude or behaviour of young people, which are living alone, without parents for the first time in their life. Therefore, this sample is not very representative for the German consumer population. External validity would have been increased with a random chosen sample of German consumers. For further research, it is recommended to choose a specific target group, so that the group and their wasting habits can be studied and then to choose the sample randomly from the German population. However, the three strong points of this study are, the good reliability of the developed test, the good randomization between the two groups and the large number of participants that were approached.

Although results were not confirmed, this study has useful implications for designing information strategies and interventions about food waste. It shows that, in the case of food waste, one single measure, like an information sheet, is not sufficient to produce a behavioural change among consumers.

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Appendix A: Questionnaire

Backwarenverschwendung in deutschen Haushalten - Klara Brüggemann

Part: Welcome

Q1
Sehr geehrte Teilnehmerinnen und Teilnehmer,

herzlichen Dank für Ihr Interesse an meiner Befragung.
Schön, dass Sie sich die Zeit nehmen, diesen Fragebogen auszufüllen!
Dieser Fragebogen ist Teil meiner Bachelorarbeit im Fachbereich Psychologie an der Universität Twente, in Enschede. Durch das Ausfüllen des Fragebogens leisten Sie einen wertvollen Beitrag zum wissenschaftlichen Vorankommen beim Thema Lebensmittelverschwendung und helfen mir zudem sehr weiter! In der Studie geht es um die Verschwendung von Backwaren (Brot, Brötchen, Kuchen etc.) in Haushalten.
Die einzigen Teilnahmebedingungen sind ein Bezug zu Deutschland und Volljährigkeit. Die Befragung wird circa 15 Minuten in Anspruch nehmen. Die Daten werden anonym erfasst, so dass keine Rückschlüsse auf einzelne Personen möglich sind. Sie können die Umfrage jederzeit stoppen oder abbrechen. In diesem Fall werden Ihre Daten nicht weiterverarbeitet.
Bitte beantworten Sie alle Antworten stets entsprechend Ihrer ehrlichen Meinung und ohne viel nachzudenken - es gibt keine "richtigen" oder "falschen" Antworten.

Vielen Dank im Voraus und viel Spaß beim Ausfüllen!
Bei Fragen oder Anmerkungen können Sie sich gerne melden unter:
k.m.bruggemann@student.utwente.nl.

Liebe Grüße
Klara Brüggemann

Q2
Ich habe den obenstehenden Text gelesen und bin einverstanden mit der Teilnahme an dieser Studie.

❍ Einverstanden (1)

Part: Past behaviour towards baking products

Q3
Wie oft in einer durchschnittlichen Woche essen Sie die folgenden Nahrungsmittel?

	Nie (1)	Sehr selten (2)	Manchmal (3)	Regelmäßig (4)	Täglich (5)
Brot (1)	❍	❍	❍	❍	❍
Brötchen (2)	❍	❍	❍	❍	❍
Kuchen (3)	❍	❍	❍	❍	❍
Kekse (4)	❍	❍	❍	❍	❍
Croissant (5)	❍	❍	❍	❍	❍

Q4
Wie häufig kaufen Sie Backwaren für Ihren Haushalt?

	Nie (1)	Sehr selten (2)	Manchmal (3)	Regelmäßig (4)	Täglich (5)
Einkauf Häufigkeit (1)	❍	❍	❍	❍	❍

Q41
Wie stark stimmen Sie der folgenden Aussage zu, bzw. nicht zu?

	Stimme überhaupt nicht zu (1)	Stimme nicht zu (2)	Stimme eher nicht zu (3)	Habe keine Meinung (4)	Stimme eher zu (5)	Stimme zu (6)	Stimme voll und ganz zu (7)
In den vergangenen Monaten habe ich auf meine Backwaren Verschwendung geachtet (1)	❍	❍	❍	❍	❍	❍	❍

Part: Manipulation

Q5

Bitte lesen Sie sich das folgende Poster gut durch. Im Anschluss werden ein paar Fragen zum Inhalt gestellt.

Q37

Hungernde Kinder in Entwicklungsländern?

Du kannst was tun!

Jährlich werden in Deutschland 18 Mio. Tonnen Nahrungsmittel weg geschmissen. Jeder von uns wirft davon 82 Kg (60 Kg vermeidbar) weg.

Eine unglaubliche Summe, an Weg geworfenen Nahrungsmitteln, die es deutlich zu reduzieren gilt! Denn dadurch, dass die industrialisierten, reichen Länder so viele Lebensmittel weg werfen gibt es in anderen Regionen der Welt eine Knappheit an Lebensmitteln. Am Beispiel des Getreides ist dies gut zu verdeutlichen. Dadurch dass Deutschland zu den wohlhabenden Ländern unserer Erde gehört, ist es möglich einen großen Anteil des Getreideaufkommens auf zu kaufen. Wir kaufen circa 20% mehr Getreide ein, als wir tatsächlich bräuchten. Dies führt zu einer Getreideknappheit, wodurch die Preise an der Börse steigen und ärmere Regionen der Welt es sich nicht mehr leisten können genug Getreide zu erwirtschaften um die eigene Bevölkerung ausreichend zu ernähren. In Deutschland sind circa 16 Prozent der weg geworfenen Lebensmittel aus Getreide. Backwaren sind eine große Gruppe der aus Getreide geschaffenen Lebensmittel, sprich Brot, Brötchen, Croissants und zum Beispiel Kuchen. Um diese großen Mengen Backwarenabfall zu vermeiden ist nicht nur ein Umdenken auf politischer Ebene, sondern auch auf Haushaltseben notwendig. Denn der End-Konsument, also Du spielst in der Lebensmittelkette den größten Faktor bei der Entstehung von Lebensmittelverschwendung. Jeder von uns kann etwas tun um die großen Abfallmengen zu reduzieren! Es gibt bereits heute viele Kampagnen die den Lebensmittelabfällen den Kampf ansagen. Starköche und Menschen in deiner Umgebung setzen sich für das Thema ein.

Was kannst du tun?

1. **Plane** deinen Einkauf: schaue was du noch vorrätig hast, wie häufig du zuhause bist um zu essen, wie viele Menschen mit essen und spreche dich mit etwaigen Mitbewohnern ab, um nicht doppelt ein zu kaufen.
2. **Schreibe** dir eine **Einkaufsliste**. Auf diese Weise vergisst du nicht was du brauchst und lässt dich nicht so leicht von den Verlockungen des Supermarktes ablenken.
3. **Kaufe** nur was du wirklich brauchst und vor dem Schlechtwerden verzehren kannst. Achte auf die **Größe** der Verpackung/Anzahl
4. **Lagere** deine Einkäufe richtig. Brot kann gut bei Raumtemperatur gelagert werden, in einen Brotkorb oder Steingut. So bleibt das Brot am längsten frisch und der Geschmack erhalten. Wenn Du Brot auf Vorrat kaufen möchtest, kannst du dieses ohne Probleme einfrieren und anschließend auftauen. Des Weiteren hilft es die Schnittkante des Brotes nach unten zu drehen, auf diese Weise ist das Brot durch die Kruste geschützt und trocknet nicht so schnell aus.
5. **Bereite** nicht zu viel Essen vor. Hilfreich hierbei ist das **Wiegen** der Lebensmittel.
6. **Verwerte deine Reste** vom letzten Mal, bevor du etwas Neues zubereitest. Wenn dein Brot z.B. doch einmal zu trocken wird, kannst du es vielfältig weiter zum Kochen verwenden. In Bratlingen, Knödeln, als Arme Ritter, im Auflauf oder als Suppe und für die etwas Koch fauleren im Omelett oder einfach im Ofen mit Käse überbacken.

Part: Evaluation of the manipulation
Q37
An dieser Stelle würde ich mich freuen, Ihre Meinung über das Poster zu hören.
Inwiefern stimmen Sie mit den folgenden Aussagen überein?

	Stimme überhaupt nicht überein (1)	Stimme nicht zu (2)	Stimme eher nicht zu (3)	Habe keine Meinung (4)	Stimme eher zu (5)	Stimme zu (6)	Stimme voll und ganz zu (7)
Das Poster spricht mich an (7)	❍	❍	❍	❍	❍	❍	❍
Meine Art über Backwaren zu denken hat sich verändert (8)	❍	❍	❍	❍	❍	❍	❍
Das Thema des Posters ist relevant (10)	❍	❍	❍	❍	❍	❍	❍
Das Poster regt zum Nachdenken an (11)	❍	❍	❍	❍	❍	❍	❍
Das Poster war im Stande, das Thema für mich wichtiger zu machen (12)	❍	❍	❍	❍	❍	❍	❍
Das Thema Backwarenverschwendung interessiert mich nicht (13)	❍	❍	❍	❍	❍	❍	❍

Part: Attitude
Q7
Nun werden Ihnen ein paar Aussagen präsentiert. Geben Sie bitte jeweils an, inwieweit Sie zustimmen bzw. nicht zustimmen. Hierbei geht es um Ihre subjektive Meinung zum Thema Lebensmittelverschwendung, es gibt also keine richtigen oder falschen Antworten!

	Stimme überhaupt nicht überein (1)	Stimme nicht zu (2)	Stimme eher nicht zu (3)	Habe keine Meinung (4)	Stimme eher zu (5)	Stimme zu (6)	Stimme voll und ganz zu (7)
Es ist mir persönlich wichtig Backwarenverschwendung zu vermeiden (8)	❍	❍	❍	❍	❍	❍	❍
Ich mache mir Sorgen über die große Mengen an Backwarenverschwendung (7)	❍	❍	❍	❍	❍	❍	❍
Ich denke an die Armut in der Welt, wenn ich Backwaren in den Müll schmeiße (12)	❍	❍	❍	❍	❍	❍	❍
Ich bin interessiert am Thema Lebensmittelverschwendung (15)	❍	❍	❍	❍	❍	❍	❍
Wenn Backwaren zu schnell trocken oder schimmelig werden, ist es gerechtfertigt sie einfach weg zu werfen (16)	❍	❍	❍	❍	❍	❍	❍
Ob ich Backwaren weg werfe oder nicht, spielt keine Rolle, da ohnehin viele Backwaren weggeschmissen werden (17)	❍	❍	❍	❍	❍	❍	❍
Wenn jemand Backwaren weg wirft, schadet dies den Armen der Welt kaum (18)	❍	❍	❍	❍	❍	❍	❍
Das Thema Lebensmittelverschwendung interessiert mich nicht genug um mein Verhalten zu ändern (19)	❍	❍	❍	❍	❍	❍	❍

Ich habe ein schlechtes Gewissen, wenn ich Backwaren entsorge (20)	❍	❍	❍	❍	❍	❍	❍
Ich als Konsument spiele nur eine kleine Rolle bei der Entstehung von Backwarenverschwendung (21)	❍	❍	❍	❍	❍	❍	❍

Part: Subjective Norm
Q8
Was könnten Menschen, die Ihnen wichtig sind über das Thema Lebensmittelverschwendung denken? Geben Sie bitte jeweils an, inwieweit Sie zustimmen bzw. nicht zustimmen.

	Stimme überhaupt nicht überein (1)	Stimme nicht zu (2)	Stimme eher nicht zu (3)	Habe keine Meinung (4)	Stimme eher zu (5)	Stimme zu (6)	Stimme voll und ganz zu (7)
Wichtige Menschen in meinem Leben stehen Lebensmittelverschwendung negativ gegenüber (8)	❍	❍	❍	❍	❍	❍	❍
Wichtige Menschen in meinem Leben fänden es gut, wenn ich trockene Backwaren schneller mal wegschmeißen würde (7)	❍	❍	❍	❍	❍	❍	❍
Ich würde stark verurteilt werden, wenn ich mehr Backwaren wegschmeiße als nötig? (10)	❍	❍	❍	❍	❍	❍	❍
Menschen in meiner Umgeben finden es gut wenn ich auf die Reduzierung von Verschwendung bei Backwaren achte (11)	❍	❍	❍	❍	❍	❍	❍
Menschen in meiner Umgebung achten selbst auf die Reduzierung von Backwarenverschwendung (12)	❍	❍	❍	❍	❍	❍	❍
Menschen die mir wichtig sind, finden es gut wenn ich eine Einkaufsliste mit zum Einkauf nehme (13)	❍	❍	❍	❍	❍	❍	❍
Menschen die mir wichtig sind, sind sich des Problems von Backwarenverschwendung bewusst. (14)	❍	❍	❍	❍	❍	❍	❍

Part: Perceived behavioural control/self efficacy
Q9
Im Folgenden werden Sie gefragt wie ausführbar bestimmte Verhaltensweisen für Sie sind. Geben Sie bitte jeweils an, inwieweit Sie zustimmen bzw. nicht zustimmen.

	Stimme überhaupt nicht überein (1)	Stimme nicht zu (2)	Stimme eher nicht zu (3)	Habe keine Meinung (4)	Stimme eher zu (5)	Stimme zu (6)	Stimme voll und ganz zu (7)
Ich fühle mich im Stande meine Backwarenverschwendung in den nächsten Wochen zu reduzieren (8)	❍	❍	❍	❍	❍	❍	❍
Ich weiß wie ich Backwaren lagern muss, damit sie sich lange halten (7)	❍	❍	❍	❍	❍	❍	❍
Ich kann gut planen um nicht zu viele Backwaren zu kaufen (10)	❍	❍	❍	❍	❍	❍	❍
Ich kann übrig gebliebene Backwaren weiterverwenden (11)	❍	❍	❍	❍	❍	❍	❍
Ich bin im Stande in Zukunft eine Einkaufsliste mit in den Supermarkt zu nehmen um nur zu kaufen was ich wirklich brauche und essen kann (12)	❍	❍	❍	❍	❍	❍	❍
Wenn ich mich bemühe, kann ich meine Backwarenverschwendung eingrenzen (13)	❍	❍	❍	❍	❍	❍	❍
Wenn man Brotreste weiterverwenden möchte, dann kann man dies auch (14)	❍	❍	❍	❍	❍	❍	❍

Part: Intention to change behaviour
Q10
Welche der folgenden Handlungen können Sie sich in Zukunft vorstellen aus zu führen? Geben Sie bitte jeweils an, inwieweit Sie zustimmen bzw. nicht zustimmen.

	Stimme überhaupt nicht überein (1)	Stimme nicht zu (2)	Stimme eher nicht zu (3)	Habe keine Meinung (4)	Stimme eher zu (5)	Stimme zu (6)	Stimme voll und ganz zu (7)
Ich werde in Zukunft eine Einkaufsliste mit in den Supermarkt nehmen (8)	❍	❍	❍	❍	❍	❍	❍
In Zukunft werde ich Backwaren wie gehabt einfach entsorgen (10)	❍	❍	❍	❍	❍	❍	❍
Ich werde Brot in Zukunft einfrieren wenn es zu viel für meinen Gebrauch ist (11)	❍	❍	❍	❍	❍	❍	❍
Ich werde in Zukunft auf die Verschwendung von Backwaren achten (12)	❍	❍	❍	❍	❍	❍	❍
Die Größe des verkauften Brotes ist zu groß, ich werde selbst in Zukunft nichts ändern (13)	❍	❍	❍	❍	❍	❍	❍
Ich werde in Zukunft die Menge an zu verzehrenden Lebensmitteln beim Kochen probieren durch wiegen oder messen ab zu schätzen (14)	❍	❍	❍	❍	❍	❍	❍
Für eine Vermeidung von Backwarenverschwendung habe ich auch in Zukunft keine Lust Mühen auf mich zu nehmen (15)	❍	❍	❍	❍	❍	❍	❍
Ich werde in Zukunft nicht mehr Backwaren einkaufen als ich brauche (16)	❍	❍	❍	❍	❍	❍	❍
Ich werde mein Verhalten	❍	❍	❍	❍	❍	❍	❍

im Umgang mit Backwaren nicht ändern (7) In Zukunft werde ich nie bewusst Backwaren weg schmeißen (17)	❍	❍	❍	❍	❍	❍	❍

Part: Demographic variables

Q12
Sie haben es fast geschafft. Nun benötige ich nur noch ein paar Daten zu ihrer Person, um die Umfrage gut auswerten zu können.

Q13
Wie alt sind Sie?

Q14
Ich bin...

- ❍ männlich (1)
- ❍ weiblich (2)

Q15
Welchen Abschluss haben Sie?

- ❍ keinen Abschluss (1)
- ❍ Hauptschulabschluss (2)
- ❍ Realschulabschluss (3)
- ❍ Fachabitur (4)
- ❍ Abitur (5)
- ❍ eine Berufsausbildung (6)
- ❍ einen abgeschlossenen Bachelor (7)
- ❍ einen abgeschlossenen Master (8)
- ❍ Sonstiges: (9) _____

Q16
Was ist Ihre Muttersprache

- ❍ Deutsch (1)
- ❍ Niederländisch (2)
- ❍ Französisch (3)
- ❍ Englisch (5)
- ❍ Sonstiges: (4) _____

Q17
Wo ist Ihr aktueller Wohnort?

- ❍ Deutschland (1)
- ❍ Niederlande (2)
- ❍ Sonstiges: (3) _____

Q18
Wie ist Ihre momentane Wohnsituation?

- ❍ alleinstehend (1)
- ❍ mit einem/r Partner/in (2)
- ❍ mit meiner Familie (3-5 Personen) (3)
- ❍ mit meiner Familie (mehr als 5 Personen) (4)
- ❍ in einer Wohngemeinschaft (5)
- ❍ in einem Wohnheim (6)
- ❍ Sonstiges: (7) _____

Q19
Anmerkungen zur Umfrage:

Part: Thank you and Debriefing
Q20
Vielen Herzlichen Dank für die Teilnahme an meiner Studie! Wenn Sie an den Ergebnissen dieser Studie interessiert sind, können Sie eine Mail an k.m.bruggemann@student.utwente.nl schreiben.

In dieser Umfrage gab es zwei verschiedene Gruppen, wovon eine zunächst einen Text über Lebensmittelverschwendung zu lesen bekam und dann die Fragen beantwortet hat und die andere Gruppe direkt die Fragen beantwortet hat. Dies ist nötig um die Wirkung einer solchen Botschaft auf Lebensmittelverschwendung zu testen.