

# Reducing Food Waste through Retail Influence on Consumer Buying Behaviour

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Worldwide, there is a great contradiction when it comes to food waste. On the one hand, it is estimated that up to 40 % of the globally produced food is lost or wasted every year, on the other hand about 925 million people suffer from malnutrition. In addition, food production has to be increased by 70 % to feed a population of 9 billion people in 2050. Due to these estimations, it becomes increasingly important to start initiatives to reduce food waste and its impact on natural resources. One reason why fruits and vegetables are wasted in developed countries is aesthetic standards set by retailers.

Aesthetic standards regulate the shape and appearance of fruits and vegetables. Retailers have set these standards based on the assumption that consumers are only willing to buy fruits and vegetables without any cosmetic flaws. The result is that produce which are misshapen are sorted out in advance and go to waste. Within this context, this paper has two main objectives: first, to explore the attitudes of consumers towards fruits and vegetables with cosmetic flaws; and second, to unveil how these attitudes influence consumers' purchase intentions.

A survey was conducted for this research in order to investigate whether this food waste is avoidable or not. A total of 213 participants from Germany took part in the survey. The results of this research indicate that consumers in Germany are potentially willing to buy misshaped fruits and vegetables and have a positive attitude towards them. However, the degree of willingness and the attitude of consumers depend on the price of the product and on the type of cosmetic flaw. Based on the assumption that consumers are willing to buy misshaped fruits and vegetables, retailers have the possibility to take responsibility and ease their aesthetic standards for an additional offer of misshaped products. This Corporate Social Responsibility (CSR) initiative would create environmental and social benefits as well as economic benefits for the retail sector.

## 1. Food waste and food loss

Food waste has a negative impact on the environment and puts more pressure on limited resources such as land and water (Lipinski et al., 2013). Globally, the amount of land which is used for uneaten food sums up 1.4 billion hectares which is equivalent to nearly 30 % of the global agricultural land use (FAO, 2013). The terms "food waste" and "food loss" are often used as synonyms (Koivupuro et al., 2012). In general, food loss is described as agricultural goods that were produced with the intention to be consumed by humans but were discarded or lost due to insufficient quality (FAO, 2014a). Most publications are consistent that food loss mainly occurs in developing countries and generally takes place in the early stages of the food supply chain (FAO, 2014b). In contrast to "food loss", "food waste" is described as food which was intended to be consumed by humans but instead was discarded after it expired or was spoiled because of negligence. This mainly occurs in industrialized countries at retail and consumer levels (Parfitt et al., 2010).

There are some measures that could be taken to reduce food waste and to help educate the consumer of tomorrow. One of these solutions could be the additional offer of fruits and vegetables with flaws. In industrialized countries such as Germany, retailers and partly the government set market standards for the visual appearance of fruits and vegetables. Retailers reject those fruits or vegetables that do not match this visual criteria. Most of the produce that gets rejected are perfectly fine for human consumption (WWF, 2015). German supermarket chains argue that consumers are not willing to buy these imperfect fruits and vegetables

and therefore stick to their market standards. However, existing studies suggest that consumers in Germany might be willing to buy imperfect fruits and vegetables. It has to be noted that the price is still the most important factor when it comes to grocery shopping (BMEL, 2015).

The problem of fruits and vegetables which are wasted because of cosmetic flaws is present and repeatedly mentioned in the literature and press (Bagherzadeh et al., 2014). Several examples can be found in the US, the UK and Germany (BBC, 2015). Recently, some supermarkets in the UK, Canada, the US and France have started to sell fruits and vegetables with deformity (, 2015).

The rising importance of CSR in the food sector led to the result that a majority of leading food companies have implemented a CSR strategy. The example of the campaign the “inglorious fruits and vegetables” by the French supermarket Intermarché shows how the offer of fruits and vegetables with cosmetic flaws was used to create a successful CSR strategy (Intermarché, 2015).

The positive attitude of consumers towards socially responsible products is not necessarily consistent with their shopping behavior. However, purchases of these products can be increased when the social benefits of these products are communicated to the consumers (White et al., 2012). Bearing this in mind, corporations need to be aware of the complexity of the decision making process and social purchasing in order to take actions and educate consumers (Devinney et al., 2006).

## 2. Methodology

In order to gain a more complete understanding of the research problem, this study has used deductive reasoning (Creswell, 2013). Quantitative data was collected to test formulated hypothesis. A survey was administered to 213 consumers to unveil their attitudes and opinions towards food waste and fruits and vegetables with flaws. All participants were Germans. The criterion used for selecting respondents was that they purchase food and are active on social media.

A pilot test with eight people helped to refine and improve the survey. The study participants were asked 35 questions. The data collection started in July 2016 with the pilot test and the rest of the survey was conducted during November and December 2016. Respondents' anonymity and privacy has been strictly preserved. The structured questionnaire used in this study was created and conducted with the online service tool Survey Monkey. This strategy enabled to collect quantitative data from German consumers with a diverse social and educational background. However, this strategy has its limitations due to the risk that a certain age or gender group is stronger represented than others.

Nominal as well as ordinal scales were used to gather data. Most responses were reported on a five-point Likert scale. Graded answers have allowed respondents to provide a more precise answer. This has helped the researchers of this study to understand respondents' attitudes and potential consumption trends. Collected data was analyzed using Social Science Statistics and tools provided by the survey platform. These two approaches have allowed to perform a descriptive and inferential analysis of raw data. The Mann-Whitney U test has been used to test the null hypothesis (Bhattacharjee, 2012).

## 3. Research findings

Findings suggest that the most important criterion for fruits and vegetables selection is freshness (89 %), followed by price (57 %) and origin (53 %). The color (26 %) as well as the shape (8 %) of the products do not seem to be very important criteria for targeted participants. Interestingly, 7 % named their own criteria such as smell, seasonality and ripeness. Not surprisingly, price and origin play an important role during the decision making process. This is in line with former findings of German consumer studies that suggest that German consumers are very price sensitive. Interestingly, shape and color do not seem to play a relevant role for those consumers targeted in this study. Both are criteria usually regulated by market standards. This leads to the assumption that consumers do not consider these criteria as there are usually no differences in shape or color in supermarkets.

The data collected suggest that the general topic of food waste has a very modest importance for the consumers targeted in this study. However, on a personal level findings show a different outcome. 40 % of the participants alleged that it is “very important (1)” not to waste food; 36 % that it is “important (2)”; 18 % that is “relatively important (3)”; 5 % that is “relatively unimportant (4)” and 1 % “unimportant (5)”. The median of 2 (important) shows a positive tendency towards the importance of not wasting food. Results also indicate that respondents believe they could reduce food waste.

To explore participants' understanding of food waste, respondents were asked at which point of the food supply chain most food is wasted. Respondents expressed mixed views on where most food waste is generated. Most participants (53 %) believe that most food waste occurs at the distribution level or at the supermarkets. However, most food waste in Germany is generated at the household level. Only 25 % of the

participants were aware of this. Results of this quantitative study reveal that most German consumers are not well-informed when it comes to understand food waste. Interestingly, they do not see themselves as the main contributors of food waste even though most of them say that they could waste less food.

According to this study, a majority of participants perceive that the topic of food waste has not received the attention it deserves either by the media or the government.

More than half of respondents (54%) mentioned that consumers would not buy fruits and vegetables with cosmetic flaws. They subscribe to the retailers' opinion as stated in the literature review. Almost a quarter (24 %) say that this kind of fruits and vegetables does not fit with the image of German supermarkets. Seventeen per cent believe these kind of fruits and vegetables are not sold due to governmental regulations. Other reasons were: "there are not enough of them" (2 %) or there wouldn't be an extension of the standard offer (1 %).

In line with previous studies, the majority of targeted consumers claimed they would buy fruits and vegetables with flaws. Participants' answers are presented in Figure 1.

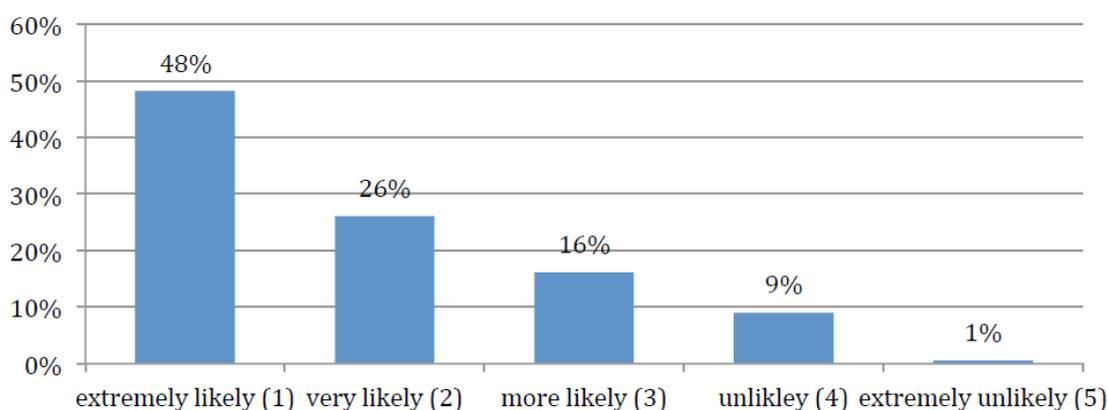


Figure 1: Consumers' willingness to buy misshaped fruits and vegetables

In order to understand consumers' perceptions towards fruits and vegetables with cosmetic flaws and how much they would prepare to pay for them, pictures of carrots and potatoes with flaws were shown to participants.

Connations are very distinct cosmetic flaws. However, most participants responded positively: 27 % would "definitely" buy these vegetables and 27 % would "very likely" buy them for the same price as flawless vegetables. However, 22 % were not sure if they would buy them for the same price. Among the rest of participants, 21 % of the participants would "probably not" buy them and 4% would "definitely not" buy them. The distribution of the answers changes strongly when the participants were asked if they would buy it when the products are cheaper than flawless vegetables. In this scenario, the percentage of respondents who would buy the vegetables more than doubled. 66 % would definitely buy them and 21 % would very likely buy them. Also, the percentage of people who would "probably not" buy them dropped sharply from 21 % to 3 %.

This research further explored how much cheaper fruits and vegetables with flaws should be compared to flawless crops. Twenty one per cent stated that they should not be cheaper, 26 % said they should be less than 10 % cheaper, 37 % said they should be 10 to 20 % cheaper, 12 % said they should be 20 to 30 % cheaper and 2 % said they should be more than 30% cheaper. In summary, a price reduction of these fruits and vegetables is necessary to convince consumers to buy them. Most of the participants see a reduction up to 20 % as appropriate.

### 3.1 Inferential Data Analysis

Mainly Likert-type questions were used in the questionnaire. A nonparametric test such as the Mann-Whitney U test was used to analyze ordinal data. Due to the large sample size of this study, the z score was used to test the hypotheses which are listed in Table 1.

Table 1: Research Hypothesis

Hypothesis	H <sub>0</sub>	H <sub>A</sub>
1	The willingness to buy fruits and vegetables with flaws of male and female consumers is identical.	The willingness to buy fruits and vegetables with flaws of male and female consumers is not identical.
2	The willingness to buy fruits and vegetables with flaws of people who buy organic products regularly and do not buy organic products regularly is identical.	The willingness to buy fruits and vegetables with flaws of people who buy organic products regularly and do not buy organic products regularly is not identical.
3	The intensity of how detailed male and female consumers are exposed to the topic of food is identical.	The intensity of how detailed male and female consumers are exposed to the topic of food is not identical.
4	The willingness to buy fruits and vegetables with flaws of people who are younger than 30 and who are older than 30 is identical.	The willingness to buy fruits and vegetables with flaws of people who are younger than 30 and who are older than 30 is not identical.
5	The willingness to buy fruits and vegetables with flaws of people who are exposed to the topic of food waste intensively and people who are not exposed to it intensively is identical.	The willingness to buy fruits and vegetables with flaws of people who are exposed to the topic of food waste intensively and people who are not exposed to it intensively is not identical.
6	The willingness to buy fruits and vegetables with flaws of people who have an income below €2000 and people who have an income of more than €2000 is identical.	The willingness to buy fruits and vegetables with flaws of people who have an income below €2000 and people who have an income of more than €2000 is not identical.

Table 2: Mann-Whitney U test results

Hypothesis	z-score	Decision
1	-2.614	Reject H <sub>0</sub>
2	0.0838	Accept H <sub>0</sub>
3	-1.4051	Accept H <sub>0</sub>
4	-1.1945	Accept H <sub>0</sub>
5	-3.7824	Reject H <sub>0</sub>
6	-2.299	Reject H <sub>0</sub>

## Hypothesis 1

The test results show that the null hypothesis (H<sub>0</sub>) was rejected. This indicates that there is a difference in the willingness to buy fruits and vegetables with flaws between male and female consumers. This is confirmed by the examination of the sample data. It shows that women tend to be more willing to buy fruits and vegetables with flaws.

#### Hypothesis 2

The null hypothesis of hypothesis 2 was accepted. Therefore, it can be concluded that the willingness to buy fruits and vegetables with flaws does not depend on whether a customer buys organic food regularly or not.

#### Hypothesis 3

The descriptive analysis showed that the participants were hardly exposed to the topic of food waste. The results of the Mann-Whitney U test show that the intensity of how detailed male and female participants were exposed to the topic of food waste is identical.

#### Hypothesis 4

The hypothesis test shows that the willingness of people younger than 30 and who are older than 30 is identical. Therefore, it can be said that age has no influence on the willingness to buy fruits and vegetables with flaws.

#### Hypothesis 5

The hypothesis testing and the examination of the sample data showed that people who were exposed to the topic of food waste intensively tend to be more willing to buy fruits and vegetables with flaws than people who were not exposed to it intensively.

#### Hypothesis 6

People who have less than € 2000 income per month tend to be more willing to buy fruits and vegetables with flaws in contrast to people who have more than € 2000. This result can be interpreted as the more income consumers have, the less willing they are to buy fruits and vegetables with flaws.

## 4. Conclusions and Recommendations

There is a good opportunity for German supermarkets to adjust their market standards for fruits and vegetables. Supermarkets must consider consumers' attitudes towards differing flaws. The misshaped products should be 10 to 20% cheaper than flawless products.

Supermarkets, through marketing campaigns, can influence consumers' attitudes and purchasing behavior towards misshapen produce. The message must emphasize that cosmetic flaws do not reduce quality or have negative effects but help to reduce food waste. Retailers should not see the offer of misshapen produce as an opportunity to improve business finances. Instead, they should focus on CSR and how this strategy help them to improve the image of the company as well as developing a competitive advantage.

A successful government policy should consider the protection of the natural environment. Therefore, the government has a clear role in drawing attention to the dimensions and consequences of food waste. This can be achieved through education, television campaigns and information stands. Also, the government should set regulations to reduce and control food waste.

The above will make consumers aware that they are one of the main causes for market standards. Consumers need to understand they have a moral responsibility to help reducing food waste through conscious and sustainable consumption and shopping behavior.

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