

FOOD WASTE AND CONSUMERS BEHAVIOUR IN CANTEENS AND HOUSEHOLDS

Mihaela BERECHET *

Abstract

In a world where a part of the population does not get enough food and another part wastes it, it should be sought for solutions to reduce the food waste. In order to find these solutions it was important to determine the reasons for which the food waste occurs. The present article aims at analyzing the food wastage and the behavior of consumers in two of the main sources where food is wasted, in order to understand the reasons of the wastage. In this view two studies were set up to analyze the wastage in a university canteen and in several households. For the above mentioned two sources there were investigated the quantities of wasted food, moreover the consumers were asked in interviews about the reasons for which they do not consume the entire food they purchase. The results of the studies demonstrated that improving the quality of cooking in canteens can influence positively the food waste. In the households the consumers would avoid food wastage if they do a better planning of the cooking process..

Keywords:

Food waste;
Consumer behaviour;
Canteen;
Household.

*** Doctorate Program, Stuttgart University, Stuttgart; Germany**

1. Introduction (10pt)

Food wastage, especially in industrialized countries is not only a problem of ethics but also a problem of environment. Food production incurs energy consumption and has as results CO₂ emissions. Especially the globalization made possible the consumption of almost everything, almost everywhere, at almost any time, food “wearing” thus in most cases heavy energy rucksacks. When the produced food is effectively consumed then the efforts to produce it are justified. But in many cases the food ends up in the waste bins, causing just loss of resources. Food waste occurs along the entire chain from production up to the user but according to a study of Stuttgart University the households are responsible for the most part of the food wastage (around 61%) and canteens and restaurants come on the second place with 17% out of the 11 million tons yearly thrown away food [1].

According to [2] at European level, the wasted food in households amounts 42% of all the food produced, while 2/3 of this amount is avoidable, and possibly avoidable food waste.

Besides the ecological impact, food wastage has also high economic impacts. According to FAO in 2007 the economic cost of global food wastage was estimated at USD 750 billion [3].

Evans [4] made a small case study and even if his sample is not representative, his results are quite interesting. He comes to the conclusion that the participants to the study did not have a careless, disregardful attitude towards the food they waste, on the contrary feeling anxiety for ridding and being preoccupied to enact the disposal in an appropriate way that ameliorate the concerns of wastage. He also concluded that the households incline regularly to buy more food than they need and a significant part of this surplus is being disposed.

Starting from the same premise that the wasted food is rather what has been purchased and not consumed in [5] it is appreciated that the prevention potential for this wasted food is theoretically 100%. Nevertheless it should be kept in mind that buying is not only triggered by the satisfaction of physical human needs, but also by the satisfaction of other needs such as need for approval and acceptance or self-affirmation [6].

Pfau and Piekarski [7] state that part of the consumers lack the necessary competence in handling food and store it in optimal conditions (location, temperature and duration).

Thøgersen's study shows that a complex interaction between supply characteristics and consumer choice determines household waste generation. The household's waste generation is a function of several external factors like the available market offerings, the physical, institutional and social living environment and some internal factors like the needs, involvement, resources and abilities of the household [8].

Consumers do not waste food only at home, but also in canteens and restaurants. Regarding the food wastage in canteens, Engström and Carlsson-Kanyama [9] made a study in food service institutions that shown that about one-fifth of the delivered food in the service institutions is lost and the largest source of loss is the plate waste, with about 11% - 13% of the amount of served food. Nonetheless they conclude that plate waste can be reduced to almost zero.

According to Frübis and Class [10] the factors influencing the plate leftovers are menu selection, preference of the consumers, food variety, control on the plate waste and serving portion.

The demand for food increases, together with the population creating thus tension between food production and access to food. One solution to reduce the tension is the awareness of the consumer households and the need of change in behavior which causes the high levels of food wastage [11].

Therefore the present articles aims at analyzing the food wastage and the behavior of food waste producers in households and canteens in order to understand the reasons. Within the framework of a European regional cooperation project, the University of Stuttgart undertook in cooperation with Abfallverwertungsgesellschaft Ludwigsburg (waste recycling company of county Ludwigsburg) investigations in several households in county Ludwigsburg. Additionally it was investigated also one of Stuttgart university's student canteens.

2. Research Method for Canteen Study

For the study was chosen Mensa II; the biggest canteen of the University that has a large kitchen, serving two areas: canteen and restaurant. During lecture time the kitchen serves between 4500 and 5000 plates of main dish and during holidays between 2000 and 3000 plates. The survey was organized in summer, towards the end of the lecture time.

The first step of the research was discussions and interviews with the staff, observations of the processes and analysis of the operations.

The second step was an analysis to quantify the food wastage. The survey was done over a period of two weeks, covering thus a quarter of a menu cycle since Mensa repeats the menu in a two-months rhythmus. There were established four categories of waste, namely: storage loss, preparation loss, buffet leftover and plate waste. Each category of waste was daily collected and measured and an average amount was calculated. During the survey there were determined the fractions of avoidable, possibly avoidable and unavoidable wastes. During this step it was identified that the storage loss (considered to be avoidable) was very low (0,25%). The preparation loss was around 18,5 % and was mostly categorized as unavoidable (peelings, bones, and so on). The highest percentage had the plate rests (almost 59%) followed by buffet leftovers (22,25%) as shown in Figure 1. The last step in the survey was the interviews with Mensa consumers.

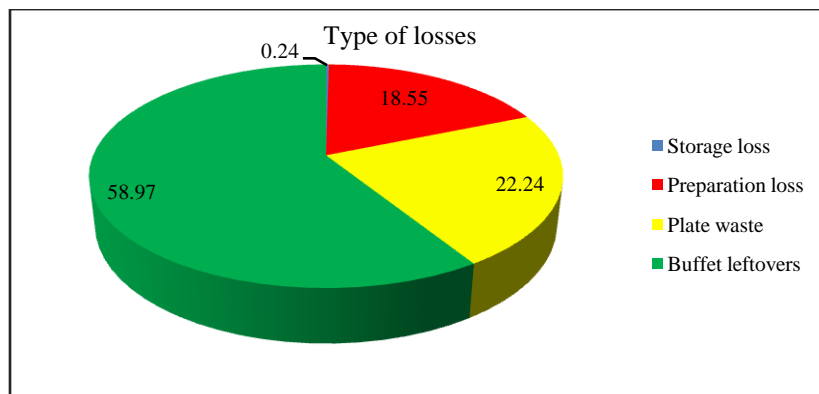


Figure 1. Types of losses in the canteen

Within the interview there were asked 505 persons, of whom the majority (almost 83%) were students and 15% were teaching staff. The rest of 2% were externs.

The consumers were asked Likert scale questions, meant to measure the intensity of attitudes of the participants towards the food and service provided by Mensa. Participants were asked to rate the quality of food (including the variety, portion, freshness, appearance, combination, taste and healthiness; as well as for the service and the ambience) on a 5-point Likert scale from 1 – strongly agree, to 5 – strongly disagree.

There were also asked open end questions, such as the reason why they do not finish the food or improvement opinions to gather qualitative feedback.

Part of the questionnaire were also yes/no questions, mainly asked to understand whether the participants are vegetarians, whether they normally finish the food they buy or whether they would like to have food testing session when new dishes are introduced.

3. Research Method for Households Study

The investigation of the food wastage in households took place over a period of three months. During this period sixteen randomly chosen households were asked to keep logs with their consume behavior. In these logs they had to fill in the shopping and disposal behavior.

There were chosen one single-household, six households of two persons, six households of three persons and three households of four persons. Ten households had children, and out of them six were married couples and four were single parents.

The investigation comprised three phases. The first phase covered the first month and served for establishing the contact with the participants and explaining them the project, collecting information regarding the present situation (by requiring them to collect the shopping bills). The households were offered kitchen scales and paper tables to register the logs. They were visited every two weeks during this phase and it was tried not to interfere too much with their behavior.

During the second phase there were introduced several measures to influence the consumer behavior, especially regarding the waste. First of all the households were offered notebooks which gave them the possibility to register the logs in electronic form. During one visit they were offered also boxes with fresh fruit and vegetables from a bio-farm in the region. This measure was taken based on the information collected in the first phase, according to which some of participants set high value on the origin and environmental friendly production of the food they buy. The fruit and vegetable boxes were offered in addition to the usual shopping of the households, with the intention to investigate how they deal with the excess supply of food, usually generated by spontaneous shopping or attractive offers in shops. The boxes were accompanied by lists where the participants were asked to fill in how they used these excess products. The boxes contained apart from ordinary species of vegetables like cucumber, carrots or champignons also some unusual species like Jerusalem artichoke to check how participants can valorize sorts they do not know.

During this phase the participants were interviewed regarding their consume behavior, if they shop with or without shopping list, or which are the reasons for the food wastage in their households.

During one of the visits it was discussed the topic of best-before date and an experiment with two yoghurts was made. The first yoghurt was fresh and the second one was since one week expired but it had been kept all the time in the refrigerator). They were opened and checked, and on a voluntary basis even tasted. As counterexample were shown photos of an expired yoghurt that has been intentionally wrong stored, for four weeks on the balcony (in April).

The last measure was to confront the households with their previous consume behavior. For this purpose the data collected during the first phase was graphically represented and shown to the participants together with the graphic representation of their own estimations. Moreover the households were asked to collect their own ideas on food waste avoidance and minimization.

During the last phase, in the third month, it was tried to verify if there were any behavior changes due to the implemented measures. It was again avoided to interfere with the participants'

behavior. Although the households were again visited, no new information was given and no additional measures were implemented. These meetings were only meant to answer the questions or problems of the participants and to collect the current data.

At the end of the investigation a final discussion took place to collect the experiences of the households, their suggestions and improvement proposal.

4. Results of the Canteen Study

84,4% from the participants answered that they generally finish their meals, while 15,6% admitted they usually leave rests on the plate. The main reasons for not finishing the meals were that it did not taste (61%), the size of the portion was too large (17%), food was too salty (4,2%) or oily (3,4%).

As it can be noticed in Figure 2, the main reason for leftovers is the taste, which the costumers relate to quality. Over 60% of the participants wish that Mensa improves its services and food, especially with regard to quality.

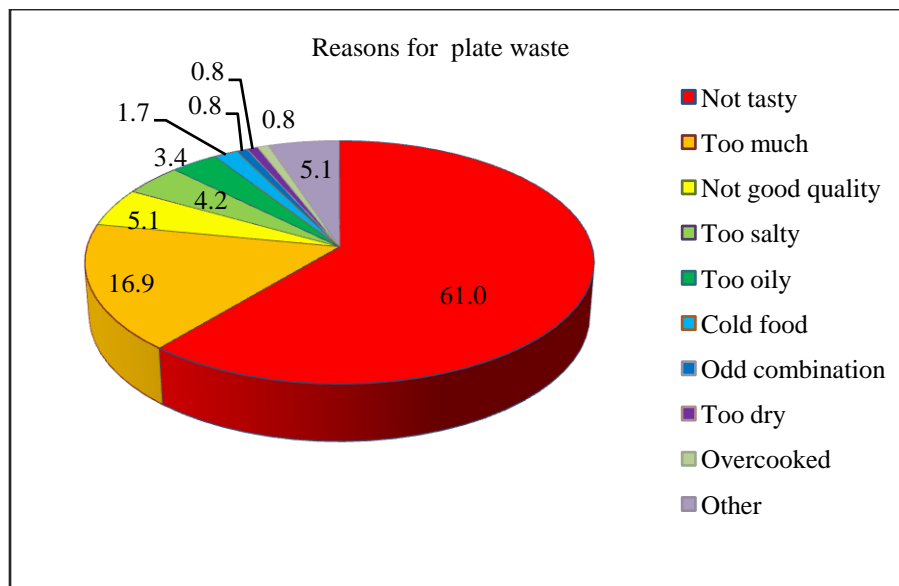


Figure 2. Reasons for plate leftovers in canteen

The questionnaire aimed also at investigating deeper how the costumers rate the quality of the food and services of Mensa and where do they see potential for improvement.

Since Stuttgart University hosts students from all over the world, one of the questions referred to the variety of food with regard to this costumers' diversity. The answers had a mean situated at 2,6, which means between "agree" and "undecided".

When asked if the size of the portion big enough is, the participants had a similar estimation. Correlated with answers to a question above, only for 17% was the portion too large, to be able to finish it.

The worst results had the questions regarding the freshness, appeal, taste and health, all with answers in direction "not agree", with means between 3,3 and 3,5. Also under the satisfaction level was the environment of the dining room, most of the participants considering it as smelly, crowded, neither pleasant, nor comfortable. The means for the answers to these questions ranged between 3,1 and 3,2. The queuing time and the price were appreciated as reasonable, with means around 2,3 to 2,5. The general service was estimated as good with a mean of around 2,7.

5. Results of the Household Study

During the household investigation it was observed that vegetables were the most frequent wasted food category (27%) as shown in Figure 3. On the second place was fruit with 19%, followed by bakery products with 16% and cooked rests with 13%. Dairy products represented 9% from the total food waste, while meat and fish registered 7%. Pasta had 5% and the last category, others with 4% was on the last place.

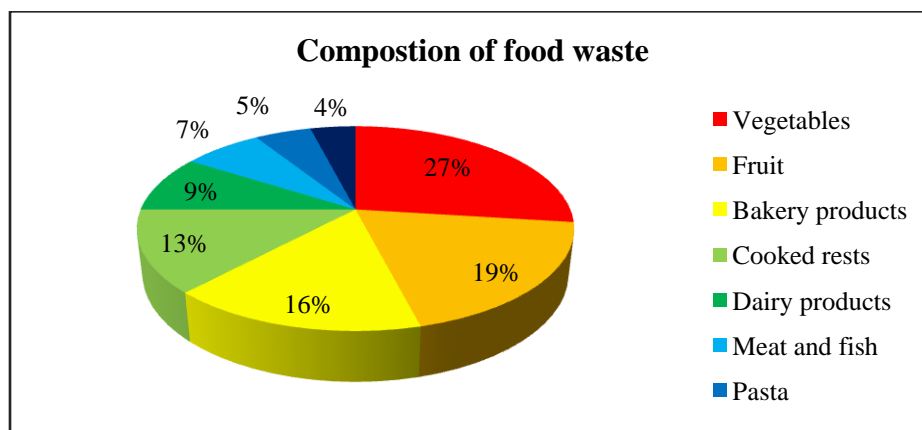


Figure 3. Composition of food waste

The evaluation of the interviews showed that the most frequent reason for food wastage was the wrong storage. With 26% represented more than a quarter of the food waste as shown in Figure 4.

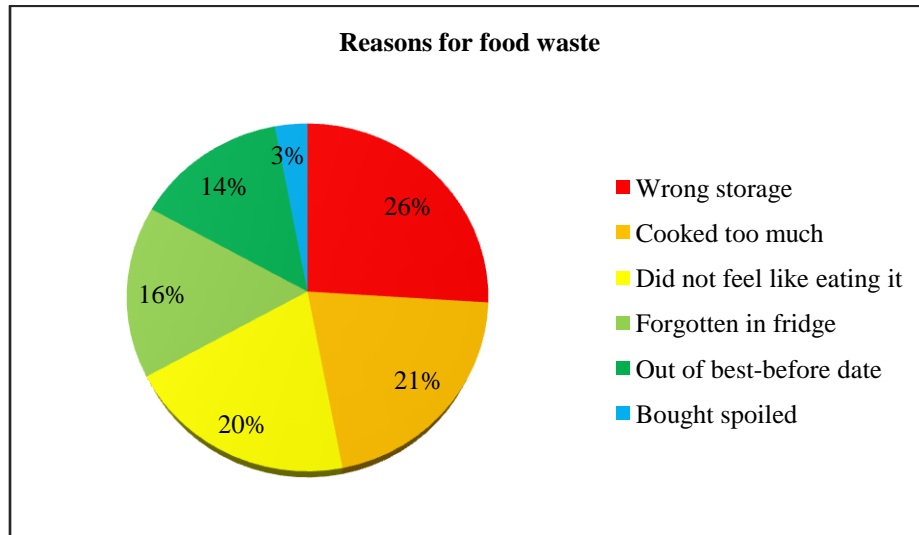


Figure 4. Reasons for food waste in households

The second most frequent reason was with 21% “cooked too much”. A similar quantity, representing 20% is being thrown away because the participants did not feel like consuming those products. 16% landed in waste bin because they were “forgotten” in the refrigerator or they could not have been consumed out of different reasons (such as sickness). The expiration of the best-before date was the reason for throwing away 14% of the food. In this category is also included fruit and vegetables that were not fresh anymore. Around 3% of food was thrown away because it was already spoiled when it was bought.

6. Conclusions

The study offered an overview on the main sources for food wastage in the university canteen. It was noticed that most of the food is wasted after it is offered to the costumers (plate and buffet leftovers). During the study valuable information on the reasons of the food wastage was collected. The most significant reason of the plate leftovers was the taste, many respondents appreciating it in direction of unsatisfactory. So better cooking could reduce the food wastage in the university canteen. At the same time throughout the questionnaire were pointed out the

aspects that, in the opinion of the consumers, could be improved to meliorate the quality of the food and general services offered by the canteen.

Regarding the analysis in the households it was concluded that proper storage and better planning of cooking lead to the avoidance of significant quantities of food waste. A better planning of the cooking process could mean cooking smaller quantities, reusing or freezing the rests. A better understanding of the “best before date” meaning correlated with proper storage can also reduce the food waste, by insuring that the products are still safe to consume some time after the end of the best before date when they are stored carefully.

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