BREAKING THE CHAIN OF LEVEL
WASTE AT THE

Abstract

Convenience is Required

A diary study was conducted to determine the motivations behind food-related decisions, which in turn impact food waste. Convenience and habit is the main driving force behind food-related decisions. Knowledge of available resources is imperative to making decisions that will reduce food waste.

The Issue

As a society, we produce and store more food than we expect to consume, sell or turn to fuel. (Sauders, 2017) This trend is greatly impacting our environmental health. 40% of the earth's surface is now meant for food production. (Ashleigh, 2019) Agricultural expansion contributes to habitat loss, species extinction, green house gasses, and risks of disease from animals. Despite this, much of the world is malnourished. That is because 40% of food production also results in food waste. (Ashleigh, 2019) In the supply chain of food, from agricultural production-processing-distribution-preperation-consumption, private households represent the largest food-waste faction. (BIOIS, 2010) If food is wasted by households at the end of the supply chain, all of the energy put into its production till preperation is in vain.

This report focuses on the factors behind food waste at the household level in order to devise a design solution for consumers to reduce such behaviour. Thus, references to 'food waste' will mainly deal with the discarding of food as chosen by a consumer. Food waste generated at other levels of the supply chain, although may witness overlap, are not the main concern.

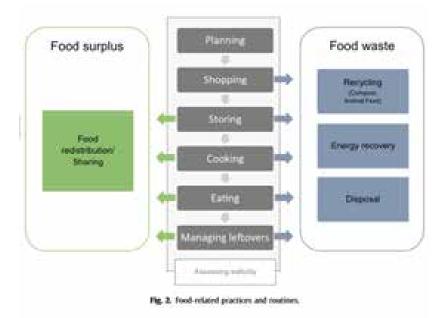
Food waste matters

Food waste matters offers a comprehensive overview of the existing discussion and research surrounding consumer behaviour and food waste. This journal was a critical resource as it consolidated multiple food waste rationales for review and then offered points of discussion and potential solutions that could be implemented, both at a policy and an individual community level. The compilation is supported by other studies not included in the review. Overall, Schanes, Dobernig and Gozet agree that food waste is a multifaceted problem, a function of economical, interpersonal and intrapersonal drivers. In their review, age, gender and educational level do not have clear correlation with food waste.

There are two main approaches to food waste behavioural research. The *theory of planned behaviour* is a common framework used which poses that individual behaviour is determined by the intention to perform the respective behaviour and thus, the motivation and willingness to act. Intentions are predicted by attitudes, subjective norms (perceived expectations of people important to the subject) and perceived behavioural control (degree to which people think that they can perform the behaviour). (Russel, Young, Unsworth, 2017) Guilt, for example, is a major reason for increased intention to reduce food waste. Throwing away food is seen as morally bad, citing food waste as a social issue in relation with food poverty, and there is a financial cost to the act. On the other hand, the environmental impact is not a significant factor. Food waste is less public than other types of behavior so subjective norms have less impact. Nevertheless, this still only partly predicts intention and actual behaviour. Studies exposed a gap between attitudes and behaviour regarding food waste. There were many that suggest a causal relationship between cognitive and socio-demographic variables and actions among large groups of people.

The second approach is the social practice theory which encompasses the emotional and habitual, typically due to external factors, that influence an individual's behaviour. Past food waste behavior will be a direct positive predictor of food waste behavior. (Russel, Young, Unsworth, 2017) Note that it is unclear whether emotion drives habit or vice versa. Socio-temporal factors extend from several parts of the decision-making process of food consumption.

Food waste matters (Cont)



Planning

Routines, perceived behavioural control over shopping and reuse of leftovers contribute greatest to food waste. Careful planning of grocery shopping is effective in making consumers more aware of their habits and prevent overpurchasing. Writing shopping lists, compiling meal-plans, and checking inventories before shopping all work to inform consumers of their inventory to avoid excessive purchases and unplanned items. However, meal planning does not hold a clear correlation to reducing fod waste.

Planning is important to address the perceived availability of time. What many consumers do is stockpile to save time and reduce stress. However, this often leads to more than one can consume in a timely manner. When it is believed that there is no time, it can prevent one from cooking planned meals for which ingredients have already been bought. Frequent grocery shopping equates to less food waste. Connected with the perceived availability, when consumers frequently grocery shop, they are capable of buying for their immediate needs. Thus, stockpiling plus a tight schedule increase the chances of ingredients becoming expired before they are consumed.

Shopping

People usually buy more than needed; Overprovisioning of food seems to be one of the most prominent reasons leading to superfluous food. One of the reasons is the psychological connotations of buying. The Good Provider Identity is the incentive to be a 'good parent' or 'good partner'. Providing an abundance of food as well as the wish to serve 'good' food becomes a means of showing affection. Results in abundance of perishable food that is not consumed quickly enough. This also translates into an indication of household well-being; if we can serve the 'right food', we are 'good hosts' and well-functioning. There is also a compensation effect where people buy 'healthy food' to mitigate the guilt of eating quick food.

How food is sold contributes to food waste. Packaging for certain products are often too large and not suitable for individual consumers or pairs. A carton of eggs which contains 12 eggs at minimum. Consumers who live alone or with only one other person will always have to buy 12 eggs, which is a lot if they're not fans of an omelette. Smaller portions are

often more expensive compared to larger portions since companies have to pay for more packaging costs. Promotional sales also encourage customers to buy more than they need.

The infrastructure of markets are also factors, though these are not easily altered from a household change. Food is mainly purchased from major supermarket chains. Buying from large chains result in more food waste because it is cheaper and more convenient. This reduces awareness in how much is being spent and the effort that goes into food production. People become more aware of the time and effort it takes to produce food if they buy from farmers markets or grow their own food. This appreciation converts into a higher appreciation for ingredients they have bought and consuming them.

Storing

As a society, we store more food than we plan to consume or sell Saunders, D. (2017, April 15). There are discrepancies between food bought and food actually eaten within a time frame. Storing, categorizing and organizing food products can lower food waste generation. Space constraints in the fridge combined with a lack of knowledge about where to best locate and store certain foods hinder efficient storage. Fridges set to a higher temperature than recommended accelerates the decay of food products. There is an unfound direct relation between knowledge about storage and food waste. Consumers that do not know what they have stored are more likely to purchase more unnecessary ingredients and hoard food.

There are many myths about groceries that Emerson addresses in an article for the NRDC, Read This Before Cleaning Out Your Fridge. A few mentioned is getting food poisoning from old food, crisper drawers aren't a thing and sell by dates tell you when things go bad. Often, consumers use their senses to determine if an ingredient is still safe to eat. Though this is a timeless method, and can actually work to reducing food waste, it is typical that the indicators are not strong enough and consumers are left to err on the side of caution. This misinformation impacts a consumer's decision to discard food that is not deemed 'fresh', increasing unnecessary food waste.

A study around different food labels and the impact of their wording revealed that people were more willing to toss out food with 'use by'. (Wilson, N., Rickard, B., Saputo, R. and Ho, S. 2017) Consumers deem food no longer safe to eat after 'use by'. This factor also changed depending on the ingredient; there's a higher willingness to waste for cereal than yogurt and bagged salad. Dependence on such vague labelling practices causes confusion among consumers. This also leads to procrastinating on throwing away food that's still 'okay'.

Cooking and Eating

Increased frequency of cooking has a positive effect on food waste. It uses perishable ingredients and satiates hunger. Cooking frequently improves portion control, guaging how much is needed to reduce leftovers and making consumers aware of what's in their fridge. However, this effect is dependant on the lifestyles of the household. Families with children find difficulty predicting whether children will eat at home, making cooking home meals redundant and counterproductive. Families with special diets tend to reduce food waste due to a smaller selection of food. Dietary restrictions force people to become more knowledgeable of what they buy and consume. Buying more to accommodate the different tastes in a household translates to more groceries for individuals rather than the collective and a requirement for more time. Experimental cooking can also lead to wasted food if it fails. Perceived capabilities of handling food at home directly affect the desire to cook, utilize groceries, and eat the cooked food.

On the other end of the specturm, is eating 'out' or going to restaurants. There is a belief that eating out means less money spent on groceries. It is rare for a household to never buy groceries. It is inevitable that there will be some form of food in a household that must be consumed. Eating out is spontaneous; instead it wastes leftovers in favour of convenience. Consumers who rely on convenience food will hold less accountability over their food, making them more likely to throw out food.

Managing Leftovers

Leftovers, although aimed at reducing food waste, can easily contribute to it. Much of this is a result of previously mentioned storing practices and eating habits, but it is also due to psychological feelings of adequacy and quality. Guardians who serve leftovers associate it with feelings of sacrifice and thrift for family, not caring for kids properly by feeding them something that's not 'fresh'. There's an aversion to reheating food and eating the same meals repeatedly. Especially if microwaving food is deemed as unhealthier, reheating food can be deemed as time consuming. This all translates to a belief in the lesser quality of food and reluctance to accept such conditions. A better system for leftovers is needed alleviate the concerns around leftovers. German app "Zu Gut für die Tonne" and the British app "Love your Leftovers" provide information regarding shelf-life and leftover recipes. British app "OLIO" connects neighbours and local businesses for food sharing; these are popular initiatives in Europe however there are trust issues that must be addressed.

Guilt and other

As mentioned earlier, guilt is a strong motivator to reduce food waste. Financial loss, rather than about the environmental and social implications of food waste, are driving forces to many aspects of food-related practices. When food waste is seen as a 'loss', it holds a larger importance. Those who consider recycling food waste as composte do not regard it as waste and thus, commit the act more often. They do not take into account the nutrients lost or the resources required to produce composte.

Age, gender and educational level do not have clear correlation with food waste, revealing that food waste is dependent on individual behaviours and routine. Employment may have an effect due to the time constraints imposed by different work schedules.

Food Decision Making. Journal of Consumer Research (Cont)

Food has become increasingly tied to a consumer's emotional, physical and psychological well-being. Consumer research hopes to understand why despite higher levels of food and nutrition literacy and an obsession with fat, calories and bmi, society is struggling with overconsumption. Overconsumption and eating habits affect our decisions to eat the food that's been bought and should be consumed.

The Food Decision Making consists of articles that brings theoretical insights into consumer's food decision making, including internal and external motivational drivers, social psychological and stimulus-based contextual factors.

The impact of Size

Size labels affect actual consumption of everyday foods. (Aydinoglue and Krishna) Visual bias of label drives perceptions of the quantity of food consumed. For example, medium/

Food Decision Making. Journal of Consumer Research (Cont)

regular sizes are thought to be how much people should consume. Small is considered too little. Size labels can make consumers deem a smaller package to be bigger than a larger one. Consumers more likely to believe a label that professes an item as smaller than larger. It allows for guiltless gluttony. In turn, excessive portions turn into food waste.

Portion sizes influence quantity consumed (Rolls et al. 2004; Schwartz and Byrd-Bredbenner 2006) Van Ittersum and Wansink determined that food decision making is under the influence of contextual perceptual biases between serving platters and consumption. They derived a model of the relationship between the diameter ratio of the serving size and the size and colour of the dinnerware. This study includes the Delboeuf illusion in which target circles seems larger when placed in the context of a smaller concentric circle than a larger one. Delboeuf illusions creates two opposing biases – people overserve on larger plates and underserve on smaller ones. The amount we consume seems less than how much we actually consume since it looks less in bigger serving plates. Translated into packaging portions, we end up buying more than we can consume.

On a smaller macro level, people use bite size as visual cue of goal progress, whether they are making a dent in how much food is left. Smaller bite sizes lead to more food being consumed and less being left on the plate. (Mishra, A., Mishra, H., & Masters, T., 791-795) There are two components to this goal-based explanation; a well-defined hunger satiation goal which leads to subsequent efforts at goal satisfaction and the role of the medium in providing feedback on goal progress. With smaller mediums giving slower progress, consumers work harder to satisfy their hunger, consuming more. Larger mediums communicate that their goal has been reached faster despite consuming less. Similar principles can be applied to shopping frequency and cooking portions.

McFerran's studies shows that our consumption decisions are prone to social influence. Consumers base their quantities off the quantities of others around them but adjust based on the other's body type. If the other is obese, the consumer chooses a smaller portion. The thought process follows "if that person (with that body type) can eat that much, then I can eat this much." The consumption habits of those around them act as a standard for their own understanding of what is accepted.

"Healthy vs Tasty"

Food is considered reflective of well-being. Finkelstin and Fishbach explore the effect of imposed healthy eating on food consumption across levels of internal motivation to eat healthy. Imposed healthy eating leads to increased perceptions of hunger and greater subsequent food consumption. Items framed as tasty "solves hunger longer" than items framed as healthy. Imposed healthy eating made consumers hungrier whereas choosing to eat healthy did not increase hunger.

Irmak, Vallen and Robinson conducted four studies that demonstrate that a food identified by an unhealthy name makes the item seem less healthful and less tasty to dieters than nondieters. Based on an individual's perception of healthy foods, certain items will appear as less desireable, hindering in their desire to consume it. This can be especially troublesome among families who must juggle the tastes of multiple members. Relatively healthy names do not have an effect on product evaluations. Dieters are more sensitive to food cues which can make them more willing to waste food that does not meet their standards of health.

Food Decision Making. Journal of Consumer Research (Cont)

These perceptions impact the type of groceries that people purchase and eating habits that will encourage the consumption of one type of food over another. Adhering to the variety of tastes of consumers will be a challenge in designing applications or services against food waste.

Resources, Conservation and Recycling

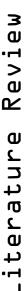
Resources, Conservation and Recycling is an online journal that uses a comprehensive model that integrates the theory of planned behavior, the theory of interpersonal behavior and the comprehensive model of environmental behavior. The participants completed a questionnaire that measured emotions in relation to food waste, habits, TPD variables, intention to reduce food waste and self-reported food waste behavior. The study revealed that negative emotions were associated with greater intentions to reduce food waste yet reported higher levels of food waste behavior. Improving a sense of control and normative support had reported stronger intentions to engage in the behavior.

A section of the journal outlines a case study that tested whether social media could grealy influence a consumer's food waste behaviour. A UK retailor asked their consumers to consume less. Although this seemed counterintuitive, it allowed for greater brand loyalty as they appeal to the 'green side'. Their campaign spanned different mediums such as social media, magazines, and e-newsletters. Effective social media approaches involved face-to-face methods. Abrhamse and Steg (2013, p.1774) Block leaders and social networks, public commitment making, and modelling all showed significant commitment toward reducing food waste. These methods made an initially private affair like food waste into a social event subject to social pressure.

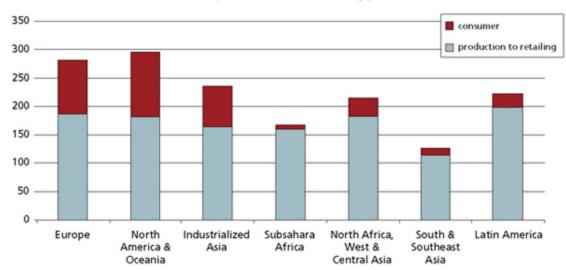
This concludes that to change food waste behavior, campaigns should promote new, positive habits rather than highlighting negative behaviour. This lays in contrast with previous notions that guilt is effective in changing food waste behaviours. While guilt explains an aversion to certain behaviours and would increase intention, it is not likely to actually change behaviour.

Impact of Food Waste on the Earth

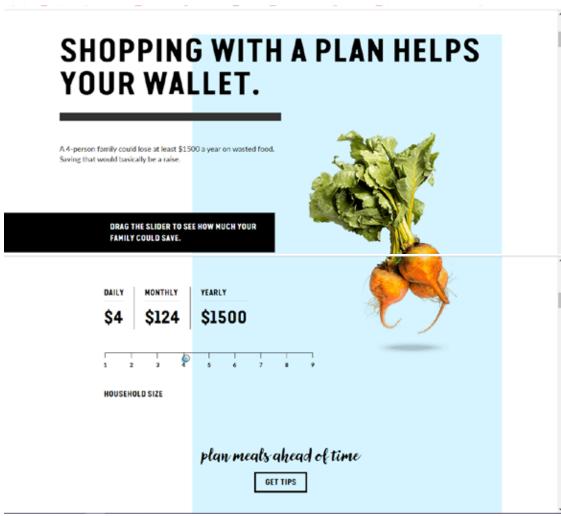
A significant portion of research was conducted on the impact of food waste on the environment and the overall causes of it within the food production chain. This research gave an appropriate overview on the importance of the topic and numerical facts that would be useful in constructing a campaign. Overall, the research maintains that we are killing the earth to produce food, yet much of it goes to waste. 40% of the earth's surface is now meant for food production and 40% of food production is food waste. (Ashleigh, C. 2019) While there are many infrastructure and policy changes that will be required, a major part of this waste is conducted at the consumer household level. Since meal consumption is the end goal of food production, if all the energy into production translates into garbage, then the loss is greater and worthless. Global quantitative food losses and waste per year are roughly 30% for cereals, 40–50% for root crops, fruits and vegetables, 20% for oil seeds, meat and dairy plus 35% for fish. (FAO,) These categories will become the main areas to address.







Per capita food losses and waste, pat consumption and pre-consumptions stages, in different regions from the Food and Agriculture Organization of the United Nations



Website from the National Resources Defence Council with statistics, recipes, and tips to reduce food waste to save money and help the environment.

Research Questions

So which one is it?

A statement that struck me within my secondary research was the idea that a greater loss occurs when food is not consumed after the massive amounts of resources already expended in it's production. It is clear that daily habits are direct causes of food waste. There are many facets of our routine behaviour to tackle, from planning to storing to cooking, all of which interconnect but will eventually be dictated by the final act of eating. My research will aim to narrow this scope to focus on the strongest underlying reason behind food decision making that will in turn contribute to food waste.

Ouestions to be addressed:

What causes or affects food-related decisions that contribute to food waste?

How do we improve the likelihood of food purchased to be consumed?

What must we inform users of about their daily eating habits to reduce food waste?

How do we organize fridges or living spaces to reduce food waste?

Diary Studies

Purpose

The purpose of these diary studies is to understand the participant's thought process when encountering a food decision making event. This study, as it progresses, will also reveal to the participant their own patterns of consumption, making them aware of how their environment or lifestyle is affecting their behaviour. The diary study was chosen for it's portability and ease of use, able to expose more personal reasons behind decisions. Diary studies aim to contribute to the understanding of the pariticpants. This approach is appropriate for this topic as it is evident that food waste is a result of individual, and case-specific habits that are highly varied. Thus, having a deeper understanding is a preferred approach than a broad understanding.

The Experiment

The study was completed with a small, handheld notebook, and an attached pen. It was to be carried around. Diary Studies have a set up which include an overview of the topic of interest, how and when to make an entry, and a sample entry. Entries were to be made when participants were either feeling hungry at home, deciding what to eat home, or confronted with teh idea or act of cooking. The focus on the home rather than every instance of eating is to focus on actions that can be changed inside the home. Since eating out is spontaneous, it cannot be accounted for consistently. There must be a distinction between 'deciding to what to eat when out' and 'deciding whether to eat out while at home'. The former indicates that eating at home is not an option whilst the latter explores eating out as an option of routine. If eating out impacts the decision to eat at home, it is relevant and a valid entry. Each page entry was guided with a brief question or prompt. For this research, two types of entries were alternated between. This was to avoid the participant's answers from becoming repetitive, allowing them to explore all the reasons why they arrived at certain decisions.

The study should be executed for a week in order to grasp the daily routine of the participants. Any more may prove to be too cumbersome for participants and increase chances of missed entries. On average, each day will produce at least 3 entries.

While this research is conducted on myself, as an average consumer, it would ideally be committed on a larger scale, with a random group consisting of 18 - 60 year olds. This range was chosen as people who have control over their daily food intake and who have already established an eating routine. Children, teens and elderly who are dependent on a guardian to dictate their eating routines should not be held as accountable for food waste in a household.

Content

Overview of topic of interest

The purpose of this diary study is to document the thoughts and feelings of the average user when they are faced with both having a meal and cooking at home.

When to make an entry

- 1. When feeling hungry at home
- 2. When deciding what to eat while at home
- 3. When confronted with the idea of or in the act of cooking (having to combine multiple ingredients in a pan or pot)

How to make an entry

Participant will write a short blurb highlighting the trigger that they felt and any emotions or thoughts accompanying the entry trigger (i.e. I'm starving. I can't wait to go home and eat.). They shall follow up with either a cognitive mapping entry or answer the 5 Whys, alternating between entries. Additionally thoughts can go on the bottom of the entry, marked by *. The date and time is to be recorded on the bottom right.

Cognitive mapping entry

Use the trigger and thought as the origin point in the cognitive map. Then, write any related thoughts or reasons behind the trigger. Often, the phrase used to identify these thoughts is 'this means'.

For example, I like donuts > this means I like sugary confections > this means dessert are the preferred food.

Cognitive maps reveal hidden connections between the decisions and the consequences or psychological incentives surrounding it.

5 Whys

Compare the starting trigger and the end result. Then begin answering the question "Why?" five times consequtively, exploring the deeper goals that led to the end result. These entries may create connections between unexpected points.

Example: I'm starving, I'm going to go home and eat > I made eggs

Why? The food I ate earlier was dry and did not taste good

Why? The chicken was dry and the noodles were hard

Why? The food was already a day old and the noodles were not the right type

Why? Papa made a lot of chicken and did not have enough noodles

Why? The noodles were leftovers from another time Papa made this dish.

Diary overview and sample entries

purpose: To document the thoughts and feelings of the participant when they are faced with hunger, having a meal or cooking at home.

WHEN TO MAKE AN EVTRY :

- 1) Feeling Hungry 2) Deciding what to eat
- 3) confronted with the idea of cooking from others in family
 4) (cooking I creating a meal

Types of ① COGNITIVE MAPPING + Other thoughts

OCOGNITIVE MAPPING (uses questron means)

desire for moods for food pray eater or moods for food gratification

TRIGGER:

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SAMPLE ENTRIES

€6 whys

THEGGE : "I'm starving, I'm going to go home a eat dinner."

Result: 1 made eggs

why? Food 1 ate earlier was not good 4 dry
why? Chicken was dry + noodles were hard
why? Food was a day old & noodles were
not the right type
why? Papa made a lot of chicken but did
not make enough noodles
why? The noodles were leftover ingredients
from a previous time.

Date t
time.

* module other thoughts as a * note.

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Page Prompts

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MAIN THOUGHT

TRIGGER:

RESULT:

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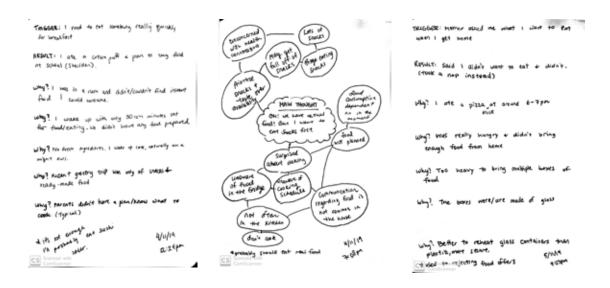
when?

why?

why?

why ?.

Results



Sample Scans of Diary Study Entries

Participant Characteristics

Age23GenderFemaleOccupationStudentHousehold size6Role within householdDependent

Date of execution October 26, 2019 - November 5, 2019

Entries were scanned and noted. Repeated points were merged and categorized for organizational purposes. *Habits* outlines the findings that can be specific to the participant or household. Other categories were addressing findings on those themes. It is evident that food decision making often came down to convenience. Convenient food was among those that she could immediately see (those on display), eat immediately, and those that she could recall was available. Also, there was a clear lack of knowledge and coordination regarding the groceries and food available in the household. There is a sense that the participant has already expected low quality food within in the home although there is an expectation that there is food available. Much of the information is perceived knowledge. While the participant showed intention to reduce food waste, there was little effort in actively performing behaviour to do so.

Summary of Findings

Habits

- 1. Irregular eating times and habits
- 2. Prone to snacking
- 3. Has intention to reduce food waste
- 4. Picky eating, dependent on taste and mood
- 5. Does not cook or make active efforts to cook food
- 6. Leftovers are common
- 7. Parents don't know what to cook

Convenience

- 1. Very important
- 2. Quick food like snacks and bread is on display
- 3. Eating decisions is based on prior knowledge of what is available
- 4. Visual availability dictates what is eaten

Lack of Knowledge

- 1. The participant lacks awareness of when grocery shopping occurs in their house, lacking knowledge of what's been bought and where it is
- 2. No Grocery Schedule
- 3. Perceived knowledge of state of inventory

Leftovers

- 1. Distrust of food quality
- 2. Desire for variety

Associations

- 1. Eating at home = not a luxurious experience
- 2. House = No food
- 3. Ready-made food = guaranteed taste

Discussion

This report aims to uncover why people throw away so much food in order to help consumers avoid overbuying and reduce food waste. The secondary research proved to be very in depth in providing a multitude of reasons for food waste at the household level and potential means of reducing it. The diary study conducted as primary research supported the findings of the secondary research, highlighting and proving many of the potential causes of food waste due to food decision making.

There are many limitations and errors to this current study. The current sample size is only one participant. While I am an average consumer and am capable to conducting my own eating regime, I did not cook within my household during the study. The findings with a participant who grocery shops and or cooks is required to cover the other aspects of the food waste process. Overall, one participant is not conclusive of a service for multiple people. The study should be expanded to a larger sample group and the findings compounded through a tally system. It would be interesting if the study was conducted among different members of the household to observe how their decisions affect the household as a whole.

Additionally, the study was interrupted by other appointments which may have affected its results. At times, I was unclear if an entry should've been made; going forward, clarification is required on when entries are to be conducted.

Regardless, I believe this diary study was useful in confirming the basic approaches to reducing food waste. If possible, the diary's findings could prove to be very effective in designing customized food plans. Perhaps before a consumer subscribes to a service, this easily executed study would reveal which aspect they should focus on. A prolonged diary study may be helpful to observe the effects of attempts to change behaviour. A notable finding in the diary study alludes to improving the tools of the kitchen to encourage the participant to bring leftover food from home on the go.

Many more experiments should be enacted In order to determine the most effective means of tackling food waste. One study will first have to determine measure the food waste of the participants over time in order to confirm whether or not the preventive measures (planning, shopping etc) are effective.

Conclusion

In order to reduce food waste through consumption, a convenient means of consuming groceries and gaining knowledge of available food options is required.

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4/11/19 a:249h The state of food of the state of the state

TRUSCOCK Homer occid me what I want to day want I get mone

Republic Sould a clidary want to eat a durant. (1000k a nap instead)

play? I ate a pizza at around 6-79th

Why? Was really hungry or didn't bring enough food from home

why? Two heavy to bring swiffly bests of-

why? The boxes werefore made of glass

why? Better to reheat glass containers than plantice, more searce.

Chief to rejecting food offers acrem

