SCHOOL OF
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Consumer Intentions & Food-Wasting Behavior

A study of Lund University students

by

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Abstract

This study aims to map out Lund University students' intentions and behaviors in regard to food waste. Through a thorough literature review, behaviors commonly related to food waste levels were identified, and are referred to as food-wasting behaviors. The theory of planned behavior is used for this paper, which is commonly applied when studying human behavior, and therefore also when it comes to food-wasting behavior. The paper follows a quantitative method through a deductive approach in which the relationship between theory and research was examined, and the focus is on the testing of the theory. Based on the theory and literature, three hypotheses were formulated. The hypotheses were tested on the population via a questionnaire by finding each respondent's attitude, subjective norms, and perceived behavioral control, as well as identifying their food-wasting behavior.

The key findings of this paper were the acceptance of parts of H1 and H3. This showed that a positive attitude towards the minimization of food waste has an effect on both price-consciousness and post-consumption behavior in favor of minimizing food waste. In addition, high perceived behavioral control when it comes to minimizing food waste proved to directly affect consumers' planning and overbuying habits, as well as estimation of food waste levels. However, H2 was rejected, meaning that subjective norms did not prove to have a significant effect on any of the food-wasting behaviors analyzed in this paper. The accepted relationships were brought up for discussion and provided implications regarding business strategies for supermarkets.

Keywords: food waste, consumer behavior, food-wasting behavior, theory of planned behavior

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List of Abbreviations

CSR Corporate Social Responsibility
TPB Theory of Planned Behavior
TRA Theory of Reasoned Action
SBC Standardized Beta Coefficient
VIF Variance Inflation Factor
MLR Multiple Linear Regression

1 Introduction

1.1 Background

In today's society, incorporation of sustainability in business strategies is no longer merely an option – it is now a necessity (Eitelwein, 2021). Integrating environmental and social aims into a business leads to the creation of long-term value and long-term success (Long, 2020). Having a sustainable business strategy therefore implies incorporating goals to help positively impact global issues such as natural resource depletion, world hunger, and climate change, just to name a few (Long, 2020). One critical problem that has been brought to light in the past decade, and is an issue that affects all of the three previously mentioned global issues, is food waste.

In developed countries, citizens have the privilege of having an abundance of food available, and are yet the greatest contributors to food waste. The world population, which is predicted to grow to 8 billion by 2025 and 9.8 billion by 2050, is already too large to be sustained by the amount of resources the world has (United Nations, 2017). Food waste has a crucial and unnecessary impact on natural resource depletion, as these resources used to produce food are exploited to then end up in landfills (Principato, 2018). An extensive amount of energy, fuel, and water is consumed when growing, producing, transporting, storing, and cooking food, emitting greenhouse gasses which, in turn, contribute to climate change (Principato, 2018). Food waste therefore means unnecessary waste of resources used to produce these consumables. Consumption of natural resources is occurring at a rate faster than it can be replenished, and if not acted upon, climate change can become irreversible, and economic growth will decline (Mittal & Gupta, 2015). This will, in turn, contribute to huge social, economic, and environmental costs.

Moreover, according to the Food Aid Foundation (2020), one third of the population suffers from malnutrition, and one ninth suffers from hunger. Despite this, around 20% of all food produced in the EU and 30% of all food produced worldwide is wasted or lost. (FAO, 2019). At the same time, the economy is also impacted as the EU alone generates around 88 million tonnes of waste, which corresponds to about 143 billion euros (FUSIONS, 2016).

Food waste occurs at all levels of the food supply chain, but many studies have shown that the most occurs at the consumer level. In Western countries, 30-40% of the entire food waste and losses occur in households (Principato, 2018). It is therefore of interest to conduct studies on how and why food is wasted at the consumption level. Furthermore, such studies could possibly answer the question of what needs to be done in order to minimize household waste, from not only an individual and societal perspective, but also from a corporate perspective.

1.1.1 Food Waste

Food waste is defined by FAO (2019) as the "decrease in the quantity or quality of food resulting from decisions and actions by retailers, food service providers and consumers". Food loss, on the other hand, is defined as "the decrease in the quantity or quality of food resulting from decisions and actions by food suppliers in the chain, excluding retailers, food service providers and consumers" (FAO, 2019). Food waste is therefore more likely to occur during the last stages of the food supply chain, as in the consumption phase by retailers and consumers, due to behavioral issues (Principato, 2018). Food loss usually occurs in the first stages of the food supply chain due to food quantity or quality reduction, causing it to be unfit for human consumption (Principato, 2018). It is therefore crucial not to confuse the terms.

Food waste can be divided into two categories: edible and non-edible food waste (Principato, 2018). Edible food waste is defined as avoidable food waste, which is food that has been thrown away for reasons that could have been avoided. Non-edible food waste is defined as unavoidable food waste, such as bones, shells, and skins (Principato, 2018). This research will be focusing on the food waste that is edible, therefore avoidable food waste.

1.1.2 Demographic and Situational Factors

Both demographic and situational factors affect food waste levels, as they explain differences in conscious and subconscious consumer behaviors that, in turn, lead to food-wasting behavior (Principato, 2018). Demographics can include age, level of education, family situation, occupation, and gender. From a demographic perspective, research has shown that different generations have different attitudes towards food waste. Baby boomers, or the post-war generation, tend to value food higher as they have experienced the scarce availability of food. Young people, on the other hand, have a higher risk of wasting food since they see little value in leftovers, and are less educated in handling food (Principato, 2018). Education also plays a role, where higher education means more quantities of food wasted, since higher education is often associated with higher income (Secondi, Principato & Laureti, 2015). Larger households also tend to waste more than smaller households, where families with children are at greater risk to waste more. Gender, on the other hand, is more debatable, as different research has shown different results on whether men or women waste more food. Though the majority of studies prove that high-income households tend to waste more than low-income households, some research has also shown the opposite. The majority of studies conducted has however shown that because higher-income households can afford to purchase more food, it is also more likely that they produce more food to waste (Principato, 2018).

Regarding the situational perspective, Principato (2018) discusses that where individuals are located on the geographical level can affect food waste levels. She states that people living in urbanized areas often generate more waste than people living in rural areas. This may be associated with sorting kitchen waste, as composting and recycling requires more time in urbanized areas than in rural areas, and people living in rural areas are more aware of the amount of food they throw away, and therefore produce less food waste (Secondi, Principato & Laureti, 2015).

1.1.3 Supermarkets

The decisions that cause household food waste already start in the grocery stores, as this food can only be thrown away if it is brought home (Gravert, Gunnarsson, Järneteg & Leandersson, 2021). The point of purchase is therefore a significant aspect to consider when looking at food waste. As the decisions that supermarkets make have a frequent and direct effect on consumers, they have a powerful position in the possibility to affect consumer behavior. Accessible information in grocery stores about, for example, storing, preparing, and saving food can increase awareness of food waste, and therefore make a significant impact (Gravert et al. 2021).

Though there are no surefire measures for reducing consumer food waste, there have been many attempts to tackle this issue within supermarkets (Gravert et al. 2021). There have, for example, been indications that informational campaigns can change food waste attitudes and knowledge, as it gives consumers an understanding of the negative effects. However, these campaigns have not proven to be sufficient for changing the actual behavior that causes food waste, as consumers often do not know how much food they dispose of (Gravert et al. 2021).

Through interviews with grocery stores conducted by Livsmedelsverket, many state that active measures are taken to not only reduce their own food waste, but also consumers' (Gravert et al. 2021). In order to reduce in-store food waste, some measures that have been taken by supermarkets include selling "ugly vegetables" by weight, or to encourage the purchasing of un-bunched bananas. Other ways include implementing pricing schemes where goods that are close to expiry dates are sold at cheaper prices. Some store owners also implemented measures that would reduce consumers' household food waste by providing suggestions that can help individuals plan their shopping, as well as managing residual food, which includes tips for recipes and product alternatives (Gravert et al. 2021).

Previous studies conducted have shown that factors such as how the price displays are designed in grocery stores can nudge consumers' shopping behavior into only buying the amount they need (Gravert et al. 2021). The study showed that several display options made a difference. These were displays of a quantity discount with a message reminding customers to only purchase what can be eaten, a quantity discount with visible unit price, and a single unit price discount, which all reduced average sales. As quantity discounts often cause consumers to purchase more food than necessary, the Danish grocery chain REMA 1000 has implemented the measure of completely removing quantity discounts. This shows the effect of nudging, helping to push consumers' decisions in the right direction, and thereby facilitating and promoting well-being on both the individual and social level by limiting overconsumption, and therefore decreasing food waste (Gravert et al. 2021).

Supermarkets have a tremendous impact on the world food economy, with some large supermarkets wielding more economic power than certain governments (Hawkes, 2008; Global Justice Now, 2016). Supermarkets therefore have considerable corporate social responsibility (CSR), as their actions have a great impact on society. CSR can be defined in

many different ways, and companies' degree of responsibility differs depending on the theory. An example is the theory of corporate citizenship, which argues that corporations belong to a community, and must therefore act responsibly with regard to their community (Carroll, 1998). Garriga and Melé (2004) offered a conceptual framework of CSR theories that categorized them in one of four ways: instrumental, which defines CSR as a way to generate profits; ethical, which states CSR is a responsibility corporations have to society; integrative, which says that CSR is important because companies rely on society to operate; and political, which claims CSR is important because companies need to act responsibly considering their great influence on society. Whichever category of CSR one subscribes to, it is in the supermarkets' best interests to limit food waste and to limit their customers' food-wasting behavior.

1.2 Research Aim and Objectives

The aim of this paper is to research the psychological and social factors that affect consumer behavior contributing to global food waste. Specifically, the research will be conducted in order to understand how Lund University students' attitudes, subjective norms, and perceived behavioral control regarding food waste can affect their food-wasting behavior. Furthermore, it is of interest to understand how companies, supermarkets in particular, can make use of this information. Furthermore, the study will examine food-wasting behavior by using the theory of planned behavior.

1.3 Research Purpose

The study aims to provide useful and relevant insights into how consumer intentions affect their food-wasting behaviors and what could feasibly be done by supermarkets to help minimize household food waste. It is therefore of interest to understand why students as consumers waste food in the first place, and what consumption behaviors are significant in their food-wasting behavior. Therefore, according to the aims and objectives of this paper, the research question is formulated as follows:

How do consumers' intentions affect food-wasting behavior, and what implications does that have for supermarkets?

1.4 Delimitations

It is of importance to define and limit the scope in this research paper. The first delimitation is to understand that the paper mainly focuses on answering how intentions affect food waste, and the focus on demographic and situational influences is restricted to only a few such factors. Therefore, the second factor to consider is that the research will only cover students living in Lund who study full time at Lund University during the spring semester of 2022. The target group is selected based on the demographic and situational factors that affect food waste levels, as mentioned in section "1.1.2 Demographic and Situational Factors". The authors of this paper also have convenient access to participants of this target group.

1.5 Outline of the Thesis

The thesis is divided into six parts. Part one is the introduction section, which provides the reader with the background and problematization as well as definitions of important terms used in this paper. It is then followed by the aims and objectives, the research purpose, research question, and delimitations. The second part is a thorough literature and theoretical review, where it defines food-wasting behavior and the main theory, the theory of planned behavior, which will be used for the analysis. The third part discusses the methodology for this research, the justifications of why certain methods are chosen and used, justifications for the chosen target group, as well as limitations of those methods. The fourth part presents the findings from the research, followed by part five, in which these findings are analyzed and discussed. The sixth part summarizes the implications of the findings in theory and practice, as well as presents ideas and suggestions for future research on the topic.

2 Literature and Theoretical Review

2.1 Food-Wasting Behavior

The term food-wasting behavior refers to certain consumer behavior leading to higher or lower levels of food waste. This section brings up previous studies that have argued for these behaviors, and serves as a foundation for the research methodology. The food-wasting behaviors have been divided into five parts: planning, overbuying, price-consciousness, frequency of consumption, and post-consumption behavior.

2.1.1 Planning

Planning seems to play a major part in the consumers' food waste levels (Aktas, Sahin, Topaloglu, Oledinma, Huda, Irani, Sharif, van't Wout & Kamrava, 2018; Flanagan & Priyadarshini, 2021; Bravi, Francioni, Murmura & Savelli, 2020). Writing shopping lists has shown to make food purchasing planned rather than impulsive, which, in turn, prevents purchasing more than necessary, and minimizes the risk for higher waste levels (Flanagan & Priyadarshini, 2021; Bravi et al. 2020). Planning meals and finding recipes before shopping for groceries is also related to the consumers' ability to limit food waste, as it minimizes the risk of purchasing items that they will not eat. Making conscious decisions can therefore be a result of writing shopping lists and planning meals, as it decreases the risk of the consumer accidentally buying items they already have at home, which would have led to more food waste (Flanagan & Priyadarshini, 2021; Bravi et al. 2020). In addition, there have been identifications from studies suggesting that consumers that do not plan the number of meals that will be eaten at home and away from home in the following days are more likely to contribute to higher levels of food waste (Gravert et al. 2021). The behavior of not planning meals has shown to be more common in previous international studies in comparison to Swedish ones. Research has also shown that younger people tend to plan less than older people, as they have a tendency to care about freedom, flexibility, and spontaneity when it comes to food (Gravert et al. 2021).

2.1.2 Overbuying

Purchasing too much food is a major reason as to why food waste occurs within households (Gravert et al. 2021). Marketing promotions such as discounts can lead to consumers overconsuming by, for example, repeating purchases and buying in bulk, leading to excess food levels and food waste (Bravi et al. 2020). 12 of 24 studies conducted by Livsmedelsverket to investigate the relationship between discounts and household food waste found evidence that reductions in price cause food waste (Gravert et al. 2021). Bulk packaging is another factor that contributes to household food waste, especially for small or single-person households. According to Livsmedelsverket, 20-25% of household food waste in Sweden is caused by bulk-size packaging due to food being difficult to empty. Apart from availability or financial aspects, buying larger packaging can also be due to consumers' concern for the environment, as larger packages, compared to smaller packages, contain more

food in relation to the material needed for the packaging. Most consumers believe that food packaging waste generates a greater environmental impact than food waste, though this is not the case. Raising awareness regarding the negative environmental impact of food waste in relation to food packaging is therefore important as it can impact consumers' food-wasting behavior (Gravert et al. 2021).

Consumers can also purposely purchase more than they need, which can be due to the desire of ensuring they always have enough food or for healthier eating habits (Gravert et al. 2021). An example given in the paper written by Gravert et al. (2021) is when parents hope for increased consumption of fruit and vegetables in the family and therefore purchase more of these goods. However, it results in waste when these foods are left uneaten. Another reason for over-purchasing of food is during festive occasions such as Christmas and Easter holidays when consumers buy more food than needed in order to be perceived as a good host or hostess (Gravert et al. 2021).

2.1.3 Price-Consciousness

According to a mixed-method study consisting of qualitative interviews and an online experimental survey from Denmark, more price-conscious consumers were found to show less wasteful behavior, and therefore waste less food (Aschemann-Witzel, Haagen Jensen, Hyldetoft Jensen & Kulikovskaja, 2017). Consumers focused on price are naturally concerned with not wasting money, which goes hand in hand with not wasting food. Therefore, price-conscious consumers tend to not over-purchase or over-consume. The findings in the study showed that instead of price offers triggering food waste, the price-conscious consumers who are part of the target group of these offers actually help reduce food waste (Aschemann-Witzel et al. 2017). In addition, it has been suggested that price-conscious consumers tend to have a higher level of planning, indicating that those consumers waste less food (Aktas et al. 2018).

2.1.4 Frequency of Consumption

The frequency of grocery purchasing has been found to be correlated to the level of food waste, as those who purchase groceries more often tend to have higher food waste. The reason for this is discussed to be due to shopping routines or the level of planning, which could include checking inventories or writing shopping lists, for instance (Mijares, Alcivar & Palacios, 2021).

2.1.5 Post-Consumption Behavior

Apart from planning practices and in-store consumption, post-consumption behavior, or habits in the home, has proven to play a part when it comes to the impact on food waste levels. For example, consumers who are not willing to consume food items past their expiry date tend to waste more food (Flanagan & Priyadarshini, 2021). The reason for food waste as a result of the passing of the expiry date could be, for instance, the overvaluation of the meaning of expiry dates or the fear of falling ill because of eating unsafe food (Flanagan & Priyadarshini,

2021). Those consumers who eat leftovers the next day and are able to reuse their leftovers in different ways tend to produce lower levels of household food waste (Flanagan & Priyadarshini, 2021; Bravi et al. 2020). In these aspects, older people have proven to be more experienced and skilled in safely consuming products before their expiry date and using leftovers (Bravi et al. 2020).

2.2 Theory of Planned Behavior

Apart from food-wasting behavior, the theory of planned behavior (TPB) has been argued to be of great influence when it comes to household food waste levels (Aktas et al. 2018; Flanagan & Priyadarshini, 2021). The theory is a psychological one that links behavior and beliefs, and is considered to be well supported by empirical evidence, and aims to predict and explain an individual's behavior based on three factors: attitude, subjective norms, and perceived behavioral control (Ajzen, 1991). If the consumer has a positive personal attitude toward food waste and feels strongly about the ethics of food waste, the likelihood is greater that the consumer wastes less food (Aktas et al. 2018; Flanagan & Priyadarshini, 2021). In addition, subjective norms and high perceived behavioral control have been argued to be factors of importance when it comes to food waste (Aktas et al. 2018). Thus, in order to analyze the students of Lund's food-wasting behavior, the TPB will be used. The theory was developed in 1991 by Icek Ajzen and is an extension of a previous theory by Icek Ajzen and Martin Fishbein from 1975, called the theory of reasoned action (TRA) (Ajzen, 1991).

The TPB can be applied in many areas of human behaviors and has frequently been used to conduct market research and consumer-related behavioral research in the past as one of the most common methods of predicting human behavior, with the theory being used as the theoretical framework for a staggering 40% of all papers within environmental psychology (Klöckner, 2013). Examining the intentions behind human behavior is no easy task, though the framework in the theory provides the means to analyze it, and the theory is judged to be an effective way to do so.

The TPB aims to both explain and predict an individual's behavior by examining three independent factors that together form the behavioral intentions (Ajzen, 1991). As seen in Figure 1 below, behaviors are influenced by intentions, which are determined by the three factors: attitude, subjective norms, and perceived behavioral control (Ajzen, 1991). External factors may also directly force or prevent certain behaviors, regardless of the intention, depending on the degree to which a behavior is actually controlled by an individual, and the extent at which perceived behavioral control is an accurate measure of actual behavioral control (Ajzen, 1991).

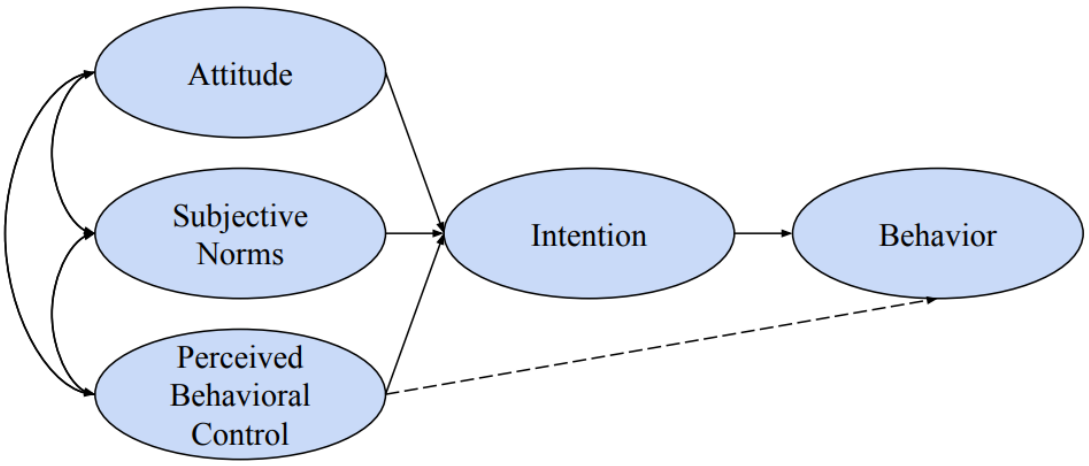

Figure 1, based on Ajzen (1991)

2.2.1 Attitude

The attitude is concerned with how favorable or unfavorable a person's attitude toward a certain behavior is (Ajzen, 1991). A person's attitude towards a behavior will affect how likely they are to perform a behavior. For example, if one believes that a certain behavior will make a positive difference in their life, the chances are higher that they will perform that behavior (Ajzen, 1991). Attitudes, according to Ajzen and Fishbein's (1975) expectancy-value model, are developed from people associating objects with certain attributes, such as with other objects, characteristics, or events. Attitudes towards behaviors are therefore built by peoples' beliefs that link that behavior towards certain outcomes or attributes that are already valued as positive or negative. Hence, people favor behaviors that they associate with desirable consequences and unfavor behaviors that are associated with undesirable consequences (Ajzen, 1991).

2.2.2 Subjective Norms

Subjective norms is the social and societal pressure a person experiences to perform a certain behavior (Ajzen, 1991). Subjective norms incorporates both how much social pressure a person is experiencing, and how highly the person values the impact of those pressures. Subjective norms is similar to attitude in that it examines how favorably or unfavorably an attitude to a certain behavior is, except as opposed to examining the individual's attitude, it looks at those around them. Subjective norms derives from an individual's attachment to peer groups, their family, and society in general (Ajzen, 1991).

2.2.3 Perceived Behavioral Control

Perceived behavioral control is the perceived ease at which an individual believes they can perform a certain behavior (Ajzen, 1991). In other words, it means how confident an individual is that they will be able to carry out a certain behavior. The difference between the TPB and the TRA is the perceived behavioral control (Ajzen & Fishbein, 1975). In the TRA, only attitude and subjective norms are used to find the intentions of a person (Ajzen & Fishbein, 1975). Behavioral achievement can therefore be directly predicted by perceived

behavioral control and behavioral intention (Ajzen, 1991). For example, two people can have equally strong intentions to perform an activity, but the person who is more confident that they will master the activity will more likely succeed.

2.2.4 Criticism

The TPB has been subjected to some criticism over the years. A major limitation has been the fact that examining only three factors as influences of intentions is an oversimplification of behavior. Critics argue that other factors, such as self-identity, past behavior, and anticipated emotions need to be accounted for as well (Tommasetti, Singer, Troisi & Maione, 2018). For example, emotions such as fear, threat, or mood, are completely disregarded by the theory. Tommasetti et al. (2018) argue that claiming something as complex as human behavior can be wholly predicted by three simple factors is unreasonable.

Another critique the TPB has received is that it assumes individuals only act deliberately and that all one's actions are premeditated (Fazio, 1990). Behavior is assumed to be the result of a linear decision-making process in the theory, and according to Fazio's MODE model, there are two kinds of behavior, namely motivated and unmotivated behavior. For motivated behavior, the individual's thinking greatly influences their behavior, and thus, the TPB applies. For unmotivated behavior, however, the individual's thinking does not affect their behavior to the same extent, which means the TPB cannot be used to measure this kind of behavior (Fazio, 1990). Furthermore, the TPB does not consider that motivated and unmotivated behavior can change over time.

The TPB has also been criticized for not taking routines and past behavior or experiences into account. Research has shown that behavior can be predicted fairly accurately by past behavior, with active decision-making having a lesser impact on behavior the more frequent the behavior is. Future behavior is instead suggested to be predicted largely by reactions to stimuli the individual recognizes from their past (Albarracin, Johnson & Zanna, 2005). Furthermore, the TBP also assumes that, regardless of the intention, the individual already has all the necessary opportunities and resources to successfully perform the desired behavior.

2.3 Literature Gap

There has been a lot of previous research relating to food-wasting behavior and the TPB, mostly relating to certain demographics. Studies on how to decrease household food waste have been conducted in countless countries and universities, and consumer behavior is also well-researched in its own right. The literature gap this research aims to fill is the application of food-wasting behavior and the TPB in a new geographical location and demographic context, covering students at Lund University.

There was a similar study conducted by students at Uppsala University on Gotland, by Wajon and Richter (2019), that related the extended TPB to different demographics, which found a correlation between attitude and subjective norms, and intentions to waste less food , though

that study did not cover the same geographic areas as this study. Furthermore, the Uppsala study did not incorporate what behaviors lead to food waste and is therefore not addressing the same gap as this one.

2.4 Hypotheses

Based on the review of literature and theory, the three hypotheses below have been formulated. Under the term food-wasting behavior, each behavior is being tested against the theory, and the result for each test is presented and analyzed.

H1: A positive attitude toward minimizing food waste is connected to behavior minimizing food waste.

H2: Subjective norms in favor of minimizing food waste are connected to behavior minimizing food waste.

H3: High perceived behavioral control relating to minimizing food waste is connected to behavior minimizing food waste.

3 Methodology

3.1 Research Approach

The paper follows a quantitative method through a deductive approach, in which the relationship between theory and research is examined with a focus on testing of the theory. The TPB is tested on the specific population by finding each respondent's attitude, subjective norms, and perceived behavioral control, as well as identifying their food-wasting behavior.

3.2 Research Instrument

The instrument used for the research was a self-completion or self-administered questionnaire. The benefits of such questionnaires in comparison to interviews are, for example, the elimination of interviewer effects (Bryman & Bell, 2011). Interviewer effects can occur when characteristics of interviewees or interviewers, such as gender, social background, and ethnicity, affect people's answers and create bias. Fixed choice, pre-coded, closed, and closed-ended questions in self-completion questionnaires also reduce the risk of interviewer variability, where information can possibly be missed, embellished, or misinterpreted. Another advantage of a self-completion questionnaire is that the processing of data is facilitated and a greater number of responses can be collected in comparison to interviews (Bryman & Bell, 2011).

Four main errors with survey research can be identified: sampling error, sampling related error, data collection error, and data processing error (Bryman & Bell, 2011). Sampling error is caused when the sample is not truly representative and is extremely difficult to avoid. Due to time limitations concerning the collection of responses, a small sample size in relation to the population size increased the risk for differences between the sample and the population. Sampling related error arises due to the issue of generalizability of the findings from the research, which can be caused by, for example, non-response or an inaccurate sampling frame. Data collection error is a result of the implementation of the research process, and can be caused by poor question wording in a questionnaire. In order to reduce the risk of data collection error, the researchers have conducted pilot testing and attended a statistical consultation before publishing the questionnaire. Lastly, data processing error is concerned with flaws in data management and coding answers (Bryman & Bell, 2011). To deal with this type of error, two additional statistical consultations were booked after closing the questionnaire to make sure the collected data had been correctly handled, calculated, and analyzed.

3.3 Research Design

The questionnaire was divided into three sections (Appendix A). All questions were marked as required, which meant that the respondent was not able to continue to the next section unless all questions in the current section had been answered. The reason for marking the

questions as required was to ensure responses on every question, which, in turn, would make the answers more easily computed and comparable. The downside, however, could be that the required questions might have increased the risk of the respondents not completing the questionnaire for different reasons, such as time limitations or lack of interest.

The first section consisted of three questions, and the purpose was to sift out respondents that were not a part of the selected population. For these three questions, the respondent was required to answer "Yes" in order to continue to the next section of the questionnaire. If any of these questions were answered with a "No", the questionnaire ended since their further responses would not be of interest to the research. The respondents were sifted out by asking if they are currently a full-time student enrolled at Lund University, if they currently live in Lund, and if they buy and prepare the majority of their own meals. The second section covered demographic information, namely nationality, age, and gender.

Finally, section three contained questions related to the TPB as well as food-wasting behavior. The questions which covered the TPB were formed with help from previous studies within the field as well as through discussion of the three parts of the theory, and later translated into the topic of food waste. Previous research helped the authors formulate the questions covering food-wasting behavior, where certain behaviors are claimed to contribute to smaller or greater amounts of food waste. Questions covering food-wasting behavior were divided into five categories according to the previous research brought up in section "2.1 Food-Wasting Behavior", namely planning, overbuying, price-consciousness, frequency of consumption, and post-consumption behavior. Apart from the five food-wasting categories, the respondents were asked to estimate their weekly level of food waste, adding yet another category of behavior. The questions in this section were mixed in an attempt to hide the purpose behind the questions, hoping to reduce the risk of the respondent answering what they believed was the most suitable answer, and instead providing more accurate answers. See Table 1 (Appendix B) for a guide of the division of the questions.

The majority of the questions within the third section were formed according to a four-point Likert scale, meaning that there was no neutral standpoint or middle option. The potential risks with choosing a forced scale include skewed results in cases where the respondents would rather choose a neutral option. However, the reason behind choosing such a scale was to force respondents to have an opinion on each question. The questions that were not in a Likert scale were reduced to four options so that they would be compatible and could be easily calculated together with the rest of the questions. To avoid response sets and the social desirability effect where the respondent consistently disagrees or agrees with the statements, some questions were reversed. For some questions, the agree-side indicated behavior in favor of the minimization of food waste, whereas for other questions, the disagree-side did so. To later analyze the responses, the responses were reversed back in order to provide a correct picture. These questions have been marked in Table 1 (Appendix B).

3.4 Data Collection

3.4.1 Population

The study covers the population of full-time students enrolled at Lund University during the spring semester of 2022. The university is one of Sweden's most popular study locations, and offers a broad range of courses and programs (Lund University, 2022a). With over 640 partner universities in more than 70 countries, Lund University provides education with an international orientation (Lund University, 2022a). There are about 44,000 students enrolled, 23% of them being international (Lund University, 2022b).

The limitation of the population to students at Lund University was done due to several reasons. Firstly, the accessibility to the population and the opportunity to obtain a large number of responses was a major factor. Secondly, the points made in section "1.1.2 Demographic and Situational Factors" had an impact on the decision. By restricting the population to certain demographic and situational categories, some potential influences on intentions and food-wasting behavior were restricted, making the responses more easily comparable. As mentioned previously, the respondents were sifted out by asking whether they are a full-time student enrolled at Lund University and if they live in Lund, which narrows down the respondents according to occupational factors and geographical location. Demographics is also the reason for asking the questions regarding age and gender.

3.4.2 Sampling Method

The sampling method used in this paper is convenience sampling, meaning that the sample was chosen by the researchers due to its accessibility (Bryman & Bell, 2011). The chosen survey administration software was Google Forms. The questionnaire was published on Facebook pages, in Messenger groups, and in WhatsApp groups of the authors of this paper, aiming to reach the population. The reason for the choice of sampling method was mainly due to the easy access to the population due to the researchers being part of it themselves. Both the posts on social media and the questionnaire were written in English in order to provide equal opportunities for Swedish and international students to take part in the research.

The advantages of the convenience sampling is that there is generally a high response rate (Bryman & Bell, 2011). However, the disadvantages entail difficulties in generalizing the findings. Instead, the data from the research could be used as a starting point for future research or to find and create links within the specific area. In comparison to probability sampling, convenience sampling provides simplicity and relatively low costs. However, sampling bias arises due to the fact that all members of the population do not have the chance to be exposed to the opportunity of answering the questionnaire (Bryman & Bell, 2011).

Convenience sampling is a type of non-probability sample, meaning that some units of the population have a higher chance of being selected than other units (Bryman & Bell, 2011). This results in a non-sampling error, creating differences between the sample and the

population. These differences can arise due to non-response, an inadequate sampling frame, flawed question wording, or poor processing of data. Non-response is a result of sample members being unwilling to cooperate, unable to be contacted, or for other reasons not being able to provide responses to the questionnaire (Bryman & Bell, 2011). For this questionnaire, some non-response occurred since the researchers were unable to reach out to every single member within the population. In addition, the likelihood of members answering was higher among those who are more interested in the topic of food waste or those who are acquainted with the researchers. The relationship between certain units of the population and the researchers could have entailed a greater level of cooperation, and, in turn, has possibly affected the outcome of the questionnaire.

3.5 Data Analysis

The data from the answers was converted from Google Forms to Google Sheets, and thereafter downloaded to Microsoft Excel and transferred to SPSS Statistics. In Excel, charts were created and designed, and means were calculated with the AVERAGE function. The variables were divided according to the categories presented in Table 1 (Appendix B). The control variables are nationality, age, and gender. These are variables which could possibly influence the relationship between the main variables, which are both the dependent and the independent variables (Bryman & Bell, 2011). The independent variables are attitude, subjective norms, and perceived behavioral control. The dependent variables are planning, overbuying, price-consciousness, frequency of consumption, post-consumption behavior, and estimation.

To analyze the data, the responses covering the TPB and food-wasting behavior were converted into numbers, ranging from 1 to 4. A score of 4 indicated attitudes, subjective norms, perceived behavioral control, and behavior in favor of the minimization of food waste, and a score of 1 indicated behavior against the minimization of food waste. Gender was divided into numbers of 1 and 2, representing men and women respectively. Similarly, nationalities were divided into numbers of 1 and 2, representing Swedish and international students respectively. Ages were also categorized into numbers 1 and 2, grouped into younger (20-22 years) and older (23-28 years) consumers. The division of the age groups was determined based on the age distribution of respondents, as the ages grouped together resulted in the most even groups in terms of number of respondents. As mentioned in section “3.3 Research Design”, answers to questions that were reversed, were reversed back before being brought into calculations. For each category of questions (Table 1, Appendix B), a mean value was derived, and thereafter used for the calculations presented below.

3.5.1 Multiple Linear Regression

The p-values and standardized beta coefficients (SBC) were determined through a multiple linear regression (MLR) analysis in SPSS. The SBC was used to measure the strength of the relationship between the independent variables and control variables to the dependent variables. The higher the absolute value of the SBC, the larger the impact the independent

variable has on the dependent variable (Bryman & Bell, 2011). The level of statistical significance is expressed in the form of a p-value (Bryman & Bell, 2011). The p-value represents probability, with a coefficient ranging from 0 to 1, where a value closer to 0 indicates stronger evidence for the alternative hypothesis, and vice versa (Beers, 2022). Generally, a p-value below or equal to 0.05 is indicative of a statistically significant result, and the same is applied for the hypotheses testing in this research. The hypotheses presented in section "2.4 Hypotheses" are alternative hypotheses. Hence, a p-value below or equal to 0.05 leads to the null hypothesis being rejected and the alternative hypothesis being accepted. If the p-value is greater than 0.05, the alternative hypothesis is rejected.

3.5.2 Adjusted R-Squared

In order to judge how well the dependent variables are explained by the independent variables in the MLR model, the adjusted R-squared was examined. R-squared examines how much of the variance in a dependent variable is explained by the independent variable (Fernando, 2021). In models with more than one independent variable, such as the one in this paper, the adjusted R-squared is used to adapt to the fact that multiple predictors are present in the model. Thus, the value of adjusted R-squared will decrease anytime an independent variable that does not explain the behavior of the dependent variable is added to the model. Hence, the adjusted R-squared is used instead of R-squared for this analysis. The adjusted R-squared was found through the MLR function in SPSS.

3.5.3 Cronbach's Alpha

The internal reliability was tested with Cronbach's alpha, and was calculated via a two-factor ANOVA without replication in Excel. The coefficient ranges between 0 and 1, where 1 is considered perfect internal reliability. Typically, 0.8 is determined as an acceptable level, although a slightly lower figure could be accepted (Bryman & Bell, 2011).

3.5.4 Multicollinearity

In Excel, correlations of the independent and control variables were tested by using the CORREL function for each of the variables with one another. When performing a MLR analysis, one should always test for multicollinearity as independent variables need to be exactly that, independent (Hayes, 2022). If any of the independent variables correlate to one another, the data provided by the MLR analysis might not be accurate. This is because what the regression coefficient, or SBC, in the MLR analysis shows is the change in the dependent variable for every 1 unit change in the independent variable, provided all other independent variables are held constant. Thus, if two of the independent variables correlate to one another and tend to change together, the model struggles with estimating the relationship between the dependent and independent variables, and p-values may not be accurate (Hayes, 2022).

After detecting correlation among the independent variables, the Variance Inflation Factors (VIF) were measured using the MLR function in SPSS. The measure is a means to examine the amount of multicollinearity within a set of variables used in a multiple regression analysis

(The Investopedia Team, 2021). A high VIF indicates that the independent variable in question is highly collinear with the other independent variables in the data set. The value is always at least 1, with 1 meaning there is no correlation, a number between 1 and 5 meaning there is moderate correlation, and a number greater than 5 meaning there is high correlation. Should one or more independent variables in the data set display high multicollinearity, one of the variables may have to be removed from the data set (The Investopedia Team, 2021).

3.6 Validity and Reliability

3.6.1 Validity

The validity of the research refers to the extent to which the indicator measures the chosen concept, which has an effect on the integrity of the conclusions from the research. There are different ways to establish validity, such as face validity, internal validity, external validity, and ecological validity (Bryman & Bell, 2011). To strengthen the face validity and make sure that the TPB was suitable for analyzing food-wasting behavior, the researchers found several studies that had been done on the topic previously, which indicates that the chosen theory is appropriate for the research topic. A small sample fraction threatens the external validity since there are difficulties generalizing the results from the study beyond the research context. Concerning internal validity, the study faces challenges when it comes to the relationship between certain variables. For example, if one independent variable is shown to have an impact on a dependent variable, there are difficulties making sure that it is that specific independent variable which is responsible for the variation in that specific dependent variable. Instead, it might be factors not measured in this research that have an impact on the dependent variable. Lastly, ecological validity is concerned with to what extent findings are actually applicable to people's everyday lives (Bryman & Bell, 2011). The unnatural setting of a questionnaire might have had an impact on people's answers, which limits the validity of the responses.

Another limitation to this study when it comes to validity is the possibility that respondents are not fully honest when completing the questionnaire. The reactive effect is one reason why people can answer dishonestly in research studies (Bryman & Bell, 2011). This implies that people change their behavior, or in this situation, their answers, because they know that they are being observed. The reactive effect occurs because participants either want to provide answers that are favorable to the researchers, or want to be viewed in a favorable way by the observer. The first point can occur especially because the participants of the questionnaire are majority people that have some type of relationship with the authors of the paper. This can give more incentive to the respondents to answer either subconsciously or consciously in a way they believe will benefit the researchers. The second point can, however, be significantly reduced in questionnaires compared to interviews, as there is both anonymity for the participant as well as no presence of an observer that causes social desirability bias (Bryman & Bell, 2011).

Dishonest answers by respondents can occur both consciously and subconsciously (Bryman & Bell, 2011). There is a risk that respondents are subconsciously dishonest because they believe that the answer they give correctly corresponds to the truth. This behavior can be due to inaccurate memory, such as the amount of times the participant shops a week, or how much food they throw away on average. As food-wasting behavior is generally looked down upon, it can also alter respondent's answers even though the survey is anonymous. Furthermore, there is a risk that the respondents either read or interpret the question incorrectly, causing the answer to falsely represent their actual opinion (Bryman & Bell, 2011).

3.6.2 Reliability

The reliability of the research refers to its consistency, which can be determined by three factors, namely stability, internal reliability, and inter-observer consistency (Bryman & Bell, 2011). In order for the stability factor to be upheld, the measure needs to be stable over time. If the questionnaire would have been sent out again, answers would need to show little variation in order to be considered stable. The internal reliability is concerned with the consistency of scales and indexes (Bryman & Bell, 2011). This type of reliability is of importance to this research since questions have been formed and grouped into different categories, as seen in Table 1 (Appendix B). In order to test the consistency of the questions, Cronbach's alpha has been calculated and taken into consideration in the analysis. Since there were three authors of this paper, there was risk of subjective judgment, leading to the inter-observer consistency being threatened. To decrease the risk of inconsistency, operationalization was performed continuously throughout the research period. The authors frequently discussed definitions of concepts and theories in order to accurately translate those into other areas, and thereby creating inter-observer consistency.

4 Empirical Observations

4.1 Descriptive Statistics

In total, there were 125 responses to the questionnaire. Out of those 125, 13 were not currently full-time students at Lund University, leading to their exclusion from the rest of the questionnaire. Out of the remaining 112 students, 5 did not live in Lund, and of the 107 remaining students following those subsequent exclusions, 12 did not buy and prepare the majority of their own meals, which led to a total of 95 students who progressed past the three screening questions and who answered the entire questionnaire. The sample fraction is calculated by dividing the sample size with the population size (Bryman & Bell, 2011). In total, 112 respondents noted that they were full-time students at Lund University. With a population size just above 29,000 full-time students at Lund University (Staff Pages, 2022), the sample fraction turned out to be approximately 0.386%.

4.1.1 Control Variables

Out of the 95 respondents, 77.9% were Swedish (see Figure 2), which is close to the Lund University average of 77%. The 22.1% of students with other nationalities were of varying descent. Four Germans and three Americans made up the largest groups, but the results were generally scattered. The total number of nationalities covered in the questionnaire was 15. Aside from the 74 Swedes and the four Germans and three Americans, there were two Norwegians, two Chinese, one French, one South African, one Spaniard, one Persian, one Azerbaijani, one Dane, one Turk, one Finn, one Mexican, and one who answered “Irrelevant”.

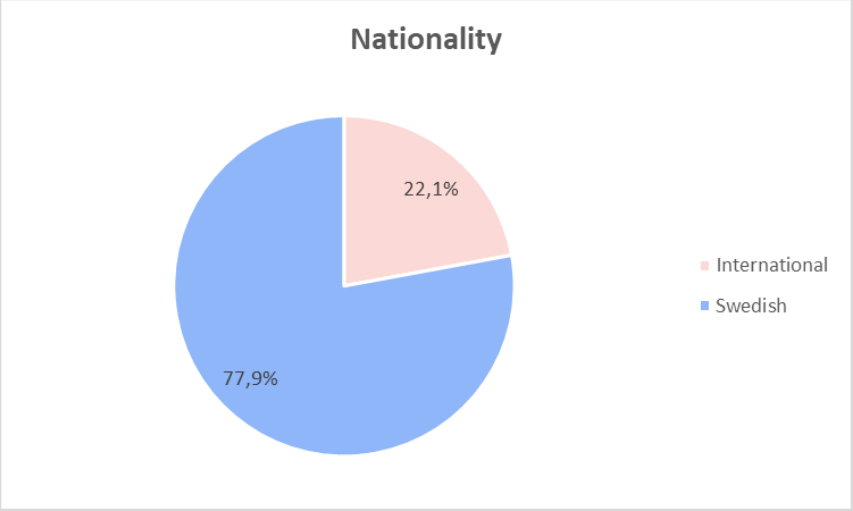

Figure 2

The age range was 20-28 years old (see Figure 3). However, the vast majority of respondents was between 20 and 25, as only 4 respondents were older than that. The greatest concentration of respondents was within the ages 22 and 23, which accounted for 60.8% of the population.

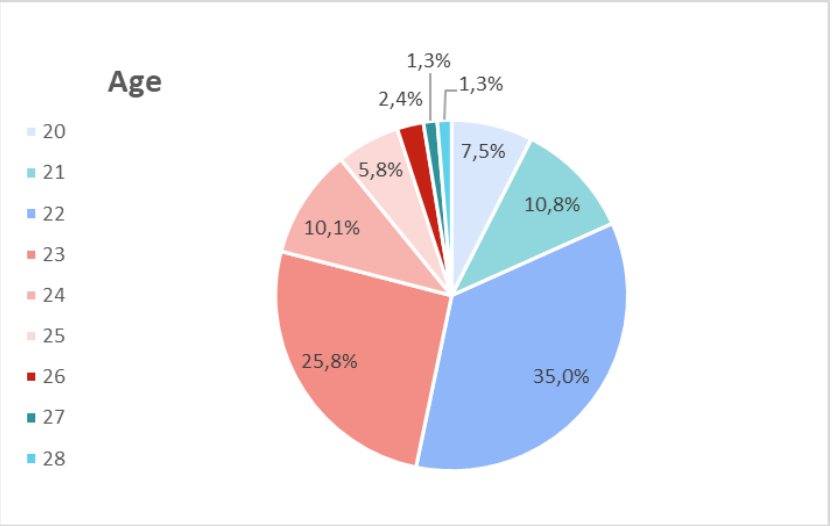

Figure 3

As seen in Figure 4 below, the gender distribution in the questionnaire was 62.1% female, and 37.9% male. No respondents chose either of the answers "Other" or "I prefer not to answer". At Lund University, the proportion of females is 56.5% (Staff Pages, 2022), meaning the sample size of the questionnaire was not entirely indicative of Lund University students.

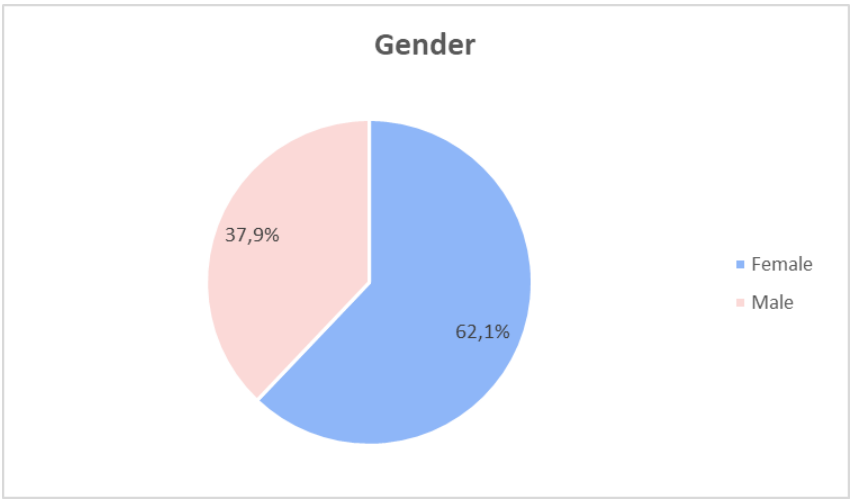

Figure 4

4.1.2 Independent Variables

The three independent variables are identified as the attitude, subjective norms, and perceived behavioral control (Table 3, Appendix B). Regarding attitude towards food waste, the majority of the respondents from this study often think about food waste. However, how

strong their attitude was towards food waste varied on the question asked. For example, 50.5% of the respondents strongly agreed with the statement "I feel guilty when I throw away food", and yet only 24.2% strongly agreed with "I often think about food waste". In general, however, there was a positive attitude towards minimizing food waste, as 76.6% either agreed or strongly agreed to often thinking about food waste, 90.5% either agreed or strongly agreed that the food waste minimization is important to them, and 89.4% either agreed or strongly agreed to feeling guilty about throwing away food.

The results for the answers to subjective norms varied significantly regarding the questions asked. "People around me care about food waste" was the statement with the most uneven results between the agree and disagree side. 73.7% of the respondents agreed to this statement, and 8.4% strongly agreed, meaning that a total of 82.1% of the sample size believed that those around them care about food waste. However, this did not indicate that people were affected by the approval of others, as the results for the other two statements were more evenly distributed between agreeing and disagreeing that people judged them for wasting food and that the opinion of others affected them. The results showed a slight majority of 53.7% either disagreed or strongly disagreed that people judged them for wasting food, but a slight majority of 55.8% agreed or strongly agreed that they were affected by others' opinions on food waste. Only a small percentage strongly agreed on both of these statements.

For the independent variable of perceived behavioral control, the results, similar to the variable of attitude, were quite homogenous. The majority felt that they had the capability of keeping their food waste levels low as well as no problems reducing their food waste, where 89.5% and 84.2% either agreed or strongly agreed to these statements respectively. The statement "I have difficulties predicting the amount of food I consume" varied more, but the majority still believed that they did not have difficulties, with 45.3% and 23.2% disagreeing and strongly disagreeing respectively with the statement.

4.1.3 Dependent Variables

The six dependent variables are identified as planning, overbuying, price-consciousness, post-consumption behavior, frequency of consumption, and estimation (Table 4, Appendix B). The questionnaire presented results that a majority of the respondents tend to plan their grocery shopping through writing lists beforehand, as well as utilizing recipes to plan. Out of the 95 respondents, 27.4% strongly agreed and 33.7% agreed to planning grocery shopping with help of recipes, and 41.1% strongly agreed and 31.6% agreed that they write lists prior to grocery shopping.

Price-consciousness was another factor that had a clear majority, where 92.6% of the respondents believed that price is important when buying groceries, and among them, 38.9% strongly believed so. For the dependent variable of overbuying, the answers were distributed quite evenly between agreeing and disagreeing to whether or not the respondents' tend to overbuy. For post-consumption behavior, there was a clear majority of the respondents who

do not tend to throw away their leftovers after cooking, but a wide distribution of answers for whether or not they throw away food past its expiration date. When answering how much they believe they throw away per week, the majority of the respondents, at 60%, believed they throw away less than average, 27.4% believed they throw away a lot less than average, while only 12.6% believed they throw away more than average. Regarding the frequency of consumption, the majority of respondents, at 67.4%, shop 2 to 3 times a week, followed by 16.8% shopping less than once a week, 12.6% shopping 4 to 5 times a week, and 3.2% shopping 6 or more times a week.

4.2 Inferential Statistics

4.2.1 Standardized Beta Coefficients

As presented in Table 6 (Appendix B), the relationships of statistical significance, with a p-value lower than 0.05, as shown through SBCs were:

- Attitude's effect on price-consciousness, with an SBC of 0.282.
- Attitude's effect on post-consumption behavior, with an SBC of 0.356.
- Perceived behavioral control's effect on planning, with an SBC of 0.218.
- Perceived behavioral control's effect on overbuying, with an SBC of 0.221.
- Perceived behavioral control's effect on estimation, with an SBC of 0.51.
- Nationality's effect on post-consumption behavior, with an SBC of -0.258.
- Age's effect on post-consumption behavior, with an SBC of 0.221.

4.2.2 Adjusted R-Squared

The findings for the adjusted R-squared can be found in Table 7 (Appendix B). The only two dependent variables explained to a greater extent than 5% by the independent variables were post-consumption at 18%, and consumption at 24.7%.

4.2.3 Cronbach's Alpha

As seen in Table 2 (Appendix B), attitude, planning, and perceived behavioral control possessed the highest Cronbach's alpha coefficients, whereas subjective norms, post-consumption behavior, and overbuying provided the lowest coefficients. The three highest coefficients were above 0.7, which could be seen as an acceptable level. Overbuying was calculated to have, by far, the lowest Cronbach's alpha at 0.255.

4.2.4 Multicollinearity

To determine whether a test of multicollinearity of the independent and control variables was required, the correlation between the variables was calculated (Table 8, Appendix B). The control variables did not exhibit signs of collinearity, with the highest correlation between any of them being between gender and nationality. The independent variables, however, did display signs of collinearity. Attitude and gender at 0.34, attitude and subjective norms at 0.427, attitude and nationality at 0.239, subjective norms and age at -0.202, and subjective norms and gender at 0.236 all had higher correlation than 0.2 or lower than -0.2. Because of these correlations, the VIF of each of the independent variables was tested (Table 5, Appendix B). The VIF showed that there were no significant issues with multicollinearity with the variables in the data set. The highest VIF was 1.5, meaning 1.5% collinearity.

4.3 Hypotheses Testing

The p-values are presented in Table 6 (Appendix B).

4.3.1 H1: Attitude and Food-wasting Behavior

The relationships between attitude and price-consciousness, as well as attitude and post-consumption behavior, are **accepted** since their p-values are less than 0.05. Planning, overbuying, frequency of consumption, and estimation are **rejected** in the aspect of attitude since their p-values are greater than 0.05.

4.3.2 H2: Subjective Norms and Food-wasting Behavior

Concerning subjective norms, none of the food-wasting behaviors were found to have a significant relationship. Therefore, all parts of the hypotheses are **rejected**.

4.3.3 H3: Perceived Behavioral Control and Food-wasting Behavior

Planning, overbuying, and estimation in relation to perceived behavioral control showed a p-value less than 0.05, and are therefore **accepted**. The remaining three food-wasting behaviors, post-consumption behavior, price-consciousness, and frequency of consumption had a p-value higher than 0.05 and are therefore **rejected**.

5 Analysis and Discussion

5.1 Interpretation of Data

The p-values and SBCs presented in the sub-sections below can be found in Table 6 (Appendix B).

5.1.1 Attitude and Price-Consciousness

According to the results, 92.6% of the respondents care about price when grocery shopping, and a calculated average of 85.6% of the respondents have a positive attitude towards minimizing food waste. Calculations also showed that attitude affects price-consciousness, with an SBC of 0.282 and p-value of 0.026. As the study is researching behavior, there are a multitude of variables that affect how a certain behavior plays out, including physical, personal, and emotional factors, life experiences, as well as an individual's desires and necessities (Mental Health Branch, 2020). It is therefore difficult for there to be a high number when discussing the SBC. Thus, the SBC and p-value implies that there is a relationship between the two, where attitude affects price-consciousness. This can be interpreted as how much an individual cares about food waste plays an effect on how price-conscious they are.

As discussed in section “2.1.3 Price-Consciousness”, consumers that care about price also exhibit less wasteful behaviors, since they tend to be concerned with not wasting money, which is associated with not wasting food. In addition, the target group for this questionnaire was limited to Lund University students, and educated individuals are exposed to more information about today’s environmental crises, such as depletion of natural resources, and therefore more likely to be aware of the harmful effects that food waste causes. This could be the reason why a large majority of the respondents either strongly agreed or agreed to having a positive attitude towards minimizing food waste. In turn, their positive attitude on minimizing food waste has a direct relation to being price-conscious when purchasing food. Furthermore, the target group is full-time students which means that their primary objective is to study and not to earn an income, and therefore tend to have a smaller economic budget than their counterparts with full-time jobs. This may have increased the percentage of respondents being price-conscious. In summary, the results have shown that attitudes towards food waste affects price-consciousness among Lund University student consumers.

5.1.2 Attitude and Post-Consumption Behavior

For post-consumption behavior, 95.8% of the respondents participating in the study tend to avoid throwing away leftover foods after cooking while 52.7% tend to avoid throwing away food even if it is past its expiry date. Calculations have shown that attitude affects post-consumption behavior with a SBC of 0.356 and a p-value of 0.003. Since this relation scored the second highest SBC, it implies that having a positive attitude towards minimizing food waste has a great effect on minimizing the behavior of throwing away food past its

expiration date or throwing away leftovers. In addition, a p-value of 0.003 indicates that the possibility that this relationship is random is minimal. Furthermore, about 85.6% of the respondents have a positive attitude towards minimizing food waste, meaning that these people also have a higher possibility of practicing non-wasteful post-consumption behavior.

As discussed in section "2.2.1 Attitude", attitudes towards certain behaviors are linked to the belief that these behaviors are connected to certain positive or negative outcomes or attributes. In this case, as shown in previous research, the reason why people avoid consuming expired foods is because they relate this behavior to possible negative consequences. They may link this behavior to becoming ill or other unsafe outcomes that may result from eating the foods with past expiry dates. In turn, this implies that one's attitude towards food waste will directly relate to their post-consumption behavior.

5.1.3 Perceived Behavioral Control and Planning

The majority of the respondents, 61.1%, either strongly agreed or agreed that they use recipes to help them plan their groceries, and 72.7% strongly agreed or agreed that they write lists prior to grocery shopping. The majority of the respondents, at a calculated average of 80.73%, exhibited high perceived behavioral control by claiming they are capable of keeping their food waste levels down. The relationship between planning and perceived behavioral control is 0.218 and 0.042 for SBC and p-value respectively. The calculated regression of 0.218 can be seen as a strong regression with the same argument mentioned in section "5.1.1 Attitude and Price-Consciousness", as behavior depends on a multitude of variables. In addition, the p-value is lower than 0.05, implying a low probability that the model stating the independent variable's impact is a random occurrence. A conclusion can therefore be drawn that there is a relevant relationship where perceived behavioral control affects the behavior of planning. This data therefore implies that people who believe they have the capability to keep food waste levels low and reduce food waste tend to also plan their grocery shopping beforehand.

The results from this study can be further backed up by previous studies discussed in section "2.1.1 Planning", where shopping lists allows for planned food purchasing rather than impulsive, which in turn gives individuals' more control over their waste levels. People who have high perceived behavioral control will therefore be more likely to plan in order to minimize the risk of buying food that they will not eat, which causes food waste.

5.1.4 Perceived Behavioral Control and Overbuying

A calculated average of 80.73% of the respondents believed that they could control their food waste level to some extent, and an average of 52.1% believed that they did not purchase more than they needed. The relationship between overbuying and perceived behavioral control lies at 0.221 for the SBC, and 0.043 for the p-value. This means that how well the respondents believe they can control their food waste affects their ability to prevent overconsumption of food. The relationship is quite self-explanatory, as one will avoid overbuying if they know it will help them keep their food waste levels low. The higher an individual's perceived behavioral control, or the confidence in an individuals' own capability to keep food waste

level low, the more likely it is they will be successful in performing this particular behavior. As discussed in section “2.1.2 Overbuying”, food waste in households occurs because, among other reasons, people are purchasing too much food. Discounts, repeating purchases, and buying in bulk all lead to excess food levels and food waste, but the results from this study suggests that having the confidence to keep food waste levels down will also prevent these behaviors from occurring.

5.1.5 Perceived Behavioral Control and Estimation

Perceived behavioral control and estimation scored the highest SBC, implying there is a very strong relationship between the two. For SBC, there was a high regression of 0.510, and a significantly low p-value, less than 0.001. This implies that there is almost no possibility that the relationship is random. Estimation involves how well the respondents believe they can predict their edible food waste. An individual who has high perceived behavioral control will therefore tend to estimate their food waste levels as low. The two factors go hand in hand, as it is difficult for an individual to have a perception that they are good at handling their own food waste but then to estimate that they have a food waste level above average. Additionally, having more confidence, or higher perceived behavioral control regardings food waste, also results in a higher chance of succeeding. In this case, the individual that has more confidence in their ability to decrease food waste levels will outperform the other individual.

5.1.6 Nationality and Post-consumption Behavior

Nationality and post-consumption behavior have a negative regression of -0.258 and a p-value of 0.01. The p-value explains that this relationship has a low possibility of being random. As Swedish respondents were categorized as the number 1, and international respondents were categorized as the number 2, the negative regression implies that Swedish students exhibit a less wasteful post-consumption behavior than international students.

5.1.7 Age and Post-Consumption Behavior

The age of respondents ranged between 20 to 28 years old, where the greatest concentration, accounting for 60.8% of the sample size, were between ages 22 and 23. Age and post-consumption behavior scored a regression of 0.221 and p-value of 0.024, which is statistically significant, meaning there is likely a relationship between the two. This relationship shows that the older the individual, the more likely they are to practice post-consumption behavior that aims to decrease household food waste levels. This behavior includes keeping leftovers after cooking food and not throwing away food judging from the written expiry date.

This relationship is backed up by previous research, as mentioned in section “2.1.5 Post-Consumption Behavior”, that older people tend to practice post-consumption behaviors that save food. This is because they tend to have more experience and possess more know-how of consuming products before expiration dates as well as using leftovers, as stated in section “2.1.5 Post-Consumption Behavior”. Research has also shown that older

generations value food higher since they have experienced the scarce availability of food (see section “1.1.2 Demographic and Situational Factors”). However, as the age gap only limits from the ages 20 to 28, this is not completely applicable in this study.

5.2 Implications for Supermarkets

As mentioned in section “1.1.3 Supermarkets”, grocery stores take a powerful position in affecting consumer behavior, as they have direct and frequent interactions with consumers. With the data gathered from the research conducted in this study, several implications can be drawn for supermarkets that could be of valuable use to implement in their business strategy.

The first relevant point to address is the impact of perceived behavioral control on planning. According to the results from the questionnaire, people who believe they have the capability to keep food waste levels low and reduce food waste tend to also plan their grocery shopping beforehand. Supermarkets can use this information for marketing purposes as well as implementing strategies that can help reduce household food waste. As mentioned in section “1.1.3 Supermarkets”, grocery stores have a considerable amount of CSR due to their economic power and impact on society. Grocery pages or apps that allow for grocery list planning and planning with recipes are therefore functions that could potentially have the ability to nudge consumers in their shopping behaviors. Along with providing information about storing, preparing, and saving food, supermarkets can utilize their platforms to increase the awareness of food waste and therefore make a significant impact in food-wasting behavior. Furthermore, supermarkets can also encourage customers to plan their grocery shopping beforehand and raise awareness that this behavior has the possibility to decrease household food waste.

Another relevant result from the questionnaire shows that the majority of the respondents are price-conscious, as 92.6% either agreed or strongly agreed that price played a role in grocery shopping. As all respondents were students in this survey, a conclusion can be drawn that students are generally price-conscious when it comes to shopping for food. At the same time, the results show that there is no clear majority who feel that offers make them buy more food, or that they accidentally purchase food items that already exist in their homes. Grocery stores that lie close to student facilities in Lund can therefore make use of this information when adapting their marketing strategies. For example, previous studies, as mentioned in section “1.1.3 Supermarkets”, have shown that price displays can nudge consumers’ shopping behavior into buying certain items. An example of this is REMA 1000, the Danish grocery chain, who removed quantity discounts to prevent consumers from purchasing more food than necessary. Supermarkets can therefore implement more single item discounts for students as price intensifies their consumer behavior. Since 42.1% of the respondents agreed or strongly agreed that special offers make them buy more food than necessary, grocery stores limiting discounts to single items can help nudge students into buying less, and therefore throwing away less.

Consumers' attitude is another vital aspect that affects household food waste levels. As discussed in the analysis, attitudes towards certain behaviors are based on the belief that they lead to certain positive or negative outcomes or attributes. People may, for example, avoid consuming foods past expiry dates because they believe it will result in unsafe outcomes, affecting their post-consumption behavior. As mentioned in section "1.1.3 Supermarkets", supermarkets can therefore raise awareness by having text under price tags or providing information in visible areas that best-before dates are often suggestions and does not always indicate inedible food. This could make a difference in consumers' post-consumption behavior by understanding that the behavior of consuming products past its written best-before date does not directly imply unsafe outcomes. In this sense, it can break their belief of linking this behavior with a negative attribute.

Supermarkets have a great responsibility and impact on consumer behavior. The research conducted in this study can therefore be useful for grocery stores to enhance their current tools as well as implement new strategies to decrease consumers' household food waste. By raising awareness on what can decrease food waste levels such as planning one's shopping, providing information about storing, preparing, best-before dates, and saving food, as well as removing quantity discounts, there is a possibility that supermarkets can nudge consumers' behavior which, in turn, affects their food-wasting behavior.

5.3 Potential Drawbacks

5.3.1 Adjusted R-Squared

The adjusted R-squared values given by the MLR models did generally not render positive results. For four out of the six dependent variables, the adjusted R-squared was lower than 5%, meaning the three independent variables and three control variables all put together do not explain the behavior of the dependent variables well. Ideally, researchers want the adjusted R-squared value to be as high as possible, though post-consumption and estimation performed better in this regard, with values of 18% and 24.7% respectively. Low adjusted R-squared values can indicate multicollinearity, though the low VIFs of the MLR models showed that was not the case. Low adjusted R-squared values do not necessarily mean a MLR model becomes irrelevant, though the low values mean the results of the data sets should not be interpreted as absolute truths. Trying to understand human behavior through studies and statistics is difficult since so many things can influence human behavior. Hence, applying traditional statistical frameworks to the study of human behavior may lead to difficulties finding relevant data compared to studying a less subjective topic, such as physics. Low adjusted R-squared values can thus occur without the findings being discredited.

5.3.2 Cronbach's Alpha

As presented in section "4.2.3 Cronbach's Alpha", three out of six categories of questions had a Cronbach's alpha coefficient below 0.7 (Table 2, Appendix B). Hence, the internal reliability, specifically the consistency of the scales, needs to be questioned. What can be done

to improve the coefficient is to remove some items of questions. However, post-consumption behavior and overbuying only consist of two questions, making it impossible to remove an item, as there has to be at least two sets of responses to compare. Concerning subjective norms, removing one item and comparing two sets of responses at a time resulted in lower Cronbach's alpha coefficients than when taking all three into consideration. When interpreting the results, the Cronbach's alpha coefficients should be considered when interpreting the results from the questionnaire.

6 Conclusion

6.1 Research Aim and Objectives

The research aim of this thesis was to investigate how and if students' attitudes, subjective norms, and perceived behavioral control regarding food waste affect their food-wasting behavior. Additionally, the aim was to understand how supermarkets possibly could make use of the outcome of the study. To achieve the aims, a thorough theory and literature review was conducted, and a questionnaire was created based upon the findings. Thereafter, the results from the questionnaire were presented, analyzed, and discussed in line with the aim and objectives of this paper, as described above. Thus, the research aim and objectives are deemed to have been reached.

6.2 Key Findings

The conclusion of the hypotheses is that H1 and H3 were partly accepted, while H2 was rejected. According to the results of this research, attitude appears to have an effect on both price-consciousness and post-consumption behavior. This can be due to the reasoning that consumers who are price-conscious associate wasting food with wasting money. Furthermore, since the target group was full-time students, their main occupation is studying, suggesting a lower economic budget. As studying individuals, they may also be exposed to more information about the harmful effects that food waste causes, which, in turn, affects their attitude. This attitude could consequently have played a role in their post-consumption behavior regarding minimizing food waste.

In addition, the research indicated that high perceived behavioral control relating to minimizing food waste is connected to behavior minimizing food waste, specifically in terms of planning, overbuying, and estimation. This implies that if an individual believes they have the capability to minimize food waste, they will pursue behaviors that do minimize food waste. However, subjective norms did not appear to have a significant effect on any of the food-wasting behaviors presented. The reason for the rejection of parts of H1 and H3, as well as entire H2, could either be because there are no significant relationships, or due to the flaws of the study. Limitations that have possibly affected the outcome of the research are discussed below, in section "6.3 Research Limitations".

6.3 Research Limitations

One major limitation to the study is the difficulty of generalizing the results outside the geographical area in which the study was conducted. This is partly due to the choice of sampling method, convenience sampling, as well as the small sample fraction. Another limitation of this study is the risk of the researchers misinterpreting the theory and literature, causing faulty formulations of questions, which, in turn, would have had an effect on the

outcome of the questionnaire. The research limitations of this study paves the way for future research, for which suggestions are given in the upcoming section “6.4 Future Research”.

An example of a faulty formulation that implies a major limitation of the research is the confusion of the terms “best-before date” and “expiry date” from the authors’ side. During the creation of the questionnaire, there was a failure of defining the two concepts and using the correct term. The question “I throw away food when it is past its expiry date” in the questionnaire was intended to understand the respondents’ behavior regarding best-before dates, not expiry dates. This human error when creating the questionnaire may have resulted in answers that were not what the researchers’ were looking for. Furthermore, as there was no definition of what expiry date is in the questionnaire, there is a possibility that some of the respondents could have interpreted the term “expiry date” as “best-before date”, implying that data collected from this question is from two different interpretations of the question. Best-before date should therefore have been used in the question “I throw away food when it is past its expiry date”, as well as a definition of what the term “best-before date” implies, as there is a risk the two terms are confused with one another.

6.4 Future Research

This study has provided interesting information that could benefit from future research, as the research conducted in this study was quite limited, with a sample size of 95 respondents. It would therefore be optimal to increase the sample size in order to gain a larger representation of the population.

One interesting addition to this study would be to be able to compare all the independent and dependent variables to the respondents’ actual food waste numbers. It would therefore be relevant to follow up on the total weight of the respondents' food waste. This would make it possible to compare the TPB with food-wasting behavior based on the actual amount of food waste. However, this method would require more effort from the participants’ side as they would need to record how much household food waste they generate every day, which can lead to unreliable results. As there is a difference between food waste and food loss, it would require effort from participants’ side to separate the two when measuring food waste weight. There may therefore need to be a greater financial budget for this study in order to give incentive for respondents to participate or to maintain control over the process of measuring.

Another interesting research possibility would be to study how supermarkets can directly affect consumers’ behavior to decrease food waste. This can, for example, be altering quantity discounts, adding reminders to only buy as much as one can eat, information on differences between best-before dates and expiration dates, providing grocery planning tools. In addition, it could be beneficial to conduct studies for supermarkets to see if grocery apps can help reduce food waste. Being able to show concrete research that supermarkets can nudge consumers into wasting less food in the way information is presented in grocery stores could make a huge difference in their environmental impact.

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Appendix A

Questionnaire: Food-wasting Behavior

Hi! We are three students from Lund University, currently writing our bachelor thesis within International Business. We are investigating students' intentions and behavior when it comes to household food waste. The questionnaire is anonymous and the answers are solely used for the purpose of this thesis.

Thank you for participating!

SECTION 1

Are you currently a full-time student enrolled at Lund University?
○ Yes
○ No

Do you currently live in Lund, Sweden?
○ Yes
○ No

Do you buy and prepare the majority of your own meals?
○ Yes
○ No

SECTION 2

What is your nationality?
○ Swedish
○ Other_____

What is your age (in years)?
_____

What is your gender?
○ Female
○ Male
○ I prefer not to answer.
○ Other_____

SECTION 3

Please indicate your level of agreement by choosing the appropriate response.

I am affected by other people's opinions on food waste.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

I often think about food waste.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

People around me judge me if I waste food.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

I throw away food when it is past its expiry date.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

If I have leftovers after cooking, I throw them away.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

People around me care about food waste.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

I have problems reducing my food waste.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

I plan my grocery shopping by finding recipes beforehand.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

The minimization of food waste is important to me.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

I sometimes accidentally purchase food items I already have at home.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

I feel guilty when I throw away food.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

I am capable of keeping my food waste levels low.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

I have difficulties predicting the amount of food I consume.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

How often do you go grocery shopping?
○ ≤1 time a week
○ 2-3 times a week
○ 4-5 times a week
○ 6≥ times a week

I plan my grocery shopping by writing shopping lists beforehand.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

Special offers in supermarkets make me buy more food than necessary.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

Each week, the amount of edible food waste my household usually throws away is:
○ A lot more than average
○ More than average
○ Less than average
○ A lot less than average

Price is important to me when buying groceries.
○ Strongly agree
○ Agree
○ Disagree
○ Strongly disagree

Appendix B

Table 1

QUESTIONNAIRE SECTIONS	
Section 1: Sifting out the population	
Are you currently a full-time student enrolled at Lund University?	
Do you currently live in Lund, Sweden?	
Do you buy and prepare the majority of your own meals?	
Section 2: Demographics	
What is your nationality?	
What is your age (in years)?	
What is your gender?	
Section 3: TPB and Food-wasting Behavior	
Attitude	I often think about food waste. The minimization of food waste is important to me. I feel guilty when I throw away food.
Subjective Norms	People around me care about food waste. People around me judge me if I waste food. I am affected by other people's opinions on food waste.
Perceived Behavioral Control	I am capable of keeping my food waste levels low. I have problems reducing my food waste.* I have difficulties predicting the amount of food I consume.*
Planning	I plan my grocery shopping by finding recipes beforehand. I plan my grocery shopping by writing shopping lists beforehand.
Overbuying	Special offers in supermarkets make me buy more food than necessary.* I sometimes accidentally purchase food items I already have at home.*
Price-Consciousness	Price is important to me when buying groceries.
Post-Consumption Behavior	I throw away food when it is past its expiry date.* If I have leftovers after cooking, I throw them away.*
Frequency of Consumption	How often do you go grocery shopping?
Estimation	Each week, the amount of edible food waste my household usually throws away is:*

*Reversed question

Table 2

CRONBACH'S ALPHA	
Theory of Planned Behavior	
Attitude	0.737
Subjective Norms	0.652
Perceived Behavioral Control	0.711
Food-wasting Behavior	
Planning	0.702
Overbuying	0.255
Post-consumption Behavior	0.530

Table 3

INDEPENDENT VARIABLES					
Variable	Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Attitude	I often think about food waste.	23 (24.2%)	50 (52.6%)	19 (20%)	3 (3.2%)
	The minimization of food waste is important to me.	46 (48.4%)	40 (42.1%)	7 (7.4%)	2 (2.1%)
	I feel guilty when I throw away food.	48 (50.5%)	37 (38.9%)	9 (9.5%)	1 (1.1%)
Subjective Norms	People around me care about food waste.	8 (8.4%)	70 (73.7%)	16 (16.8%)	1 (1.1%)
	People around me judge me if I waste food.	4 (4.2%)	40 (42.1%)	42 (44.2%)	9 (9.5%)
	I am affected by other people's opinions on food waste.	6 (6.3%)	47 (49.5%)	31 (32.6%)	11 (11.6%)
Perceived Behavioral Control	I am capable of keeping my food waste levels low.	40 (42.1%)	45 (47.4%)	10 (10.5%)	0 (0%)
	I have problems reducing my food waste.	0 (0%)	15 (15.8%)	50 (52.6%)	30 (31.6%)
	I have difficulties predicting the amount of food I consume.	7 (7.4%)	23 (24.2%)	43 (45.3%)	22 (23.2%)

Table 4

DEPENDENT VARIABLES					
Variable	Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Planning	I plan my grocery shopping by finding recipes beforehand.	26 (27.4%)	32 (33.7%)	22 (23.2%)	15 (15.8%)
	I plan my grocery shopping by writing shopping lists beforehand.	39 (41.1%)	30 (31.6%)	17 (17.9%)	9 (9.5%)
Overbuying	Special offers in supermarkets make me buy more food than necessary.	7 (7.4%)	33 (34.7%)	48 (50.5%)	7 (7.4%)
	I sometimes accidentally purchase food items I already have at home.	8 (8.4%)	43 (45.3%)	33 (34.7%)	11 (11.6%)
Price-consciousness	Price is important to me when buying groceries.	37 (38.9%)	51 (53.7%)	7 (7.4%)	0 (0%)
Post-consumption Behavior	I throw away food when it is past its expiry date.	14 (14.7%)	31 (32.6%)	41 (43.2%)	9 (9.5%)
	If I have leftovers after cooking, I throw them away.	1 (1.1%)	3 (3.2%)	24 (25.3%)	67 (70.5%)
Variable	Question	≤1 time a week	2-3 times a week	4-5 times a week	6≥ times a week
Frequency of Consumption	How often do you go grocery shopping?	16 (16.8%)	64 (67.4%)	12 (12.6%)	3 (3.2%)
Variable	Statement	A lot more than average	More than average	Less than average	A lot less than average
Estimation	Each week, the amount of edible food waste my household usually throws away is:	0 (0%)	12 (12.6%)	57 (60%)	26 (27.4%)

Table 5

VARIANCE INFLATION FACTORS	
Nationality	1.096
Age	1.058
Gender	1.150
Attitude	1.500
Subjective Norms	1.327
Perceived Behavioral Control	1.096

Table 6

MULTIPLE LINEAR REGRESSION		
PLANNING		
Variable	Standardized Beta Coefficient	p-value
Nationality	0.073	0.494
Age	-0.137	0.191
Gender	0.145	0.183
Attitude	0.039	0.754
Subjective Norms	-0.021	0.857
Perceived Behavioral Control	0.218	0.042
OVERBUYING		
Variable	Standardized Beta Coefficient	p-value
Nationality	0.129	0.231
Age	0.066	0.531
Gender	-0.055	0.616
Attitude	0.074	0.560
Subjective Norms	-0.006	0.957
Perceived Behavioral Control	0.221	0.043

cont. Table 6

PRICE-CONSCIOUSNESS		
Variable	Standardized Beta Coefficient	p-value
Nationality	0.052	0.626
Age	0.103	0.330
Gender	-0.159	0.150
Attitude	0.282	0.026
Subjective Norms	-0.157	0.184
Perceived Behavioral Control	-0.003	0.980
POST-CONSUMPTION BEHAVIOR		
Variable	Standardized Beta Coefficient	p-value
Nationality	-0.258	0.010
Age	0.221	0.024
Gender	0.019	0.851
Attitude	0.356	0.003
Subjective Norms	-0.005	0.966
Perceived Behavioral Control	0.178	0.073
FREQUENCY OF CONSUMPTION		
Variable	Standardized Beta Coefficient	p-value
Nationality	0.034	0.755
Age	0.095	0.379
Gender	0.054	0.629
Attitude	0.087	0.498
Subjective Norms	0.077	0.520
Perceived Behavioral Control	0.116	0.291

cont. Table 6

ESTIMATION		
Variable	Standardized Beta Coefficient	p-value
Nationality	-0.110	0.245
Age	-0.054	0.558
Gender	-0.089	0.354
Attitude	-0.025	0.818
Subjective Norms	0.149	0.162
Perceived Behavioral Control	0.510	<0.001

Table 7

ADJUSTED R-SQUARED	
Planning	0.044
Overbuying	0.013
Price-consciousness	0.027
Frequency of Consumption	-0.017
Post-consumption	0.180
Estimation	0.247

Table 8

CORRELATION: CONTROL & INDEPENDENT VARIABLES						
	Nationality	Age	Gender	Attitude	Subjective Norms	Perceived Behavioral Control
Nationality	1	0.037	0.102	0.239	0.048	-0.096
Age	0.037	1	-0.004	-0.144	-0.202	-0.051
Gender	0.102	-0.004	1	0.340	0.236	0.029
Attitude	0.239	-0.144	0.340	1	0.427	0.171
Subjective Norms	0.048	-0.202	0.236	0.427	1	-0.092
Perceived Behavioral Control	-0.096	-0.051	0.029	0.171	-0.092	1