

Master Thesis

Are grocery store meal kits able to reduce consumer food waste?

A quantitative study on whether grocery store meal kits can reduce consumer food waste compared to traditional cooking, using a food waste diary.

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Abstract

Grocery store meal kits are popular among consumers as they respond to the three food market trends simultaneously; 1) convenience, 2) health, and 3) sustainability. Grocery store meal kits are packages which are available at grocery stores including predominantly fresh, pre-portioned ingredients and a recipe for one meal, enabling cooking at home. They differ from traditional cooking in the way how meals are bought (shopping) and prepared (cooking). As consumers are the biggest contributor to the total amount of food waste, the primary step to reduce food waste is at the consumer level. Therefore, the objective of this study is to investigate whether and how grocery store meal kits influence consumer food waste, compared to traditional cooking. In addition, this study also investigates how monetary promotions (price promotion vs. no promotion), cooking skills, and time scarcity may moderate the relationship between cooking with a grocery store meal kit (vs. traditional cooking) and consumer food waste. 33 Dutch households used a food waste diary to report their food waste. The collected data was analysed using a regression analysis. The outcomes of this study showed that cooking with a grocery store meal kit (vs. traditional cooking) does not have a significant impact on consumer food waste. Moreover, monetary promotions (price promotion vs. no promotion) and cooking skills did not significantly impact the strength of the relationship. However, time scarcity did significantly impact the strength which means that the effect of cooking with a grocery store meal kit (vs. traditional cooking) on consumer food waste becomes more negative if time scarcity increases. These results give some first academic insights into the relationship between grocery store meal kit cooking (vs. traditional cooking) and consumer food waste. Managers/ policy makers may use these insights in their communication on how consumers can help in reducing food waste.

Keywords: grocery store meal kit; traditional cooking; consumer food waste; monetary promotions; cooking skills; time scarcity.

Preface

I hereby present my Master Thesis: ‘Are grocery store meal kits able to reduce consumer food waste?’. I would like to start my Master Thesis to thank everyone who have helped and supported me. First, I would like to say thank you to my supervisor Dr. M. Hermans for her great guidance which made me feel both challenged and motivated during the whole process. Also, thanks to all the respondents who joined the study and reported their food waste and Elise van Drie for the great cooperation in this data gathering process. Finally, I also want to thank my family and friends who kept me motivated during the last six months and never stopped believing in me.

Table of contents

Abstract	2
Preface	3
1. Introduction	5
1.1 Meal kits.....	5
1.2 Food waste.....	6
1.3 Contributions	7
1.4 Research outline.....	9
2. Literature review	10
2.1 Convenience food	10
2.2 Meal kits.....	11
2.3 Food waste.....	12
3. Conceptual framework	14
4. Methodology	20
4.1 Research and sampling design.....	20
4.2 Operationalization.....	22
4.3 Data analysis strategy.....	24
4.4 Research ethics	24
5. Results	26
5.1 Sample.....	26
5.2 Reliability analysis and assumptions.....	27
5.3 Results	28
5.4 Robustness check.....	30
6. Discussion	31
6.1 Theoretical implications	31
6.2 Managerial implications	33
6.3 Limitations and future research suggestions.....	33
References	36
Appendix A: Food waste diary (Dutch)	43
Appendix B: Overview variables	46
Appendix C: Regression analysis	49

1. Introduction

Nowadays, retailers must constantly adapt their strategies due to the availability of new technologies and market developments (Kumar et al., 2017). Eurochoice identified three trends in 15 different European countries; 1) customers prefer convenience, 2) customers prefer healthy options, and 3) customers choose a better future (sustainability). The trends that are identified in the European food market are consistent with a changing global food market (Eurochoice, n.d.).

1.1 Meal kits

To respond to these food market developments, meal kits are introduced. Meal kits are a commercially available subscription service that delivers recipes and the required, predominantly fresh, pre-measured/pre-portioned ingredients directly to households, enabling cooking at home (Fraser et al., 2022). Meal kits are an alternative to a more traditional way of cooking in which consumers prepare meals from ingredients purchased at a grocery store (Heard et al., 2019). Meal kits have been gaining traction in the U.S. for the past few years, expanding in size three times faster than any other category. 14.3 million households purchased meal kits in the last six months of 2018, reflecting a market increase of 3.8 million households from the end of 2017 (NielsenIQ, 2019). In the Netherlands, the total market of the meal kit industry was estimated around 225 million euros in 2016 (DistriFood, 2016).

Due to this success, grocery stores started to offer meal kits as well, which can be bought in-store or via online grocery store shopping. These grocery store meal kits are another variant of meal kits, which are called ‘verspakketten’. The delivery service meal kits and grocery store meal kits are in most aspects the same, however, the subscription part does not apply for grocery store meal kits. Moreover, the delivery service only holds if you buy a grocery store meal kit via online grocery store shopping. Thus, grocery store meal kits are packages which are available at grocery stores including predominantly fresh, pre-measured/pre-portioned ingredients and a recipe for one meal, enabling cooking at home. In 2018, 187 new meal kit items were introduced within in-store retail outlets alone (NielsenIQ, 2019). Moreover, a third of Dutch households bought occasionally a grocery store meal kit (Motivation, 2018) which resulted in a sales increase of 40% in 2019 (Nagf, n.d.). Due to the popularity of grocery store meal kits, the number of customers of service delivery meal kits decreased by 17% (RTL Nieuws, 2018). Therefore, the focus of this study is on grocery store meal kits which currently can be bought in almost all supermarkets.

A reason for the increasing popularity may be that grocery store meal kits respond to the three trends in the food market simultaneously. Grocery store meal kits are, in contrast to

the traditional way of cooking, a form of convenience food as they include a recipe and pre-proportioned, packaged ingredients which saves time, physical energy, and mental effort (Osman et al., 2012). The main driver for buying grocery store meal kits is convenience (Motivication, 2018). Moreover, consumers perceive grocery store meal kits as tasteful and healthy (Motivication, 2018). Next to being convenient, tasteful, and healthy, meal kits also seem to be more sustainable as there is an indication from non-academic studies that meal kits may have an impact on reducing food waste (Fast Company, 2016; Forbes, 2019).

1.2 Food waste

The issue of food waste has received increased attention in the past few years (Tsalis et al., 2021). Roughly 1/3 of the food produced in the world for human consumption is lost or wasted every year. Food is lost or wasted throughout the entire chain, from agricultural production to final household consumption (European Parliament, 2017). Not only have governments and international nongovernmental organizations (NGOs) prioritized this issue, but local food market actors have seen value in addressing this problem, enacting potential solutions for reducing food waste at all stages of the food supply chain (Tsalis et al., 2021). Yearly, 2 billion kilo food is wasted in the Netherlands. The waste of food is estimated at 34,2 kilo per person per year in 2019. With a share of about 23 to 32%, consumers are the biggest waster in the entire chain (Samen tegen voedselverspilling, n.d.). This is in line with findings throughout Europe; households have a share of 53% (European Parliament, 2017) and in the U.S. household even have a share of 60% in the generation of food waste (Tsalis et al., 2021).

The United Nations have created the Sustainable Development Goal 12.3 to halve food waste by 2030 compared to 2015 (Tsalis et al., 2021). Since the consumer is the biggest waster in the entire chain (Samen tegen voedselverspilling, n.d.; Griffen et al., 2009; European Parliament, 2017; Tsalis et al., 2021), preventing food waste at the consumer level is essential to reach the above described Sustainable Development Goal 12.3. The focus of this study regarding food waste is therefore on excess ingredients that are not used for the prepared meal or subsequent meals, as well as uneaten portions of the meal that are discarded by consumers (Heard et al., 2019).

1.3 Contributions

Due to the popularity of convenient, healthy, and sustainable food among consumers (Eurochoice, n.d.), researchers have become more interested in meal kits in recent years (Heard et al., 2019). Prior academic research has shown that grocery store meal kits, in contrast to the traditional way of cooking, are a form of convenience food as they make the process of consuming a meal easier (Osman et al., 2012; Jackson & Viehoff, 2016; Hertz & Halkier, 2017). Several studies examined the relationship between convenience food and food waste. Buckley et al. (2007) found that convenience foods are used to decrease ingredient wastage. Moreover, a study related to food waste in Finnish households found that 6% of the total waste included convenience food and takeaway meals. This percentage is low compared to vegetables (19%) and milk products (17%) (Silvennoinen et al., 2014). Based on these studies, one can say that convenience food products and thereby grocery store meal kits may have an impact on reducing food waste. However, the often associated characteristics of convenience food unhealthy and unsustainable do not apply for grocery store meal kits as they are perceived as healthier and contain fresher ingredients and more vegetables than other convenience food products (Brunner et al., 2010; Jackson & Viehoff, 2016; Hertz & Halkier, 2017). Moreover, grocery store meal kits can not completely be seen as convenience food since consumers still have to prepare the meal by themselves which can result in more waste (Ganglbauer et al., 2013). These differences imply that the results of the studies on convenience food and food waste (Buckley et al., 2007; Silvennoinen et al., 2014) can not directly be applied to healthy convenience food products such as grocery store meal kits. In addition, study by Silvennoinen et al. (2014) stated that healthy food (vegetables) results in more food waste than convenience food. However, since grocery store meal kits are a combination of healthy convenience food, the effect of grocery store meal kits on consumer food waste is still unknown. Due to the increasing attention towards food waste prevention at the last stage of the supply chain and the popularity of grocery store meal kits as cooking method among consumers, it is important to fill this literature gap by investigating the relationship between cooking with a grocery store meal kit (vs. traditional cooking) and consumer food waste to determine if explicit grocery store meal kits can reduce consumer food waste.

Grocery store meal kits are different from traditional cooking in how ingredients are bought (shopping) and how a meal is prepared (cooking) (Heard et al., 2019). Promotions are used to influence the shopping behavior of consumers as it is a practice to maximize sales (Gedenk et al., 2006). In the literature promotions are defined as monetary (e.g., price promotions) and non-monetary (e.g., premiums) promotions (Leclerc, 1974). As monetary

promotions are most often used in food marketing (Tsalis, 2021) and directly influence the shopping behavior of consumers (Alvarez & Casielles, 2005), the focus of this study is on monetary promotions (price promotions). In addition, cooking skills and time scarcity have an influence on the cooking behavior of consumers. Consumers with low levels of cooking skills and consumers who experience time scarcity, lack skills and time which are needed to prepare a meal as intended and therefore determine what kind of meals can be prepared (Van Doorn, 2016; Aschemann-Witzel et al., 2020). Prior studies showed that these practices (monetary promotions, cooking skills, and time scarcity) are related to food waste generation itself (Stuart, 2009; Ganglbauer et al., 2013; Van Doorn, 2016; Aschemann-Witzel et al., 2020). However, since the differences between grocery store meal kits and traditional cooking are related to the shopping and cooking behavior of consumers, the effects of monetary promotions, cooking skills, and time scarcity on the relationship between cooking with a grocery store meal kit (vs. traditional cooking) and consumer food waste may differ. Since it is still unknown in the literature how monetary promotions, cooking skills, and time scarcity may influence the strength of this relationship, the objective of this study is to not only investigate whether grocery store meal kits have an impact on consumer food waste, but also how monetary promotions (price promotions), cooking skills, and time scarcity may moderate this relationship as these practices may change the effect of cooking with a grocery store meal kit (vs. traditional cooking) on consumer food waste. Currently, no scientific research has been conducted on the relationship between grocery store meal kits and consumer food waste, compared to traditional cooking, nor in incorporating monetary promotions, cooking skills, and time scarcity as moderating variables. Therefore, this study tries to gain new insights by conducting a quantitative study using a food waste diary approach. Investigating this relationship will contribute to the literature on convenience food and food waste, as the current available literature on convenience food and food waste can not directly be applied to healthy convenience food products such as grocery store meal kits. This study will thus add new insights to the convenience food and food waste literature stream.

Next to theoretical contributions, insights into the relationship between grocery store meal kits (vs. traditional cooking) and consumer food waste are also important for practical reasons as food waste prevention is one of the most promising means to accomplish the goal of environmental impact savings (Stancu et al., 2016). Moreover, as consumers are the biggest waster in the entire chain (Samen tegen voedselverspilling, n.d.; Griffen et al., 2009; European Parliament, 2017), the primary step to halve food waste by 2030 compared to 2015 is preventing food waste at the consumer level. Looking at the bigger picture, given the environmental impact

of food waste, there is potential to make a significant difference (Ganglbauer et al., 2013). Preventing food waste has pro-environmental opportunities (Gentil et al., 2011), which are beneficial for the whole society. The results of this study will provide marketers with insights in food waste generation by grocery store meal kits versus traditional cooking and how monetary promotions, cooking skills, and time scarcity may influence this relationship. These insights can be used for advising consumers under which conditions grocery store meal kits are useful in reducing food waste.

To conclude, the central question of this study is: What is the impact of cooking with a grocery store meal kit on consumer food waste, compared to cooking in the traditional way? The sub question of this study is: To what extent do monetary promotions, cooking skills, and time scarcity moderate this relationship?

1.4 Research outline

This paper continues with in the second chapter a literature review which analyses the relevant literature on convenience food, meal kits, and food waste. In chapter three a conceptual framework and hypotheses will be formulated, after which in chapter four the research methodology will be explained. In chapter five the main results will be presented and in chapter six implications and limitations of this study, along with suggestions for future research will be described.

2. Literature review

2.1 Convenience food

Convenience is one of the big trends in the food business (Brunner et al., 2010). Carrigan et al. (2006) confirm this by stating that convenience food has been incorporated into daily life. Convenience foods enable the consumer to save time and effort in food activities, related to shopping, meal preparation and cooking, consumption and post-meal activities (Buckley et al., 2007). Convenience food makes the process of consuming a meal easier (Jackson & Viehoff, 2016).

The appearance of the concept 'convenience foods' lies in the 1920s. The interest of academics shifted a lot from 1920 till 2015 (Scholliers, 2015). Jackson and Viehoff (2016) found that the concept has a contested nature which results in multiple definitions. Although definitions are multiple and contested, convenience foods encompass a wide variety of processed and semi-processed food, frequently contrasted with 'fresh' foods using raw ingredients, cooked from scratch (Jackson & Viehoff, 2016). In contrast, according to Brunner et al. (2010) convenience food is referred to eat-ready (frozen) meals and components, fast-food and sliced salads and thereby focussing on direct consumption.

Warde (1999) found that many people are eating convenience food as a response to problems of scheduling everyday life. Convenience food is required because people have a problem with timing and a shortage of time (Warde, 1999). Time scarcity can therefore be seen as a motive to buy convenience food. However, following other studies, convenience involves more than just time, especially in food preparation (Brunner et al., 2010; Osman et al., 2012). It also concentrates on minimizing physical and mental effort associated with food specific activities (Osman et al., 2012). This is line with the definition of Brunner et al. (2010) who define convenience food products as those that help consumers minimize time as well as physical and mental effort required for food preparation, consumption, and cleanup. Due to this, less cooking skills are needed for convenience food products compared to traditional cooking and this can therefore also be seen as a motive to buy convenience food. According to Brunner et al. (2010) it is important to consider convenience at all stages in the process of food consumption and to determine the proportionate importance that consumers attach to time and energy use in acquisition, consumption, and disposal. Therefore, convenience should according to Osman et al. (2012) also be defined in terms of time, physical energy, and mental effort savings related to food preparation and consumption.

Grocery store meal kits are a form of convenience food as they include a recipe and pre-proportioned, packaged ingredients which enable the consumer to save time and effort in food

activities (Buckley et al., 2007; Brunner et al., 2010; Osman et al., 2012; Jackson & Viehoff, 2016). Jackson and Viehoff (2016) found that convenience foods often are associated with unhealthy and unsustainable as they are related with diseases such as diabetes and cancer. Moreover, consumers have no influence on the quality or the production process of the food (Brunner et al., 2010). However, these findings are in contrast to grocery store meal kits as these packages include ingredients which are vegetable based or low in calories and the ingredients are pre-portioned which helps minimizing food waste (Quested et al., 2013). Grocery store meal kits are often geared at providing a balanced, healthy meal. Studies showed that meal kits are generally recognized as healthy by consumers based on the fresh ingredients (Hertz & Halkier, 2017; Cho et al., 2020). Therefore, Brunner et al. (2010) and Jackson and Viehoff (2016) stated that grocery store meal kits are a combination of convenient, healthy, and sustainable and stand out as a form of convenience foods. Due to this, the findings of Buckley et al. (2007) and Silvennoinen et al. (2014) who stated that convenience foods are used to decrease ingredient wastage are not directly applicable to healthy convenience food products such as grocery store meal kits.

2.2 Meal kits

Existing studies have focussed on the environmental impact of meal kits such as energy use, transportation costs, and packaging (Heard et al., 2019; Gee et al., 2019). Heard et al. (2019) studied delivery service meal kits compared to traditional grocery retailing along the full supply chain. They compared the life cycle environmental impact of products in a meal kit and products in a grocery store. The outcome of the study showed that delivery service meal kits have less impact on environmental issues compared to traditional grocery retailing (Heard et al., 2019). The study of Gee et al. (2019) focused on energy requirements by comparing meal kit delivery services versus conventional grocery shopping. They found that the energy use of delivery service meal kits, compared to conventional grocery shopping, is decreasing due to lower transportation. The findings of both studies are in general the same, except for the aspect of packaging. Gee et al. (2019) argued that packaging could play a deciding role in relative per meal energy use, in contrast to the findings of Heard et al. (2019).

In addition, recent study by Fraser et al. (2022) studied why families use meal kits and what they perceived to be the main impacts on family dynamics, nutrition, social and mental health. The results showed that women, as the primary carers responsible for family meals, primarily reported the role that meal kits played in reducing their mental load through reduced food related decision making, enhanced family participation in meal preparation and

opportunities for food literacy. Additionally, meal kits were reported to reduce food eaten away from home (Fraser et al., 2022).

The existing literature on meal kits is still limited and focusses mainly on delivery service meal kits and not (yet) on the newer variant; grocery store meal kits. Currently only one academic paper is available which takes both variants (delivery service meal kits and grocery store meal kits) into account. Recent study by Yoon et al. (2022) examined consumer preferences for meal kits focusing on packaging waste. The study showed that the provision of fully recyclable insulation packaging helps consumers feel more positive regarding online meal kit packaging. However, it does not lead to any changes in the preference of purchasing platforms, showing a robust preference for buying meal kits at grocery stores (Yoon et al., 2022).

2.3 Food waste

The concept of food waste can be defined as: “Excess ingredients that are not used for the prepared meal or subsequent meals, as well as uneaten portions of the meal that are discarded” (Heard et al., 2019, p. 191). Stuart (2009) found that food waste has a negative impact on the environment. It affects natural resources, availability of food in developing countries, and it generates greenhouse gas emissions (Stuart, 2009). Studies on household food waste across several European countries found socio-demographics leading to different amounts of food waste, e.g., gender, age, education level and household size (Koivupuro et al., 2012; Secondi et al., 2015).

According to Griffin et al. (2009) consumers are the biggest contributor to the total amount of food waste generated. Therefore, many studies have focused on household food waste in relation to consumer behavior. A 2011 study by The Swedish Institute for Food and Biotechnology (SIK) identified that the causes of food losses and waste in medium-/high-income countries mainly relate to consumer behavior (Gustavsson et al., 2011). This is in line with several other studies who found that insufficient purchase planning in combination with the careless attitude of those consumers who can afford to waste food, are causing large amounts of waste (Parfitt et al., 2010; Stefan et al., 2013; Stancu et al., 2016; Janssens et al., 2019). Parker et al. (2019) stated that insufficient planning and shopping routines often result in buying more than what is actually needed for a meal, which is called ‘over-purchasing’. A shopping trip for a high amount of grocery store items leads to more impulse buying which causes over-purchasing and thereby food that is being wasted (Kollat & Willett, 1967; Parker et al., 2019). In addition, studies by Parfitt et al. (2010) and Ghinea and Ghiute (2019) both

showed that the date of expiration is a central explanation of why consumers act in wasting food. Moreover, Porpino et al. (2015) and Mallinson et al. (2016) found that price consciousness and impulse buying are good antecedents in predicting household food waste.

In addition, many studies have also focussed on ways how to avoid / prevent household food waste. As the studies above describe, a large number of behaviors can have a positive impact on food waste generation and, consequently, to the efforts towards food waste prevention (WRAP, 2009). According to Quested et al. (2013) behaviors that can prevent food waste include meal planning, cupboard checking and list making before going for food shopping, proper storage of food items, use of food leftovers, cooking with packages including the precise amounts of food, and careful use of expiration date. To investigate these avoiding/preventing food waste behaviors, many studies used the generic theory of planned behaviour (Stefan et al., 2013; Karim-Ghani et al., 2013; Graham-Rowe et al., 2015; Stancu et al., 2016; Visschers et al., 2016).

3. Conceptual framework

Currently, there is a gap in the literature since the studies conducted on convenience food and food waste can not directly be applied to healthy convenience food products such as grocery store meal kits due to several reasons explained in the introduction. This means that currently no academic literature exists on the relationship between grocery store meal kits and consumer food waste, compared to traditional cooking. Studies by Fast Company (2016) and Forbes (2019) stated that meal kits have the ability to reduce food waste, however, these studies are not academic as the numbers are not exact, surveys are imperfect and the U.S. Department of Agriculture statistics with which the collected data is compared are averages (Fast Company, 2016). However, the result is still interesting; cooking with a meal kit may waste 62% less food than grocery store ingredients (Fast Company, 2016). Although these studies are not based on grocery store meal kits but on delivery service meal kits and the outcomes can not be seen as valid academic contributions due to the nature of the studies, meal kits seem to have the potential to reduce food waste. Therefore, this study tries to fill the academic literature gap and add new insights to the convenience food and food waste literature stream by investigating the relationship between cooking with a grocery store meal kit and consumer food waste, compared to food waste that is generated by the traditional way of cooking to determine if explicit grocery store meal kits can reduce consumer food waste.

Cooking a meal consists of three main activities: planning the meal, shopping for the meal, and preparing the meal (Ganglbauer et al., 2013). The specific features of grocery store meal kits (pre-proportioned, packaged ingredients including a recipe) make the process of how ingredients are bought (shopping) and how a meal is prepared (preparing) different from the traditional way of cooking (Heard et al., 2019). Since the differences between the two methods of cooking are related to shopping and preparation activities and not to how a meal is planned, the planning activities of cooking a meal are excluded in this study. How consumers shop for their meal is influenced by monetary promotions (price promotions) as monetary promotions are used to obtain and retain consumers and to encourage consumers to buy certain products (Chen & Zhang, 2006). How consumers prepare their meal is influenced by their cooking skills as someone's cooking skills determine the ability to prepare different foods and thereby what kind of meals can be prepared (Hartmann et al., 2013; Van Doorn, 2016; Aschemann-Witzel et al., 2020). When consumer experience time scarcity they do not always have the time to cook 'proper' meals from scratch (Evans, 2011). Therefore, time scarcity also has an influence on what kind of meals can be prepared. Since the differences between grocery store meal kits and traditional cooking are related to the shopping and cooking behavior of consumers, the effects

of monetary promotions, cooking skills, and time scarcity on the relationship between cooking with a grocery store meal kit (vs. traditional cooking) and consumer food waste may vary. However, there is a gap in the literature on how monetary promotions, cooking skills, and time scarcity may influence the strength of this relationship. To add new insights to the convenience food and food waste literature stream, the moderating effects of monetary promotions, cooking skills, and time scarcity are taken into account. Figure 1 shows the conceptual model of this study.

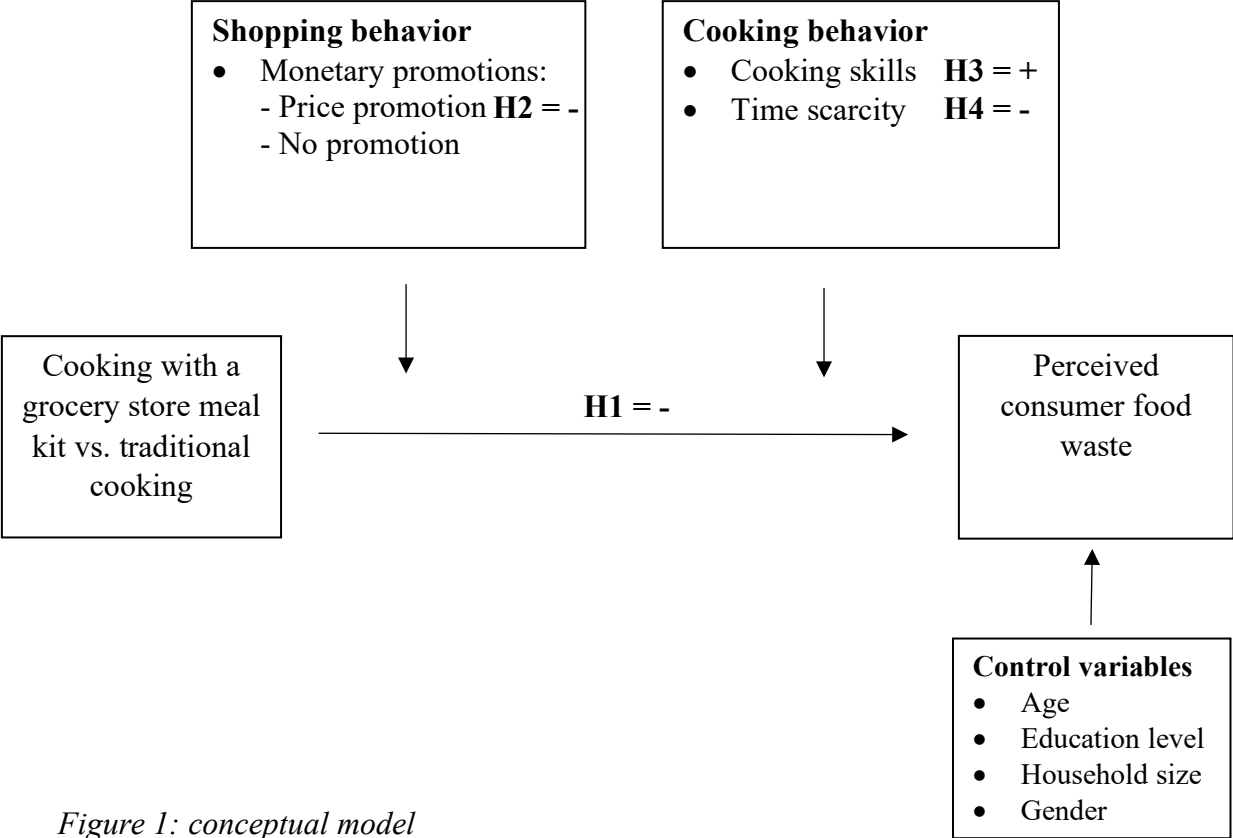


Figure 1: conceptual model

Consumer food waste generation when cooking with a grocery store meal kit versus cooking in the traditional way.

One can argue that if ingredients are bundled as in a meal kit, there can be something in the package which a consumer does not like which therefore will be discarded. This can result in more waste compared to cooking in the traditional way whereby consumers can collect the ingredients for a meal by themselves. However, due to the transparent packaging of grocery store meal kits, consumers can before they buy the product already see all ingredients. Packaging transparency can have a effect on product consumption as it offers the consumer a possibility to monitor it (Sabo et al., 2017). Therefore, if consumers see some ingredient(s) they

do not like, it is expected that they will not buy the grocery store meal kit. Moreover, due to the increasing popularity, grocery stores have extended their assortment of meal kits which provide consumers the possibility to choose a meal kit of which they like all ingredients. Therefore, waste due to not liking ingredients is largely prevented in advance.

However, when consumers cook in the traditional way, they have to collect the ingredients for a meal by themselves. Consumers find it difficult to correctly estimate portion sizes (Bingham, 1987). Due to this, consumers buy more than what they actually need for a meal which fuels waste (Stones, 2013; Parker et al., 2019). This surplus is prevented when consumers cook with a grocery store meal kit whereby each meal comes with only the precise amount needed for each ingredient. In theory this means a consumer will eat all of it. Thus, since grocery store meal kits are pre-proportioned which prevents the behavior of over-purchasing, it seems to be easier for a consumer to cook the perceived right amount of food and thereby generate less food waste compared to when a consumer is cooking in the traditional way. Therefore, the following hypothesis is proposed:

H1: cooking with a grocery store meal kit has a negative effect on consumer food waste, compared to cooking in the traditional way.

Monetary promotions

Monetary promotions can be defined as promotions that have a direct influence on the cost–benefit relationship of a product (Büttner, 2015). Price promotions are a type of promotion which belongs to monetary promotions and include buy-one-get-one-free and direct price discounts (e.g., 50% off) (Hawkes, 2009). When grocery shopping, consumers might search for good deals on food much more as part of their self-identity than for reasons of economic need (Urbany et al., 1996; Jensen & Bech-Larsen, 2017). In addition to the low overall price level and low valuation of food, pricing mechanisms such as buy-one-get-one-free offers, multi-item offers, and a price gradient more favorable to large unit sizes in food marketing, can trigger consumers to over-purchase and over-stock food items because it becomes economically cheaper to purchase larger units (Stuart, 2009; Ganglbauer et al., 2013). This is in line with findings of Bell et al. (2002) and Gilbert and Jackaria (2002) who stated that monetary promotions lead to trying out new products and stockpiling. Hence, supermarket monetary promotions tempt consumers to buy more food than they need, which helps to fuel both obesity and waste (Stones, 2013; Tsalis et al., 2021). Based on this, it is expected that if consumers cook in the traditional way and go shop their needed ingredients with

monetary promotions, consumers are encouraged to buy more ingredients (e.g., two cucumbers instead of one since the second one is free) which are not needed for the meal, it will result in more waste. The reason behind this is that when consumers cook in the traditional way they have to collect their needed ingredients by themselves. This shopping trip for a high amount of products leads to more impulse buying and thereby food that is being wasted (Parker et al., 2019). When grocery store meal kits have a monetary promotion, consumers are also encouraged to over-purchase (e.g., buy two meal kits in stead of one since the second one is free). However, it is not expected that monetary promotions on grocery store meal kits will lead to more waste compared to traditional cooking, as each grocery store meal kit due to its specific features (pre-proportioned and packaged ingredients) only includes the precise amount of needed ingredients for one meal. This means that if consumers are encouraged to buy one more grocery store meal kit as the monetary promotion buy-one-get-one-free holds, they buy two packages with the precise amount of needed ingredients for two meals. So, due to the specific features of grocery store meal kits whereby consumers do not have to collect the needed ingredients for a meal by themselves and each package only includes the precise amount of needed ingredients, it is expected that the impact of monetary promotions (price promotions) on grocery store meal kits will result in the contrary; less food waste, compared to traditional cooking. Therefore, the following hypothesis is proposed:

H2: the negative effect of cooking with a grocery store meal kit on consumer food waste is stronger for price promotions vs. no promotion, compared to cooking in the traditional way.

Cooking skills

Cooking skills can be defined as: “The ability to prepare different foods.” (Hartmann et al., 2013, p. 129). Consumers with low levels of cooking skills may be less well equipped to judge the right quantities needed for preparing their meals and therefore purchase and prepare more food than they need (Van Doorn, 2016). When consumers cook in the traditional way they do not get any help or guidance how to prepare the meal. In contrary, the specific feature of grocery store meal kits (including a recipe) helps the consumer in preparing the meal as intended and to generate as little leftovers and waste as possible. Moreover, convenience food is a type of food that assists consumers to overcome a lack of cooking skills and overall requires fewer cooking skills (Brunner et al., 2010). These findings suggests that, although some basic cooking skill are still needed, cooking skills are less essential in preparing a meal with a grocery store meal kit compared to traditional cooking. It is likely that consumers with low cooking skills are still

able to prepare a meal when cooking with a grocery store meal kit and minimize food waste. Thus, it is expected that grocery store meal kits are more useful to reduce waste for consumers with low cooking skills compared to high cooking skills. Therefore, the following hypothesis is proposed:

H3: the negative effect of cooking with a grocery store meal kit on consumer food waste is weakened by higher cooking skills, compared to cooking in the traditional way.

Time scarcity

Time scarcity is defined as: “The feeling that one lacks enough time to do all the things that one would like to do.” (Scott, 1993, p. 51). Time use and perceptions of the availability of time play an important role in solid waste management (Godbey et al., 1998). Scarcity causes myopic and impulsive behavior, prioritizing short-term gains over long-term gains. More detrimentally, scarcity directly impairs cognitive function, which can lead to suboptimal decisions (Zhao & Tomm, 2018). When consumers experience time scarcity, they lack time needed to prepare a meal as intend as they not follow instructions, do not precisely cut their ingredients and not store their leftovers for later use as they prioritise short-term gains (e.g., saving time) over long-term gains (e.g., reducing food waste). This time scarcity behavior results in more waste (Aschemann-Witzel et al., 2020). Therefore, it is expected that when consumers experience time scarcity and cook in the traditional way, it will result in more waste. However, due to the specific features of grocery store meal kits which make it a form of convenience food less time, physical energy, and mental effort is needed related to food activities compared to cooking in the traditional way (Buckley et al., 2007; Osman et al., 2012). So, although consumers are experiencing time scarcity, it is expected that they are still able to prepare a meal when cooking with a grocery store meal kit and minimize food waste in contrast to cooking in the traditional way. Therefore, the following hypothesis is proposed:

H4: the negative effect of cooking with a grocery store meal kit on consumer food waste is strengthened by higher time scarcity, compared to cooking in the traditional way.

Control variables

A study on household food waste across several European countries found socio-demographics leading to different amounts of food waste, e.g., gender, age and education level. The outcomes of that study showed that the older you are, the more likely you are to waste small amounts of

food. Regarding gender, the outcomes indicated that females waste less food than males and individuals who stopped education at an early age are more likely to waste less food (Secondi et al., 2015). Moreover, more food is being wasted in bigger households (Koivupuro et al., 2012). Since prior research has proven that these socio-demographics have an influence on food waste generation itself, these variables are taken into account as control variables in this study.

4. Methodology

4.1 Research and sampling design

The aim of this study is to investigate the relationship between cooking with a grocery store meal kit and consumer food waste generation, compared to food waste that is generated by the traditional way of cooking. A quantitative approach is chosen since the collected data is numerical in nature (Field, 2018). As this paper tries to measure the perceived food waste of consumers, a food waste diary is used. Food diaries (sometimes called “kitchen diaries”) refer to individuals or groups of individuals (e.g., families, cohabitants) asked to measure and self-report food waste occurring in their daily lives (Fusions, 2014). Prior study made a comparison between using a diary and a survey for measuring food waste. The study found that in a survey people report less food waste compared to a waste diary which makes the survey method less accurate (Giordano et al., 2019). Moreover, in the last decade (2010–2020), food diaries have been successfully applied in several studies all over the world (Silvennoinen et al., 2014; Jörissen et al., 2015), representing a useful tool in food waste research (Williams et al., 2012; Richter & Bokelmann, 2017). Since prior research has shown its preference and value, a food waste diary is chosen to measure the perceived food waste of consumers.

To select respondents three criteria are used. First, only respondents who cooked with a grocery store meal kit before, can participate in the study to prevent waste what can be the result of misunderstanding the concept of cooking with a grocery store meal kit. Second, a minimum age of 18 is applied since this can be seen as a reasonable age where people are able to cook a meal and thereby have cooked meals before. Third, to take part in the study, consumers have to cook at least one time with a grocery store meal kit or delivery service meal kit, one time in the traditional way and one time with an instant food product during the measurement week. The delivery service meal kit and instant food option are necessary for a fellow researcher. The data about these options are not used in this paper. Since not all cooking methods are included, respondents can choose for themselves seven days in a time frame of two weeks to cook with one of the four options. Although this means no random selection of cooking method which can bias the outcomes, this criteria is necessary to collect the needed data for this study.

The method that is used for searching for respondents is convenience sampling. This is a non-probability sampling method in which respondents are initially searched via the researcher’s network, which leads to limitations in generalizing the results of the study. However, due to time and resources restrictions a random sampling method is not possible. Since convenience sampling is appropriate to gather insights in limited time (Sekaran & Boogie, 2016), it is decided to work with a convenience sampling.

The sampling size is based on prior studies by Williams et al. (2012) and Richter and Bokelmann (2017) who both used a food diary to measure household food waste. Williams et al. (2012) had the intention to work with two groups of 30 respondents. Richter and Bokelmann (2017) incorporated 25 households. As in this paper it is only possible to investigate one group due to time and resources restrictions, it is chosen to work with a sample of minimum 30 respondents.

To increase the awareness of consumers regarding their food waste, it is necessary to give the respondents a pre-announcement to provide more reliable data (Van Herpen et al., 2019). The pre-announcement includes information regarding food waste to make sure that the respondents know what can be seen as waste and when to report waste. A disadvantage of a pre-announcement may be that respondents change their food waste behavior. However, in this study it is necessary to give a pre-announcement because results are unreliable if the respondents are not aware of their food waste (Van Herpen et al., 2019).

The duration time of the measurement is again based on prior research by Williams et al. (2012) and Richter and Bokelmann (2017). Williams et al. (2012) used a time frame of two months in which respondents had to measure their food waste for one week long. Richter and Bokelmann's (2017) respondents kept a diary within seven days in a period of three months. In both studies, respondents were able to choose the measurement week by themselves in the stated time frame. As this paper has to deal with time and resources restrictions, it is decided to work with a time frame of two weeks. Since not all cooking methods are included in the study, respondents can choose for themselves seven days within the time frame of two weeks to measure their food waste when they cook with either a grocery store meal kit, delivery service meal kit, in the traditional way or with an instant food product.

The food waste diary is operationalized together with a fellow researcher investigating a similar topic. Due to this, some questions (concerning delivery service meal kits and instant food) are incorporated which are not relevant for this study and therefore not used in the results.

The food waste diary consists out of four parts, which are based on Williams et al. (2012). First, respondents are introduced to the topic and provided with a pre-announcement in which respondents are explained how to fill in the food waste diary and how to measure and report their waste. Second, individual characteristics questions are asked such as socio-demographics and the moderating variable cooking skills. These questions are only filled in once since they are likely not to change during the measurement week. Third, questions about the cooking method and the other moderating variables monetary promotions and time scarcity

are asked which are filled in every day. Fourth, questions about the actual food waste are asked and this is reported daily. The complete food waste diary can be found in appendix A.

Respondents are asked to daily report their perceived food waste in combination with their cooking method. Since it is difficult to measure the exact amount of food waste every day and thereby not to discourage consumers not to join the study, it is decided to measure consumers perceived food waste rather than weighting out the exact food waste daily. Regarding the focus of this study on consumer food waste (excess ingredients that are not used for the prepared meal or subsequent meals prepared during the measurement week, as well as uneaten portions of the meal that are discarded by consumers), unavoidable waste e.g., bones, and waste given to pets is excluded (Williams et al., 2012). Moreover, leftovers that are frozen are also excluded as they probably would not exceed the expiration date and therefore not be discarded in the duration of this study. In addition, leftovers from meals that were preprepared before but are discarded during the measurement week are also excluded, since this waste is not related to this study.

Since the study is conducted in the Netherlands, the food waste diary and the related questions are asked in Dutch. However, the questions in the diary are based on English literature and therefore needed to be translated to Dutch. To maintain validity, back-translation is used (Brislin, 1970).

4.2 Operationalization

The scales of the relevant variables are retrieved from prior research for validation and reliability reasons. In appendix B an overview of the variables, including the definition, items, scales, and Cronbach's Alpha can be found. The Cronbach's Alpha of all scales retrieved from prior research is >0.8 , which accounts for the reliability of the scale (Field, 2018).

Perceived consumer food waste (dependent variable)

The scale that is used to measure consumer food waste is the 5-point scale: 1) hardly any, 2) less than 10%, 3) between 10% and 25%, 4) between 25% and 50%, and 5) more than 50%, based on Stefan et al. (2013). The scale is later also used in a study by Stancu et al. (2016) in which the Cronbach's Alpha is 0.85, which is sufficient. Respondents are daily asked about their perceived food waste. The scale is ordinal in nature, however, in this study it is measured as a continuous variable so it can take part in the regression analysis as this method only allows metric variables (Field, 2018).

Cooking with a grocery store meal kit vs. traditional cooking (independent variable)

Respondents are daily asked to report their method of cooking; either cooking with a grocery store meal kit, traditional cooking, delivery service meal kit or instant food (the two latter are necessary for the fellow researcher). Since not all cooking methods are included in the study, respondents can choose for themselves seven days within the time frame of two weeks to cook with one of the four options. This variable is transformed into dummy variables in which 0 = traditional cooking and 1 = grocery store meal kit cooking.

Monetary promotions (moderating variable)

Respondents are daily asked to report their method of cooking including if any of the product(s) used for the meal were in promotion (price promotion vs. no promotion). This variable is transformed into dummy variables in which 0 = no promotion and 1 = price promotion. When only one product of a traditional meal had a monetary promotion (price promotion), the dummy variable is indicated as 1 since the effect of the monetary promotion can directly result in more waste as consumers are encouraged to buy more, even if the monetary promotion holds for only one product. Respondents are beforehand asked to keep their grocery shopping receipt so they can always look up which product(s) were in promotion.

Cooking skills (moderating variable)

To measure cooking skills, the six items from Hartmann et al. (2013) are used. These items focus on how respondents perceive their skills in cooking. Respondents can once indicate their agreement on the six items by using a 7-point Likert-scale, which runs from ‘strongly disagree’ to ‘strongly agree.’ The Cronbach’s Alpha in Hartmann et al. (2013) study is 0.91, which is sufficient.

Time scarcity (moderating variable)

Measuring time scarcity is based on Brunner et al. (2010) who used five items. The scale of Brunner et al. (2010) is used to measure the concept of time scarcity instead of the feeling which can differ daily. In this study, time scarcity is measured as a feeling and therefore the word ‘today’ is added to make all items relevant for each day. Respondents are daily asked to indicate their agreement on the five items by using a 7-point Likert-scale, which runs from ‘strongly disagree’ to ‘strongly agree.’ The Cronbach’s Alpha in Brunner et al. (2010) study is 0.84, which is sufficient.

Pre-test

For validity reasons, a pre-test is conducted among four consumers who did not participate in the actual study to see if all the items in the food waste diary are clear. These four consumers are asked to give their opinion and feedback on everything they come across. Some adjustments are made based on their feedback. Clarification is given about what the measurement days entail. Moreover, some adjustment to the outlook of the diary are made to make it more readable and grammar mistakes are adjusted.

4.3 Data analysis strategy

After the data is collected, it is analysed using SPSS. A regression analysis is used to analyse the relationship between cooking with a grocery store meal kit and consumer food waste, compared to traditional cooking. This technique is chosen due to its purpose to know whether consumer food waste can be predicted by cooking with a grocery store meal kit, compared to traditional cooking. If we know what predicts something we can forecast something. As a regression analysis only allows metrically scaled variables, nominal variables are transformed into dummy variables (Field, 2018). To conduct the regression analysis, the following equation is used in which i represents the participant, t the day, b_0 the intercept, and e the prediction error:

$$\text{Food waste}_{it} = \beta_0 + \beta_1 \text{GSMK-cooking}_{it} + \beta_2 \text{Price promotion}_{it} + \beta_3 \text{Cooking skills}_{it} + \beta_4 \text{Time scarcity}_{it} + \beta_5 \text{GSMK-cooking}_{it} * \text{Price promotion}_{it} + \beta_6 \text{GSMK-cooking}_{it} * \text{Cooking skills}_{it} + \beta_7 \text{GSMK-cooking}_{it} * \text{Time scarcity}_{it} + \epsilon_{it}$$

4.4 Research ethics

This study is conducted in an ethical manner as the five principles for research ethics from the American Psychological Association are followed (Smith, 2003). Although data is collected in cooperation with a fellow researcher, this study is written individually. Authorship belongs to Evelien Rosmalen. Moreover, the primary data will be stored, which provides the researcher with the ability to prove authenticity. However, the collected data is only used for this study and not shared with third parties. The role of the author is both researcher and student, which is shared with the participants of this study and both can be viewed as ethical. In addition, respondents are participating voluntarily to this study as they can stop at any time they want. Anonymity is ensured since the collected data is not related to a specific person. Since the study is of quantitative nature, data will be used in large entities and no single cases will be discussed.

This accounts for the respondent's privacy. Before participation, the purpose and subject of the study are clearly stated to provide transparency. This pre-announcement can change the behavior of the respondents, however, on the other hand the anonymity aspect reduces potential social desirability (Van Herpen et al., 2019). Finally, the APA guidelines are used to respect the copyrights of other authors when referenced.

5. Results

5.1 Sample

In total, 42 respondents participated in the study. Six respondents only prepared dinner with a delivery service meal kit, instant food and traditional, two respondents only cooked with instant food and traditional, and one respondent only cooked in the traditional way during the measurement week. These nine respondents are excluded since cooking once with a grocery store meal kit and once in the traditional way is a requirement for this study. Moreover, the respondents who prepared dinner once with a grocery store meal kit and once in the traditional way also reported 52 days with instant food and five days with delivery service meal kits since these cooking options were taken into account for the fellow researcher. However, reported days concerning delivery service meal kits and instant food are not relevant for this study and these 57 days are therefore also excluded. The final sample consists of 33 respondents, who in total did report 174 days of food waste. The minimum ratio of observations to variables for a regression analysis is five observations to one variable (Hair et al., 2019). This study consists of four variables (excluding interaction terms and control variables), so the 174 valid values are above the minimum. In total, 47 meals (27%) are prepared with a grocery store meal kit and 127 meals (73%) in the traditional way. The sample consists out of 30 females (91%) and three males (9%), who are on average 32 years old (minimum 20, maximum 86), live mostly in a two persons household (42,4%) and are mainly high educated (Masters' degree 33,3%). These percentages can be attributed to the fact that the food waste diary is distributed within the own network of the researcher. Table 1 shows the descriptive statistics from all continuous variables used in the statistical model.

	Minimum	Maximum	Mean	Std. Deviation
Perceived consumer food waste	1	4	1,8333	,83343
GSMK-cooking	0	1	,2701	,44530
Price promotion	0	1	,4023	,49178
Cooking skills	4,17	7	5,7730	,63688
Time scarcity	1,20	6,60	3,7345	1,33865
Age	20	86	31,9425	14,94603
Education level (Elementary and Secondary school)	0	1	,0606	,23912
Education level (MBO)	0	1	,2241	,41822
Education level (HBO)	0	1	,1839	,38853

Education level (Bachelor)	0	1	,1379	,34582
Education level (Master)	0	1	,3621	,48199
Education level (Doctorate)	0	1	,0345	,18299
Household size (1 person)	0	1	,1724	,37883
Household size (2 persons)	0	1	,4713	,50061
Household size (3 persons)	0	1	,1897	,39316
Household size (4+ persons)	0	1	,1818	,38653
Gender (Female)	0	1	,9310	,25413

Table 1: descriptive statistics

5.2 Reliability analysis and assumptions

First, a reliability analysis is conducted for the variables cooking skills and time scarcity as these variables are measured with multiple items. Item 3 from the time scarcity scale is reversed to make sure all items are consistent. As can be seen in table 2, the Cronbach's Alpha of both cooking skills and time scarcity is $> .7$, which is sufficient (Field, 2018).

	Cronbach's Alpha
Cooking skills	,707
Time scarcity	,861

Table 2: Cronbach's Alpha

After the reliability analysis, some variables needed to be transformed. The moderating variables cooking skills and time scarcity are measured via Likert-scale items and are therefore transformed into one variable presenting the respondents' mean-score. To decrease the risk of multicollinearity, these moderating variables (cooking skills and time scarcity) are later also mean-centered (Hair et al., 2019). In addition, the independent variable cooking with a grocery store meal kit (reference group: traditional cooking), the moderating variable monetary promotions (reference group: no promotion), and the control variables education level (reference group: elementary and secondary school), household size (reference group: 4+ persons), and gender (reference group: male) are transformed into dummy variables so they can take part in the regression analysis as this method only allows metric variables (Field, 2018).

Before the results can be interpreted, five assumptions for regression analysis have to be met first: linearity of the phenomenon measured, constant variance of the residuals

(homoscedasticity), independence of the residuals, normality of the residuals and multicollinearity (Field, 2018). First, to check linearity and the constant variance of the residuals (homoscedasticity), a scatterplot is used (see appendix C, figure 2). The points in the cloud fall along a straight line and the scatterplot shows no clear pattern. Therefore, the first two assumptions are met. Second, the Durbin-Watson test is used to check the third assumption: independence of the residuals. The Durbin-Watson test (see appendix C, table 4) shows a value of 1,852 which is >1 and <3 and represents independence (Field, 2018). However, this assumption is only technically met in order to run the regression model since the respondents reported multiple days of food waste, which implies that the error terms are not fully independent. Third, to check normality of the residuals, the histogram (see appendix C, figure 3), the Kolmogorov-Smirnov test (see appendix C, table 4), and the normal probability plot (see appendix C, figure 4) are used. Based on the histogram and the Kolmogorov-Smirnov test ($D(.231) = .300, p < .05$), there is an indication of non-normality. This could be due to the scale of the dependent variable food waste which is in nature ordinal but in this study it is treated as a continuous variable to take part in the regression. However, the dots in the normal probability plot generally follow the line and no outliers could be identified. Therefore, the fourth assumption is met. Fourth, to check multicollinearity, the tolerance and VIF-scores are used (see appendix C, table 5). The tolerance scores are $>.2$ and the VIF-scores are <10 , which shows no concerns about multicollinearity. In addition, according to the correlation matrix (see appendix C, table 6), no independent variables have correlations $>.7$. So, the fifth and last assumption is met.

Since all assumptions are (technically) met, the regression analysis is run. The F-test (see appendix C, table 7) is significant ($F(17,173) = 2,185, p < .05$). Based on this outcome, it can be concluded that the model is useful and has predictive capability (Field, 2018). Moreover, the adjusted R^2 (see appendix C, table 4) shows a value of .104, which means that 10,4% of the variance in food waste is explained by the independent variables in this model. This percentage implies that there may be other factors, which are not included in this model, that have an influence on the amount of food that is being wasted.

5.3 Results

In contrast to H1, cooking with a grocery store meal kit does not have a significant negative effect on consumer food waste (if there is no promotion and for the average consumer) ($\beta = -.052, p > .05$). This means that respondents cooking with a grocery store meal kit do not

generate less food waste compared to respondents cooking traditional. In contrast to H2, monetary promotions (price promotion) do not moderate the relationship between cooking with a grocery store meal kit (vs. traditional cooking) and consumer food waste ($\beta = -.217, p > .05$). In other words, the negative effect of cooking with a grocery store meal kit on consumer food waste is not stronger for price promotion vs. no promotion, compared to cooking in the traditional way. In contrast to H3, cooking skills do not moderate the relationship between cooking with a grocery store meal kit (vs. traditional cooking) and consumer food waste ($\beta = .285, p > .05$). This means that the negative effect of cooking with a grocery store meal kit on consumer food waste is not weakened by higher cooking skills, compared to cooking in the traditional way. As expected in H4, the impact of cooking with a grocery store meal kit (vs. traditional cooking) on consumer food waste is stronger for higher time scarcity, compared to cooking in the traditional way ($\beta = -.261, p < .05$). In other words, if consumers experience time scarcity, the negative effect of grocery store meal kit cooking on consumer food waste is strengthened, compared to traditional cooking.

In addition, no significant direct effects are found of monetary promotions (price promotion) ($\beta = .144, p > .05$), cooking skills ($\beta = -.245, p > .05$), and time scarcity ($\beta = .056, p > .05$). However, there are two significant direct effects of Bachelor's degree ($\beta = 1,045, p < .05$) and single households ($\beta = -.632, p < .05$). This means that respondents having a Bachelor's degree reported more food waste and respondents living in a single household reported less food waste.

	Hypothesized effect	Coefficient	Std. Error	Hypothesis supported
Constant		1,771	0,523	
GSMK-cooking	Negative	-,052	,139	No
Price promotion		,144	,129	
Cooking skills		-,245	,133	
Time scarcity		,056	,047	
Interaction effects				
GSMK-cooking * Price promotion	Negative	-,217	,300	No
GSMK-cooking * Cooking skills	Positive	,285	,226	No
GSMK-cooking * Time scarcity	Negative	-,261*	,114	Yes
Control variables				
Age		-,002	,005	

Education level (MBO)		,262	,349	
Education level (HBO)		,538	,348	
Education level (Bachelor)		1,045*	,407	
Education level (Master)		,068	,353	
Education level (Doctorate)		,804	,603	
Household size (1 person)		-,632*	,235	
Household size (2 persons)		-,183	,184	
Household size (3 persons)		-,223	,241	
Gender (Female)		-,078	,284	

Table 3: Coefficients, * = significant at .05

5.4 Robustness check

A requirement for this study was that respondents had to cook at least one time with a grocery store meal kit and one time in the traditional way. Due to this requirement, nine respondents were excluded as they did not cook with a grocery store meal kit during the measurement week. However, these nine respondents did cook in the traditional way. To see if this requirement has an impact on the outcomes, a robustness check is done in which the nine respondents who did not prepare a meal with a grocery store meal kit but did in the traditional way are instead included. The results of the robustness check showed no big changes in the outcomes (see appendix C, table 8). The only difference is that living in a two persons household now also has direct effect on food waste ($\beta = -,353, p < .05$). Therefore, it can be concluded that the outcomes of this study are robust.

6. Discussion

6.1 Theoretical implications

The main objective of this study was to compare the generation of consumer food waste by grocery store meal kit cooking and traditional cooking. In contrast to expectations, no evidence is found that if consumers cook with a grocery store meal kit compared to traditional cooking, their perceived food waste is less. This is in contrast to findings of Quedsted et al. (2013) who stated that packages including the precise amounts of food contribute to minimizing food waste. Moreover, this outcome is also in contrast to Buckley et al. (2007) and Silvennoinen et al. (2014) who stated that convenience foods (e.g., grocery store meal kits) are used to decrease ingredient wastage. A possible explanation for this could be that not the actual food waste is measured, but the perceived food waste. Due to this, it may be that the actual discarded amount is different from what the respondents perceived. Moreover, the outcomes of studies on convenience foods and food waste (e.g., Buckley et al., 2007; Silvennoinen et al., 2014) are not directly applicable for grocery store meal kits as grocery store meal kits are a combination of healthy and convenient and consumers still have to prepare the meal by themselves. Due to this, it is questionable if grocery store meal kits are real convenience food products. The outcome of this study confirms this.

Next, this study also included the moderating variables monetary promotions (price promotion vs. no promotion), cooking skills, and time scarcity to investigate the impact of these variables on the relationship between cooking with a grocery store meal kit (vs. traditional cooking) and consumer food waste. In contrast to expectations, no evidence is found that monetary promotions have an impact on the relationship between cooking with a grocery store meal kit (vs. traditional cooking) and consumer food waste. A possible explanation for this could be that consumers who specifically seek out price promotions might not necessarily always waste food because they face economic constraints and because they are conservative and cautious with what they have bought (Tsalis et al., 2021). This is in with studies by Porpino et al. (2015) and Mallinson et al. (2016) who found that price consciousness is a good antecedent in predicting household food waste. In that sense, the use of price promotions might not necessarily trigger wastage, as wastage might depend on the type of consumer (Tsalis et al., 2021). Moreover, no evidence is found that the negative effect of cooking with a grocery store meal kit on consumer food waste is weakened by higher cooking skills, compared to cooking in the traditional way. A possible explanation for this could be that people are not always aware of lacking skills and thereby overestimate in evaluating them (Kruger & Dunning, 1999). The descriptive statistics of the variable cooking skills showed in table 1 confirm this. The

respondents considered themselves as rather good chefs since the minimum (4,17) is even above the neutral value. Moreover, the std. deviation (.63688) is low, which can also be a explanation for no significant result (Field, 2018). As expected, the negative effect of cooking with a grocery store meal kit on consumer food waste is strengthened by higher time scarcity, compared to cooking in the traditional way. This outcome is a meaningful contribution to the literature on consumer/ household food waste prevention as consumers are the biggest waster in the entire chain (Griffen et al., 2009; Tsalis et al., 2021). Moreover, this outcome is in line with findings of Buckley et al. (2007) and Osman et al. (2012) who stated that with convenience foods (e.g., grocery store meal kits) less time, physical energy, and mental effort is needed related to food activities. This means that although consumers are experiencing time scarcity, they are due to the specific features of grocery store meal kits still able to minimize food waste compared to traditional cooking.

Interestingly, evidence is found of direct effects of having a Bachelor's degree and living in a single household on consumer food waste. These outcomes add to existing studies (e.g., Koivupuro et al., 2012; Secondi et al., 2015) showing the role of education level and household size in the generation of food waste. However, no evidence is found for direct effects of monetary promotions (price promotions vs. no promotion), cooking skills, and time scarcity on consumer food waste.

To conclude, the central question of this study was: What is the impact of cooking with a grocery store meal kit on consumer food waste, compared to cooking in the traditional way? No evidence is found that cooking with a grocery store meal kit (vs. traditional cooking) influences the generation of consumer food waste. Moreover, the sub question of this study was: To what extent do monetary promotions, cooking skills, and time scarcity moderate the relationship between cooking with a grocery store meal kit (vs. traditional cooking) and consumer food waste? No evidence is found that monetary promotions and cooking skills influence the strength of this relationship. However, the outcomes showed that time scarcity has an influence and thereby strengthened the negative effect of cooking with a grocery store meal kit (vs. traditional cooking) on consumer food waste.

6.2 Managerial implications

The outcomes of this study are useful for retailers in developing their strategies. More specifically, this study provides useful information for marketing managers regarding designing marketing campaigns aimed at reducing food waste at the consumer/ household level. As this study showed that the effect of cooking with a grocery store meal kit (vs. traditional cooking) on consumer food waste becomes more negative if time scarcity increases, marketing managers could incorporate this finding in their advertising strategies by developing marketing campaigns regarding reducing food waste if they want to increase and support sustainable consumer behavior (in this study referred to reducing food waste). Marketing managers could argue in their campaigns that even in the current busy lives of consumers which results in time scarcity, consumers can still reduce food waste if they cook with a grocery store meal kit. This message perfectly fits with what consumers currently prefer in the food market; convenience, health, and sustainability. However, as this study showed that cooking with a grocery store meal kit (vs. traditional cooking) does not have an impact on consumer food waste and cooking skills do not have a main or moderating effect, marketing managers should focus only on consumers who are experiencing time scarcity in their advertisement by using personal data to target consumers who are likely to experience time scarcity (e.g., working full time and having young children). Moreover, this study showed that monetary promotions also do not have a main or moderating effect. This insight is useful for retailers as this means that they do not have to ‘waste’ money by providing price promotions since the effect of cooking with a grocery store meal kit (vs. traditional cooking) on consumer food waste is not stronger for price promotions (vs. no promotions).

As the findings of this study are related to food waste reduction, the outcomes are also useful for policy makers as they are mainly concerned about the environmental and social consequences of food waste with a high interest in reducing food waste in households. Reducing food waste has a societal impact as it reduces environmental damage which is beneficial for the whole society. This concern is reflected in the Sustainable Development Goal 12.3 to halve food waste by 2030 compared to 2015 created by The United Nations. In order to reach this target, policy makers could also use the insights of this study by developing a social marketing campaign in the same way marketing managers could do.

6.3 Limitations and future research suggestions

This study has several limitations. First, one requirement for this study was that respondents had to cook at least one time with a grocery store meal kit and one time in the traditional way. This requirement can bias the validity of the results as it remains unclear if the measurement

week represents a normal week of food preparation. Therefore, future research should not ask respondents to cook at least once with a grocery store meal kit but instead study food waste over a longer period of time.

Second, due to the short measurement period, no insights into leftovers that are stored in the fridge or freezer are captured. This may bias the results as during the measurement week, many respondents indicated that they did not have any waste as they stored their leftovers in the fridge or freezer. Since the measurement period was only two weeks, it may be that these leftovers are discarded afterwards but this is not indicated as waste in measurement week. Therefore, future research should study food waste over a longer measurement period as this may represent a normal week of food preparation and captures more insights into the leftovers that are stored in the fridge or freezer.

Third, the food waste was self-reported, meaning that it could be a biased estimate of the actual waste. This limitation is also identified in the studies of Stefan et al. (2013) and Stancu et al. (2016). Future research may use a scale in which respondents can precisely weight their amount of food waste to make sure the actual waste is measured which will increase the validity of the outcomes.

Fourth, this study focused on grocery store meal kits so the outcomes are not applicable to delivery service meal kits. Future research may also include delivery service meal kits to investigate if there is a difference between these two types of meal kits and the generation of food waste.

Fifth, this study excluded the planning activities of a meal and focused only on the shopping and preparing activities as these activities are different for grocery store meal kit cooking and traditional cooking. However, the planning part of a meal could also differ between the two ways of cooking as for traditional shopping a grocery list may be needed, while for grocery store meal kit cooking this not necessarily is the case. Moreover, it could be that someone's cooking skills or time scarcity may lead to a different planning of the meal. Excluding the planning activities may bias the results as now not the complete cooking process activities are taken into account. Future research may therefore also include the planning part to investigate all activities related to cooking a meal to investigate the complete cooking process.

Sixth, one can argue that low cooking skills and time scarcity may lead to cooking with a grocery store meal kit as lacking skills and time are motives to buy convenience food. However, this study did not capture these relationships. This can bias the results as the relationship between these variables may be different than expected and studied in this study.

Future research may therefore study the relationship between these variables the other way around to investigate this impact.

Seventh, during the measurement week respondents were asked to indicate their cooking method; either cooking with a grocery store meal kit or delivery service meal kit, traditional, or with an instant food product (the delivery service meal kit and instant food product were taken into account for the fellow researcher). Respondents could only choose one option. This can be seen as a limitation because respondents could combine two methods of cooking (e.g., grocery store meal kit cooking in combination with a salad which is cooked in the traditional way). This may bias the results as this extra data is now not captured in this study. Future research may therefore make use of a combination option of the two methods (cooking with grocery store meal kit and traditional) to be able to also capture and include this data. In addition, future research could also measure food waste in more detail by capturing which parts of the meal are exactly wasted, why these parts are wasted and how food is exactly stored as many respondents indicated that they stored their leftovers.

Eighth, this study also has some methodology and statistical limitations. To select respondents convenience sampling is used which is a non-probability method and the limited adjusted R^2 (10,4%) indicates that other factors which are not included in this study are also relevant. Moreover, the assumption of independent error terms is only technically met in order to run the regression analysis. However, the respondents reported data for multiple days so the independency is questionable. In addition, the dependent variable food waste is essentially of ordinal level which seems to result in normality problems. Due to these methodology and statistical limitations, the generalizability of the outcomes of this study may be limited. Future research could improve the validity by selecting respondents via a probability sampling method (e.g., random sampling), control for the potential clustered error terms by conducting a Repeated Measures ANOVA instead, and develop a new continuous scale in order to improve the normality of the model or conduct an ordinal logistic regression analysis instead. Despite the above described limitations, currently no scientific research exists about especially grocery store meal kits and consumer food waste which makes this study a first attempt with insights into the relationship between grocery store meal kit cooking (vs. traditional cooking) and consumer food waste.

References

- Alvarez, B. A., & Casielles, R. V. (2005). Consumer evaluations of sales promotion: the effect on brand choice. *European Journal of Marketing*, 39(1-2), 54–70.
<https://doi.org/10.1108/03090560510572016>
- Aschemann-Witzel, J., Giménez, A., Grønhøj, A., & Ares, G. (2020). Avoiding household food waste, one step at a time: The role of self-efficacy, convenience orientation, and the good provider identity in distinct situational contexts. *Journal of Consumer Affairs*, 54(2), 581-606. <https://doi.org/10.1111/joca.12291>
- Bell, D. R., Iyer, G., & Padmanabhan, V. (2002). Price competition under stockpiling and flexible consumption. *Journal of Marketing Research*, 39(3), 292–303.
<https://doi.org/10.1509/jmkr.39.3.292.19103>
- Bingham, S. (1987). The dietary assessment of individuals; methods, accuracy, new techniques and recommendations. *Nutrition abstracts and reviews*, 57, 705-741.
- Brislin, R. W. (1970). Back-translation for Cross-Cultural Research. *Journal of Cross-Cultural Psychology*, 1(3), 185-216. <https://doi.org/10.1177/135910457000100301>
- Brunner, T. A., van der Horst, K., & Siegrist, M. (2010). Convenience food products. Drivers for consumption. *Appetite*, 55(3), 498-506. <https://doi.org/10.1016/j.appet.2010.08.017>
- Buckley, M., Cowan, C., & McCarthy, M. (2007). The convenience food market in Great Britain: Convenience food lifestyle (CFL) segments. *Appetite*, 49(3), 600-617.
<https://doi.org/10.1016/j.appet.2007.03.226>
- Büttner, O. B., Florack, A., & Göritz, A. S. (2015). How shopping orientation influences the effectiveness of monetary and nonmonetary promotions. *European Journal of Marketing*, 49, 170-189. [10.1108/EJM-01-2012-0044](https://doi.org/10.1108/EJM-01-2012-0044)
- Carrigan, M., Szmigin, I., & Leek, S. (2006). Managing routine food choices in UK families: The role of convenience consumption. *Appetite*, 47(3), 372-383.
<https://doi.org/10.1016/j.appet.2006.05.018>
- Chen, C. Y., & Zhang, S. (2006). Understanding the Impact of Certain and Uncertain Store Promotions on the Decision-Making Process in Product Choices. *Advances in Consumer Research*, 33, 526-526.
- Cho, M., Bonn, M. A., Moon, S., & Chang, H. (2020). Home check meal kits: product attributes, perceived value and repurchasing intentions the moderating effects of household configuration. *Journal of Hospitality and Tourism Management*, 45, 192-202. <https://doi.org/10.1016/j.jhtm.2020.08.011>
- Distrifood. (2016). Markt maaltijdboxen is €225 miljoen waard. Retrieved from

- <https://www.distrifood.nl/branche/nieuws/2016/03/markt-maaltijdboxen-is-e225-miljoen-waard-10196536>
- Eurochoice. (n.d.). 3 trends in European specialty foods in a changing global food market. Retrieved from <https://www.eurochoice.nl/article/3-trends-in-european-specialty-foods-in-a-changing-global-food-market/>
- European Parliament. (2017). Food waste: the problem in the EU in numbers [infographic]. Retrieved from <https://www.europarl.europa.eu/news/en/headlines/society/20170505STO73528/food-waste-the-problem-in-the-eu-in-numbers-infographic>
- Evans, D. (2011). Blaming the Consumer - Once Again: The Social and Material Contexts of Everyday Food Waste Practices in Some English Households. *Critical Public Health*, 21(4), 429–40. <https://doi.org/10.1080/09581596.2011.608797>
- Fast Company. (2016). Cooking with A Meal Kit May Waste 62 % Less Food than Grocery Store Ingredients. Retrieved from <https://www.fastcompany.com/3063772/cooking-with-a-meal-kit-may-waste-62-less-food-than-grocery-store-ingredients>
- Field, A. (2018). *Discovering Statistics using IBM SPSS Statistics* (5th ed.). Los Angeles: Sage.
- Forbes. (2019). Blue Apron Meal Kits Beat Grocery Shopping In Sustainability Study. Retrieved from <https://www.forbes.com/sites/barbstuckey/2019/05/13/blue-apron-meal-kits-beat-grocery-shopping-in-sustainability-study/>
- Fraser, K., Love, P., Campbell J. K., Ball, K., & Opie, S. R. (2022). Meal kits in the family setting: Impacts on family dynamics, nutrition, social and mental health. *Appetite*, 169, 105816. <https://doi.org/10.1016/j.appet.2021.105816>
- Fusions. (2014). Report on review of (food) waste reporting methodology and practice. Retrieved from <http://www.eu-fusions.org/index.php/publications/266-establishing-reliable-data-on-food-waste-andharmonising-quantification-methods.pdf> .
- Ganglbauer, E., Fitzpatrick, G., & Comber, R. (2013). Negotiating food waste: Using a practice lens to inform design. *ACM Transactions on Computer-Human Interaction (TOCHI)*, 20(2), 1-25. <https://doi.org/10.1145/2463579.2463582>
- Gedenk, K., Neslin, S. A., & Ailawadi, K. L. (2006). Sales Promotion. In M. Krafft, & M. Mantrala (Eds.). *Retailing in the 21st Century* (pp. 345-359). Berlin: Springer-Verlag.
- Gee, I., Davidson, F., Speetles, B., & Webber, M. (2019). Deliver Me from food waste:

- Model framework for comparing the energy use of meal-kit delivery and groceries. *Journal of Cleaner Production*, 236(1), 1-11.
<https://doi.org/10.1016/j.jclepro.2019.07.062>
- Gentil, E. C., Gallo, D., & Christensen, T. H. (2011). Environmental evaluation of municipal waste prevention. *Waste Management*, 31(12), 2371-2379.
<https://doi.org/10.1016/j.wasman.2011.07.030>
- Ghinea, C., & Ghiuta, O. A. (2019). Household food waste generation: young consumers behaviour, habits and attitudes. *International Journal of Environmental Science and Technology*, 16(5), 2185-2200. <https://doi.org/10.1007/s13762-018-1853-1>
- Gilbert, D. C., & Jackaria, N. (2002). The efficacy of sales promotions in uk supermarkets: a consumer view. *International Journal of Retail & Distribution Management*, 30(6), 315–322. <https://doi.org/10.1108/09590550210429522>
- Giordano, C., Alboni, F., & Falasconi, L. (2019). Quantities, determinants, and awareness of households' food waste in Italy: A comparison between diary and questionnaires quantities. *Sustainability*, 11(12), 3381. <https://doi.org/10.3390/su11123381>
- Godbey, G., Lifset, R., & Robinson, J. (1998). No time to waste: An exploration of time use, attitudes toward time, and the generation of municipal solid waste. *Social Research*, 101- 140.
- Gofton, L., & Marshall, D. W. (1988). A comprehensive scientific study of the behavioral variables affecting the acceptability of fish products as a basis for determining options in fish utilization. Research and Development at Torry Research Station, University of Newcastle Upon Tyne.
- Graham-Rowe, E., Jessop, D. C., & Sparks, P. (2015). Predicting household food waste reduction using an extended theory of planned behavior. *Resources, Conservation and Recycling*, 101, 194–202. <http://dx.doi.org/10.1016/j.resconrec.2015.05.020>
- Griffin, M., Sobal, J. & Lyson, T. (2009). An analysis of a community food waste stream. *Agriculture and Human Values*, 26(1), 67-81. <https://doi.org/10.1007/s10460-008-9178-1>
- Gustavsson, J., Cederberg, C., Sonesson, U., van Otterdijk, R., & Meybeck, A. (2011). *Global Food Losses and Food Waste – Extent, Causes and Prevention*. Rome: FAO.
- Hair (Jr.) J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate Data Analysis*. Cengage Learning, EMEA
- Hartmann, C., Dohle, S., & Siegrist, M. (2013). Importance of cooking skills for balanced food choices. *Appetite*, 65, 125-131. <https://doi.org/10.1016/j.appet.2013.01.016>

- Hawkes, C. (2009). Sales promotions and food consumption. *Nutrition Reviews*, 67(6), 333–42. <https://doi-org.ru.idm.oclc.org/10.1111/j.1753-4887.2009.00206.x>
- Heard, B. R., Bandekar, M., Vassar, B., & Miller, S. A. (2019). Comparison of life cycle environmental impacts from meal kits and grocery store meals. *Resources, Conservation and Recycling*, 147, 189-200. <https://doi.org/10.1016/j.resconrec.2019.04.008>
- Hertz, F. D., & Halkier, B. (2017). Meal box schemes a convenient way to avoid convenience food? Uses and understandings of meal box schemes among Danish consumers. *Appetite*, 114, 232-239. <https://doi.org/10.1016/j.appet.2017.03.016>
- Jackson, P., & Viehoff, V. (2016). Reframing convenience food. *Appetite*, 98, 1-11. <https://doi.org/10.1016/j.appet.2015.11.032>
- Janssens, K., Lambrechts, W., van Osch, A., & Semeijn, J. (2019). How consumer behavior in daily food provisioning affects food waste at household level in The Netherlands. *Foods*, 8(10), 428. <https://doi.org/10.3390/foods8100428>
- Jensen, B. B., Bech-Larsen, T. (2017). Consumers' multifaceted deal knowledge in a grocery retail setting. *Int. Rev. Retail Distrib. Consum. Res.*, 27, 61–77. <https://doi.org/10.1080/09593969.2016.1214167>
- Jörissen, J., Priefer, C., & Bräutigam, K. R. (2015). Food waste generation at household level: results of a survey among employees of two European research centers in Italy and Germany. *Sustainability*, 7(3), 2695–2715. <https://doi.org/10.3390/su7032695>
- Karim-Ghani, W.A.W.A., Rusli, I. F., Biak, D.R.A., & Idris, A. (2013). An application of the theory of planned behaviour to study the influencing factors of participation in source separation of food waste. *Waste Management*, 33, 1276–1281. <https://doi.org/10.1016/j.wasman.2012.09.019>
- Koivupuro, H. K., Hartikainen, H., Silvennoinen, K., Katajajuuri, J. M., Heikintalo, N., Reinikainen, A., & Jalkanen, L. (2012). Influence of socio-demographical, behavioural and attitudinal factors on the amount of avoidable food waste generated in Finnish households. *Consumer studies*, 36(2). <https://doi.org/10.1111/j.1470-6431.2011.01080.x>
- Kollat, D. T., & Willett, R. P. (1967). Customer impulse purchasing behavior. *Journal of marketing research*, 4(1), 21-31.
- Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of personality and social psychology*, 77(6), 1121-1134.

- Kumar, V., Anand, A., & Song, H. (2017). Future of retailer profitability: an organizing framework. *Journal of Retailing*, 93(1), 96-119.
<https://doi.org/10.1016/j.jretai.2016.11.003>
- Leclerc, F. (1974). Monetary promotions vs. Non-Monetary promotions, which is more effective? *Advances in Consumer research*, 24(1), 220-221.
- Mallinson, L., Russell, J. & Barker, M. (2016). Attitudes and behaviour towards convenience food and food waste in the United Kingdom. *Journal of Appetite*, 103, 17-28. <https://doi.org/10.1016/j.appet.2016.03.017>
- Motivaction. (2018). Verspakketten razend populair. Retrieved from <https://www.motivaction.nl/kennisplatform/nieuws-en-persberichten/verspakketten-razend-populair>
- Nagf. (n.d.). Verspakketten populairder dan ooit. Retrieved from <https://nagf.nl/nieuws/verspakketten-populairder-dan-ooit>
- Nielsen. (2018). *The meal kit opportunity*. The Nielsen Company.
- NielsenIQ. (2019). Will shoppers enthusiasm for meal kits remain strong in 2019? Retrieved from <https://nielseniq.com/global/en/insights/analysis/2019/will-shoppers-enthusiasm-for-meal-kits-remain-strong-in-2019/>
- Osman, I., Osman, S., Mokhtar, I., Setapa, F., Shukor, S., & Temyaity, Z. (2012). Family Food Consumption: Desire towards Convenient Food Products. *Procedia – Social and Behavioral Sciences*, 121, 223-231. <https://doi.org/10.1016/j.sbspro.2014.01.1123>
- Parfitt, J., Barthel, M., & MacNaughton, S. (2010). Food waste within food supply chains: quantification and potential for change to 2050. *Philosophical Transactions of the Royal Society B: Biological sciences*, 365, 3065-308.
<http://dx.doi.org/10.1098/rstb.2010.0126>
- Parker, J. R., Umashankar, N., & Schleicher, M. G. (2019). How and Why the Collaborative Consumption of Food Leads to Overpurchasing, Overconsumption, and Waste. *Journal of Public Policy & Marketing*, 38(2), 154-171.
<https://doi-org.ru.idm.oclc.org/10.1177/0743915618823783>
- Porpino, G., Parente, J. & Wansink, B. (2015). Food waste paradox: antecedents of food disposal in low income households. *International Journal of Consumer Studies*, 39, 619-629. <http://dx.doi.org/10.2139/ssm.2563622>
- Quested, T. E., Marsh, E., & Stunell, D. (2013). Spaghetti soup: The complex world of food waste behaviours. *Resources, Conservation and Recycling*, 79, 43–51.
<https://doi.org/10.1016/j.resconrec.2013.04.011>

- Richter, B., & Bokelmann, W. (2017). Explorative study about the analysis of storing, purchasing and wasting food by using household diaries. *Resources, Conservation and Recycling*, *125*, 181–187. <https://doi.org/10.1016/j.resconrec.2017.06.006>
- RTL Nieuws. (2018). Verspakket wint terrein van maaltijdbox: ‘Geen moeite, wel vers eten in huis.’ Retrieved from <https://www.rtlnieuws.nl/editienl/artikel/4507661/verspakket-wint-terrein-van-maaltijdbox-geen-moeite-wel-vers-eten-huis>
- Sabo, B., Bečica, T., Keleš, N., Kovačević, D., & Brozović, M. (2017). The impact of packaging transparency on product attractiveness. *Journal of Graphic Engineering and Design*, *8*. <https://doi.org/10.24867/JGED-2017-2-005>
- Samen tegen voedselverspilling. (n.d.). Voedselverspilling feiten en cijfers. Retrieved from <https://samentegenvoedselverspilling.nl/voedselverspilling-feiten-en-cijfers/>
- Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach* (7th edition). Chichester: John Wiley & Sons.
- Scholliers, P. (2015). Convenience foods. What, why and when. *Appetite*, *94*, 2-6. <https://doi.org/10.1016/j.appet.2015.02.017>
- Scott, D. (1993). Time Scarcity and Its Implications for Leisure Behavior and Leisure Delivery. *Journal of Park and Recreation Administration*, *11*(3), 51-60.
- Secondi, L., Principato, L., & Laureti, T. (2015). Household food waste behavior in EU-27 countries: A multilevel analysis. *Food Policy*, *56*, 25–40. <https://doi.org/10.1016/j.foodpol.2015.07.007>
- Silvennoinen, K., Katajajuuri, J. M., Hartikainen, H., Heikkilä, L., & Reinikainen, A. (2014). Food waste volume and composition in Finnish households. *British Food Journal*, *116*(6), 1058–1068. <https://doi.org/10.1108/BFJ-12-2012-0311>
- Smith, D. (2003). Five principles for research ethics. *American Psychological Association*, *34*(1), 56.
- Stancu, V., Haugaard, P., & Lähteenmäki, L. (2016). Determinants of consumer food waste behavior: Two routes to food waste. *Appetite*, *96*, 7–17. <https://doi.org/10.1016/j.appet.2015.08.025>
- Stefan, V., Van Herpen, E., Tudoran, A. A., & Lähteenmäki, L. (2013). Avoiding food waste by Romanian consumers: the importance of planning and shopping routines. *Food Quality and Preference*, *28*(1), 375-381. <https://doi.org/10.1016/j.foodqual.2012.11.001>
- Stones, M. (2013). Promotions fuel obesity and waste. *Food Manufacture*, *88*(12), 8.

- Stuart, T. (2009). *Waste: Uncovering the Global Food Scandal*. London: W.W. Norton & Company.
- Tsalis, G., Jensen, B. B., Wakeman, S. W., Aschemann-Witzel, J. (2021). Promoting Food for the Trash Bin? A Review of the Literature on Retail Price Promotions and Household-Level Food Waste. *Sustainability*, *13*, 4018. <https://doi.org/10.3390/su13074018>
- Urbany, J. E., Dickson, P. R. & Kalapurakal, R. (1996). Price search in the retail grocery market. *Journal of Marketing*, *60*, 91–104.
<https://doi.org/10.1177/002224299606000207>
- Vischers, V.H.M., Wickli, N., & Siegrist, M. (2016). Sorting out food waste behaviour: A survey on the motivations and barriers of self-reported amounts of food waste in households. *Journal of Environmental Psychology*, *45*, 66–78.
<https://doi.org/10.1016/j.jenvp.2015.11.007>
- Van Doorn, J. (2016). Commentary: Why Do We Waste So Much Food? A Research Agenda. *Journal of the Association for Consumer Research*, *1*(1), 53-56.
<https://doi.org/10.1086/684462>
- Van Herpen, E., Van Geffen, L., Nijenhuis- De Vries, Holthuysen, N., Van der Lans, I., & Quested, T. (2019). A validated survey to measure household food waste. *MethodsX*, *6*, 2767- 2775. <https://doi.org/10.1016/j.mex.2019.10.029>
- Warde, A. (1999). Convenience food: space and timing. *British Food Journal*, *101*(7), 518-527. <https://doi.org/10.1108/00070709910279018>
- Williams, H., Wikström, F., Otterbring, T., Löfgren, M., & Gustafsson, A. (2012). Reasons for household food waste with special attention to packaging. *Journal of cleaner production*, *24*, 141-148. <https://doi.org/10.1016/j.jclepro.2011.11.044>
- WRAP. (2009). Household food and drink waste in the UK. Banbury: WRAP.
<https://wrap.org.uk/sites/default/files/2020-12/Household-Food-and-Drink-Waste-in-the-UK-2009.pdf>
- Yoon, S., Gao, Z., & House, L. (2022). Do efforts to reduce packaging waste impact preferences for meal kits? *Food Quality and Preference*, *96*, 104410.
<https://doi.org/10.1016/j.foodqual.2021.104410>
- Zhao, J., & Tomm, B. M. (2018). Psychological Responses to Scarcity. *Psychology*.
<https://doi.org/10.1093/acrefore/9780190236557.013.41>

Appendix A: Food waste diary (Dutch)

Beste deelnemer,

Hartelijk dank voor uw deelname aan dit onderzoek. Wij zijn Evelien Rosmalen en Elise van Drie, masterstudenten Marketing aan de Radboud Universiteit Nijmegen. Dit onderzoek wordt uitgevoerd in het kader van onze master thesis. Uw deelname is volledig anoniem. Daarnaast gebruiken wij de gegevens uitsluitend voor dit onderzoek en is deelname geheel vrijwillig.

Dit onderzoek zal gaan kijken naar hoe u omgaat met uw avondeten, wat door u thuis is bereid en geconsumeerd. Het bereiden van een maaltijd kan voor dit onderzoek op de volgende vier manieren:

- **Traditioneel:** koken met losse ingrediënten.
- **Maaltijdpakket via een bezorgservice dienst (bijvoorbeeld Hellofresh):** een doos (voorgesneden) rauwe ingrediënten, gebundeld met een receptkaart voor een complete zelfbereide maaltijd aan huis geleverd, vaak geabonneerd.
- **Verspakket van de supermarkt:** een doos (voorgesneden) rauwe ingrediënten, gebundeld met een receptkaart voor een complete zelfbereide maaltijd online of fysiek bij een supermarkt gekocht.
- **Kant-en-klaar maaltijd (bijvoorbeeld opwarmmaaltijden of kant-en-klare salades):** gemakvoeding waarbij de kookactiviteit afwezig is.

U moet voor dit onderzoek gedurende zeven dagen, goed in de gaten houden of u avondeten (of gedeelten daarvan) weggooit. Elke avond willen we u vragen een vragenlijst in te vullen. Als u restjes overhoudt van het avondeten, die u bewaart, vult u de vragenlijst in na het later opeten of het weggooien van de restjes. U bent vrij om tussen 25 april tot 9 mei zelf zeven dagen uit te kiezen waarop u de vragenlijst invult. Deze dagen hoeven niet achtereenvolgend te zijn. Een dag buiten de deur eten telt bijvoorbeeld niet mee voor dit onderzoek. U kunt dan de dag erna kiezen voor het volgende meetmoment als u kookt met één van de vier bovenstaande manieren. U kunt dan via dezelfde link in de vragenlijst komen. De vragenlijst bestaat uit twee delen. Één gedeelte bestaat uit vragen die eenmaal beantwoord dienen te worden (± 5 min). Het andere deel zijn dagelijkse vragen over het (gedeeltelijke) weggegooide avondeten zelf (\pm zeven keer 3 min).

In dit onderzoek gaat het om al het avondeten wat u uiteindelijk weggooit.

Wat valt er wel onder het weggooien van voedsel? Alle voeding die tijdens de meetweek gekocht is waarvan de houdbaarheidsdatum is verstreken, verspild of weggegooid wordt of op de composthoop wordt gegooid.

Wat valt er niet onder het weggooien van voedsel? Onvermijdelijk afval zoals botten, schillen en voedsel dat aan huisdieren wordt gegeven of ingevroren wordt.

Voor dit onderzoek is het belangrijk dat u de kassabon van uw gekochte producten bewaart, minimaal één keer traditioneel kookt, minimaal één keer met een maaltijdpakket via een bezorgservice dienst of verspakket van de supermarkt kookt en minimaal één keer een kant-en-klaar maaltijd consumeert.

Mocht u nog vragen hebben over het onderzoek kunt u bellen of een mail sturen naar: elise.vandrie@ru.nl (+31612767954) of evelien.rosmalen@ru.nl (+31642343927). Na afronding van het onderzoek zullen de resultaten naar u toegestuurd worden. Nogmaals hartelijk dank voor uw deelname.

Vriendelijke groet,

Evelien Rosmalen & Elise van Drie

Allereerst zal nu het deel volgen met vragen die slechts éénmaal beantwoord hoeven te worden.

Wat is uw leeftijd?

.....

Wat is uw hoogst genoten opleiding?

- Basisschool en middelbare school
- Middelbaar beroepsonderwijs (MBO)
- Hoger beroepsonderwijs (HBO)
- Bachelor (Universiteit)
- Master (Universiteit)
- Doctoraat (Universiteit)
- Overig

Wat is de grootte van uw huishouden?

- 1 persoon
- 2 personen
- 3 personen
- 4 of meer personen

Wat is uw geslacht?

- Vrouw
- Man
- Anders

In hoeverre bent u het eens met de volgende stellingen? (1 = helemaal mee oneens, 7= helemaal mee eens)

1. Ik beschouw mijn kookvaardigheden als voldoende.
2. Ik heb de vaardigheden om een warme maaltijd te bereiden zonder een recept.
3. Ik heb de vaardigheden om een gratin (aardappel ovenschotel) te bereiden.
4. Ik heb de vaardigheden om een soep te bereiden.
5. Ik heb de vaardigheden om een cake te bakken.
6. Ik heb de vaardigheden om een brood te bakken.

Tot zover de vragen die slechts éénmaal beantwoord hoefden te worden. Klik op het pijltje om verder te gaan naar de vragen over meetdag 1.

Meetdag X: dag X van de 7 dat u de vragenlijst na het avondeten invult.

De maaltijd die u vandaag heeft gegeten, hoe heeft u deze klaargemaakt?

- Traditioneel
- Maaltijdpakket via een bezorgservice dienst (bijvoorbeeld Hello Fresh)
- Verspakket van de supermarkt
- Kant-en-klaar maaltijd

→ Als er maaltijdpakket via een bezorgservice dienst of verspakket van de supermarkt wordt aangevinkt: *Hoeveel inspanning was er nodig om het maaltijdpakket of verspakket te bereiden?*

- Laag, alle ingrediënten waren voorgesneden
- Hoog, de ingrediënten moesten zelf nog worden gesneden

Hoe heeft u de maaltijd aangeschaft?

- Online
- Fysiek, in een winkel

De volgende vraag staat in het kader van promoties. Hierbij gaat het erom of de maaltijd die u vandaag gekookt en gegeten heeft in promotie was op het moment dat u de product(en) kocht. U kunt op uw bewaarde kassabon kijken of er sprake was van een promotie op het moment van kopen als u dit zelf niet meer weet. Welke promotie was van toepassing op de product(en) die u vandaag gebruikt heeft voor uw maaltijd?

- 'Koop een product, en krijg er een gratis' (bijvoorbeeld 1+1 of 2+1 gratis)
- Prijsverlaging (...% korting)
- Een combinatie van verschillende promoties, namelijk...
- Anders, namelijk...
- Niet van toepassing, de producten die ik vandaag voor mijn maaltijd heb gebruikt, waren niet in promotie op het moment van kopen.

In hoeverre bent u het eens met de volgende stellingen? (1 = helemaal mee oneens, 7= helemaal mee eens)

1. “Zo veel te doen, zo weinig tijd”; deze uitspraak is vandaag van toepassing op mij.
2. Ik heb vandaag meer uren in de dag nodig om mijn werk gedaan te krijgen.
3. Ik heb vandaag veel tijd beschikbaar, maar ik weet niet wat te doen.
4. Ik heb vandaag het gevoel dat hoe hard ik ook werk, al mijn werk niet af komt.
5. Ik heb vandaag haast.

De volgende vraag staat in het kader van voedselverspilling. We willen u vragen om de hoeveelheid voedsel die u (mogelijk) heeft weggegooid te noteren als een percentage van wat u heeft gekocht om de maaltijd te bereiden. Hoeveel voedsel zou u zeggen dat u heeft weggegooid van wat u heeft gekocht om de maaltijd te bereiden?

- Helemaal geen
- Minder dan 10%
- Tussen de 10% en 25%
- Tussen de 25% en 50%
- Meer dan 50%

Tot zover de vragen voor meetdag X. Klik op het pijltje om uw antwoorden op te slaan. U kunt dan de vragenlijst afsluiten. Op uw volgende meetdag kunt u via dezelfde link weer in de vragenlijst komen. Hartelijk bedankt.

Afsluitende tekst meetdag 7

Tot zover de vragen voor meetdag 7. Klik op het pijltje om uw antwoorden op te slaan. U kunt dan de vragenlijst afsluiten. Dit was uw laatste meetdag. Hartelijk bedankt voor uw bijdrage aan het onderzoek.

Appendix B: Overview variables

Variable	Definition	Items	Scale	Cronbach's Alpha
Perceived consumer food waste (DV) – daily measured	“Excess ingredients that are not used for the prepared meal or subsequent meals, as well as uneaten portions of the meal that are discarded by consumers.” (Heard et al., 2019, p. 191).	How much food do you think you have been thrown away of the ingredients you bought to prepare the meal? (Stefan et al., 2013)	1) Hardly any, 2) less than 10%, 3) between 10% and 25%, 4) between 25% and 50%, 5) more than 50% (Stefan et al., 2013; Stancu et al., 2016).	0.85
Cooking with grocery store meal kit vs. traditional cooking (IV) – daily measured	Packages which are available at grocery stores including predominantly fresh, pre-measured/pre-portioned ingredients and a recipe for one meal, enabling cooking at home.	How did you prepare the meal that you have eaten today?	- Traditional - Delivery service meal kit - Grocery store meal kit - Instant food	NA
Monetary promotions (moderating)	Monetary promotions have a direct influence	Which promotion applied to the product(s) you used	- Buy-one-get-one-free - x% discount	NA

variable) – daily measured	on the cost–benefit relationship of a product (Büttner, 2015).	for your meal today?	- Combination of promotions, namely... - Other, namely... - No promotion	
Cooking skills (moderating variable) – measured once	“The ability to prepare different foods.” (Hartmann et al., 2013, p. 129)	I consider my cooking skills as sufficient. I am able to prepare a hot meal without a recipe. I am able to prepare gratin. I am able to prepare soup. I am able to bake cake. I am able to bake bread. (Hartmann et al., 2013)	7-point Likert-scale, which runs from ‘1) strongly disagree’ to ‘7) strongly agree.’	0.91
Time scarcity (moderating variable) –	“The feeling that one lacks enough time to do all the things that one	“So much to do, so little time”: this saying applies very well to me today. Today, I need more hours in the day to	7-point Likert-scale, which runs from ‘1) strongly	0.84

daily measured	would like to do.” (Scott, 1993, p.51).	get my work done. Today, I feel like I have a lot of time on my hands. Today, I feel like no matter how hard I work, I’ll never get caught up. Today, I am in a rush.” (Brunner et al., 2010).	disagree’ to ‘ 7) strongly agree.’	
Age (Control variable) – measure once	NA	What is your age?	NA	NA
Education level (Control variable) – measured once	NA	What is your highest degree of education?	“Elementary and Secondary school Middle-level applied education Associate degree Bachelor’s degree Masters’ degree Doctorate degree Other” (Janssens et al., 2019, p. 16)	NA
Household size (Control variable) –	NA	What is the size of the household you live in?	“1 person 2 persons	NA

measured once			3 persons 4+ persons” (Koivupuro et al., 2012, p. 185).	
Gender (Control variable) – measured once	NA	What is your gender?	- “Female - Male” (Secondi et al., 2015, p. 35) - Other	NA

Appendix C: Regression analysis

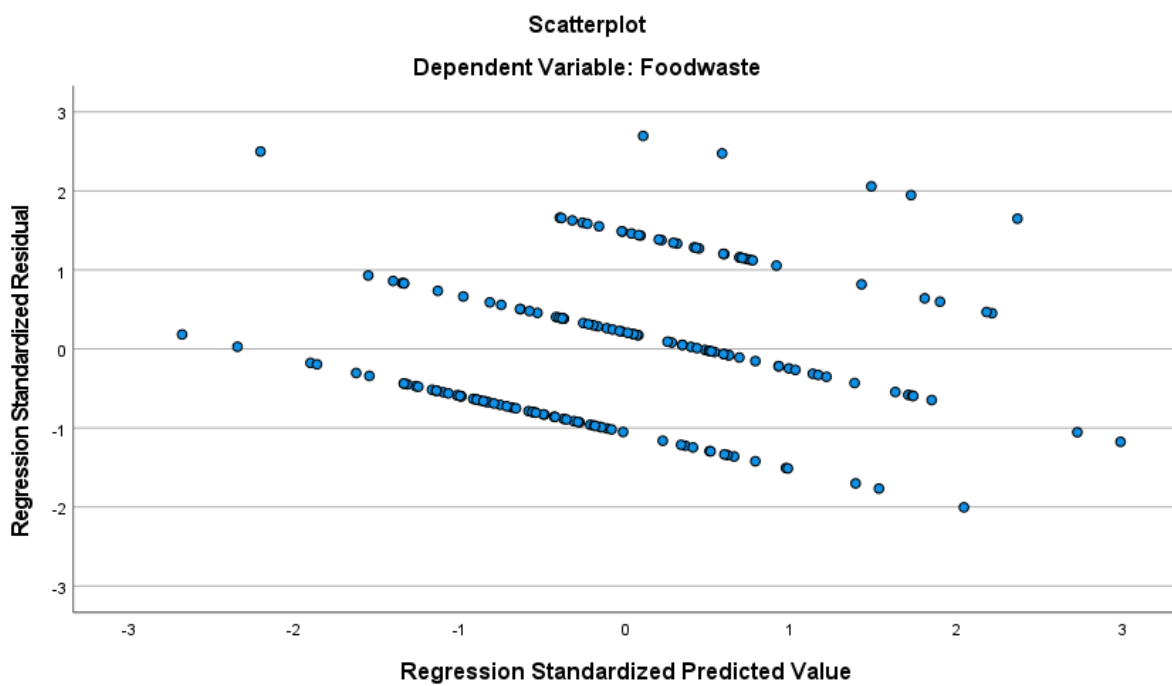


Figure 2: scatterplot

Adjusted R Square	Durbin-Watson	Kolmogorov-Smirnov test
,104	1,852	,300

Table 4: Durbin-Watson and Kolmogorov-Smirnov test

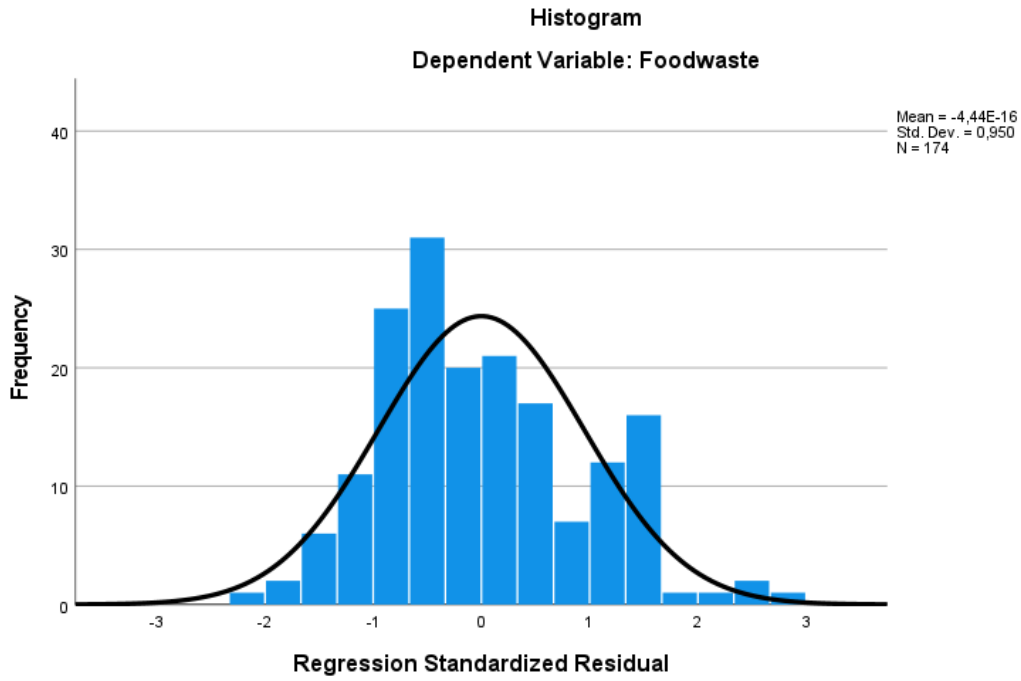


Figure 3: Histogram

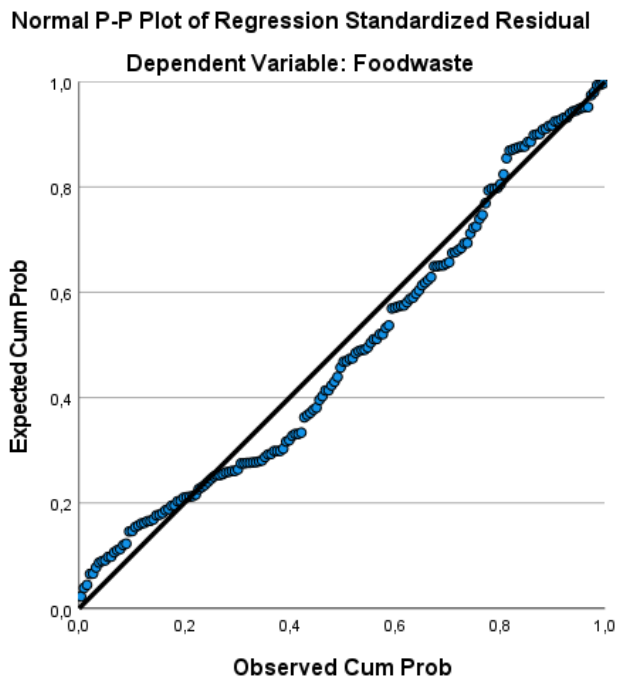


Figure 4: P-P Plot

	Tolerance	VIF
GSMK-cooking	,586	1,456
Price promotion	,687	1,456
Cooking skills	,430	2,324
Time scarcity	,752	1,380
GSMK-cooking * Price promotions	,538	1,857
GSMK-cooking * Cooking skills	,729	1,371
GSMK-cooking * Time scarcity	,641	1,560
Age	,553	1,807
Education level (MBO)	,270	5,890
Education level (HBO)	,264	6,109
Education level (Bachelor)	,284	5,445
Education level (Master)	,226	7,935
Education level (Doctorate)	,298	3,361
Household size (1 person)	,447	2,239
Household size (2 persons)	,431	2,321
Household size (3 persons)	,404	2,475
Gender (Female)	,677	1,478

Table 5: Tolerance and VIF-scores

Table 6: Correlations

Correlations

	Foodwaste	Age	MBO_educatio n	HBO_educatio n	Bachelor_educ ation	Master_educati on	PHD_educatio n	oneperson_ho usehold	twoperson_ho usehold	threeperson_h ousehold	Female	GSMKcooking	Pricepromotion	MEANCENTER EDCookingskil ls	MEANCENTER EDTimescarit y	GSMKCooking _pricepromo n	GSMKCooking _cookingskil ls	GSMKCooking _timescarity
Foodwaste	1,000	-.126	-.003	.010	.191	-.117	.030	-.058	-.069	.023	.039	.056	.066	.016	.074	.021	.065	.038
Age	-.126	1,000	.406	.009	-.260	-.359	.044	.041	.063	.004	-.031	.013	.023	.029	-.179	-.019	.037	-.052
MBO_education	-.003	.406	1,000	-.269	-.219	-.367	-.092	-.245	.155	.093	-.094	.027	.024	.019	-.035	.090	.021	.010
HBO_education	.010	.009	-.269	1,000	-.219	-.367	-.092	-.052	-.145	.275	-.352	.027	-.084	.118	.117	-.087	.067	-.013
Bachelor_education	.191	-.260	-.219	-.219	1,000	-.299	-.075	.458	-.363	-.219	.134	-.004	-.062	.138	.095	-.006	.073	.186
Master_education	-.117	-.359	-.367	-.367	-.299	1,000	-.125	-.167	.303	-.210	.224	-.015	.101	-.126	-.104	.013	-.089	-.140
PHD_education	.030	.044	-.092	-.092	-.075	-.125	1,000	-.083	-.152	.341	.056	-.027	.068	.350	-.001	.061	.107	-.019
oneperson_household	-.058	.041	-.245	-.052	.458	-.167	-.083	1,000	-.405	-.245	-.124	-.071	-.004	-.030	-.043	-.026	-.036	-.023
twoperson_household	-.069	.063	.155	-.145	-.363	.303	-.152	-.405	1,000	-.445	.271	.110	-.050	-.017	-.071	.039	.029	-.024
threeperson_household	.023	.004	.093	.275	-.219	-.210	.341	-.445	-.445	1,000	-.352	-.052	.068	-.040	.097	-.043	-.052	-.042
Female	.039	-.031	-.094	-.352	.134	.224	.056	-.352	.271	-.352	1,000	.048	-.028	-.008	-.131	.080	.014	-.048
GSMKcooking	.056	.013	.027	.027	-.004	-.015	-.027	-.071	.110	-.052	.048	1,000	-.091	.060	-.059	.503	.096	-.012
Pricepromotion	.066	.023	.024	-.084	-.062	.101	.068	-.004	-.050	.068	-.028	-.091	1,000	.033	.077	.321	.017	-.024
MEANCENTEREDCooking skills	.016	.029	.019	.118	.138	-.126	.350	-.030	-.017	-.040	-.008	.060	.033	1,000	.140	.053	.432	.086
MEANCENTEREDTimescarity	.074	-.179	-.035	.117	.095	-.104	-.001	-.043	-.071	.097	-.131	-.059	.077	.140	1,000	-.051	.080	.421
GSMKCooking_pricepromotion	.021	-.019	.090	-.087	-.006	.013	.061	-.026	.039	-.043	.080	.503	.321	.053	-.051	1,000	.101	-.058
GSMKCooking_cookingskills	.065	.037	.021	.067	.073	-.089	.107	-.036	.029	-.052	.014	.096	.017	.432	.080	.101	1,000	.202
GSMKCooking_timescarity	.038	-.052	.010	-.013	.186	-.140	-.019	-.023	-.024	-.042	-.048	-.012	-.024	.086	.421	-.058	.202	1,000

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23,110	17	1,359	2,185	,006 ^b
	Residual	97,057	156	,622		
	Total	120,167	173			

Table 7: F-test

	Coefficient	Std. Error
Constant	2,210	0,419
GSMK-cooking	-,005	,133
Price promotion	,103	,115
Cooking skills	-,131	,102
Time scarcity	,076	,043
Interaction effects		
GSMK-cooking * Price promotion	-,240	,280
GSMK-cooking * Cooking skills	,277	,212
GSMK-cooking * Time scarcity	-,283*	,107
Control variables		
Age	-,005	,005
Education level (MBO)	,021	,270
Education level (HBO)	,119	,305
Education level (Bachelor)	,670*	,309
Education level (Master)	-,067	,271
Education level (Doctorate)	,229	,485
Household size (1 person)	-,676*	,197
Household size (2 persons)	-,353*	,158
Household size (3 persons)	-,122	,191
Gender (Female)	-,046	,185

Table 8: Robustness check, * = significant at .05