UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
ESCOLA DE ADMINISTRAÇÃO
DEPARTAMENTO DE CIÊNCIAS ADMINISTRATIVAS
PROGRAMA DE PÓS GRADUAÇÃO EM ADMINISTRAÇÃO

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The impact of norms on suboptimal food consumption: a solution for food waste

Porto Alegre

2018

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Dissertação de Mestrado apresentada ao Programa de Pós-Graduação em Administração da Universidade Federal do Rio Grande do Sul, como requisito parcial para a obtenção do título de Mestre em Administração.

Orientadora: Profa. Dra. Marcia Dutra de Barcellos

Porto Alegre

2018

CIP - Catalogação na Publicação

Stangherlin, Isadora do Carmo
The impact of norms on suboptimal food consumption: a solution for food waste / Isadora do Carmo Stangherlin. -- 2018.
124 f.
Orientadora: Marcia Dutra de Barcellos.

Dissertação (Mestrado) -- Universidade Federal do Rio Grande do Sul, Escola de Administração, Programa de Pós-Graduação em Administração, Porto Alegre, BR-RS, 2018.

1. Suboptimal food products. 2. Food waste. 3. Consumer food waste. 4. Social norms. I. Barcellos, Marcia Dutra de, orient. II. Título.

Elaborada pelo Sistema de Geração Automática de Ficha Catalográfica da UFRGS com os dados fornecidos pelo(a) autor(a).

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The impact of norms on suboptimal food consumption: a solution for food waste

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Acknowledgements

It has been a long journey until finish this study, full of learning, growth (professional and, more important, personal) and I would like to thank everybody who helped me to get here. At the final moments of my masters' program, I could not be happier than I am.

First, I would like to thank my dear supervisor. Marcia, thanks for all the support (always) and advices you gave me. You are an inspiration as a professor, supervisor, leader and friend. Thank you for being always positive, no matter what. Thank you for encouraged me to use a different method in my research and for always look further than our country. This journey would not be so good without you.

I would like to thank the members of the examination board – Professors Kenny Basso, Jessica Aschemann-Witzel, and Daniela Callegaro de Menezes – for accepting to be part of the board, dedicating their time to evaluate this project. Prof. Kenny Basso, thank you for all the guidance, support and partnership, I have been learning a lot with you and my growth would not be possible without your help. Prof. Jessica Aschemann-Witzel, thank you for all the advice you always gave, thank you for accepting my ideas and discuss them with me with always brilliant comments and suggestions. Prof. Daniela Callegaro de Menezes thank you for your support during these two years, your kindness and experience always influenced me a lot.

Thanks to all professors and colleagues from UFRGS, specially the ones that worked with me almost every day, thanks for all the support and for sharing good and bad moments. Thanks CNPq for the scholarship during this master's degree course. I would like to thank my parents, your love, support and guidance always made the difference in my way. Thank you for respecting my decisions, even when it was difficult to understand the time I was distant.

Finally, I would like to thank my sweet Marcel, your support, wisdom, positive thought, and encouraging way of facing life made this journey much more interesting, funny and easy. Thank you for being always by my side, encouraging me to grow, holding the distance and to be an example of professionalism. You are an inspiration for me!

And thank all those who contributed to the development of this work and to those who will consult it in the future (hope you enjoy the reading!).

Abstract

The main goal of this study is to investigate stimulus that can be used to increase consumers purchase intentions toward suboptimal food products. Consumers seem to have low preferences to buy fruits and vegetables with unusual appearance, products with damaged package and close to the expiration date, usually called suboptimal food products. However, rejection of suboptimal food is an important contributor to food waste levels. Interventions aimed at encouraging the purchase of suboptimal food are scarce, however needed. This study used the theory of normative influence to test the effect of both descriptive and injunctive norms on a product with an unusual appearance, a product with a reduced expiration date and a product with a damaged package. The first study tested different messages appeals to create a realistic norm in study 2. From this study, it was selected the social message appeal and the frequencies of purchase toward each product, using them in the messages as the prevalent norm. The second study analysed the effect of injunctive and descriptive norms of purchase intentions toward suboptimal food and also tested the effect of environmental concern and food waste problem awareness. Results show that both environmental concern and food waste problem awareness impact purchase intentions toward suboptimal food. Additionally, appeals employing social norms proved to affect purchases intentions toward these products. However, this effect only occurred for the vegetable with an unusual appearance and the product with a package damaged. For the product with a reduced expiration date the norms had no effect. Moreover, for the product with an unusual appearance, food waste problem awareness mediated the effect of injunctive norm on purchase intentions. Based on the results, this study contributes to the theory of normative influences by showing that, in a general way, this theory is applied to food waste reduction issues, more specifically, with suboptimal food consumption. However, it is necessary to consider the type of sub-optimally and the context where the influence is applied. Additionally, was discussed how social norms can be used to tackle food waste and the implications for marketing and policy actions.

Key words: Suboptimal food products, food waste, consumer food waste, social norms.

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FAO - The Food and Agriculture Organization of the United Nations

WRAP - Waste and Resources Action Programme

GHG - Greenhouse Gas

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1. INTRODUCTION

Society has faced adverse environmental effects produced by pollution, overpopulation, and excessive use of natural resources, increasing the urgency in motivating people to engage in different patterns of behaviour. World population is moving toward achieving 10 billion people (United Nations, 2015) and social inequalities in food access are already visible (Food and Agriculture Organization of the United Nations (FAO), 2015; Salhofer, Obersteiner, Schneider, & Lebersorger, 2008). Therefore, it is questionable if food systems will have the capacity to support this increase in the future.

Resources have been used inefficiently in the food production systems, with a gap between what is produced and what is consumed (Papargyropoulou, Lozano, Steinberger, Wright, & Ujang, 2014). Production systems and consumption patterns are accused of being incoherent due to the fact that around one third of food produced for human consumption is lost or wasted every year (FAO, 2013) and at the same time millions of people around the world suffer from hunger and malnutrition (FAO, 2015). Despite of social inequalities and food access issues, agricultural activities are accused for several damages on the environment (Foley et al., 2011; Tilman, Cassman, Matson, Naylor, & Polasky, 2002). Food supply chain is one of the major contributors to high levels of greenhouse gas (GHG) emissions (McMichael, Powles, Butler, & Uauy, 2007).

Many areas of food systems can be improved to mitigate the impacts and an important one is related to waste reduction (Foley et al., 2005; Godfray & Garnett, 2014). When food waste occurs, energy from agriculture, transportation, processing, food sales, storage, and preparation also are wasted (Abeliotis, Lasaridi, & Chroni, 2014; Cuéllar & Webber, 2010; FAO, 2013). Therefore, food waste represents a waste of resources (Kummu et al., 2012).

One significant way of meeting such calls involves our food behaviour as consumers. An important contributor to food waste levels is consumers' preference for cosmetic standards (Beretta, Stoessel, Baier, & Hellweg, 2013; Parfitt, Barthel, & Macnaughton, 2010). Individuals have a pattern of shopping behaviour in which only products with a certain visual characteristic are selected. However, this demand for "cosmetically perfect" food results in high levels of food waste (Godfray et al., 2010; Gustavsson, Cederberg, Sonesson, van Otterdijk, Meybeck, 2011), directly impacting both farmers and retailers in the food supply chain (Buzby & Hyman, 2012).

Fruits and vegetables are selected by its appearance (Marx-Pienaar & Erasmus, 2014). Deviations in the usual shape, size, or weight cause rejection, even if they have the same

intrinsic quality attributes and safety assurance (Göbel, Langen, Blumenthal, Teitscheid, & Ritter, 2015). With the same importance, packages imperfections also have limited acceptance. When a package has a superficial damage, contamination cues are produced and the preference to purchase the products is reduced (White, Lin, Dahl, & Ritchie, 2016). A similar pattern of behaviour that contributes to food waste levels is related to date labels (Milne, 2012). When expiration date is approaching or has passed, consumers reject the product mainly due to food safety and risk concern (Qi & Roe, 2016).

Therefore, edible food is thrown away by farmers, producers, retailers and consumers due to a high demand for perfection. Fruits and vegetables with different visual appearance, food product with damaged package and close to its expiration date are called suboptimal food products (de Hooge et al., 2017) and previous studies discuss the low preference for these products (Aschemann-Witzel, de Hooge, Amani, Bech-Larsen, & Oostindjer, 2015; de Hooge et al., 2015; Loebnitz & Grunert, 2015; Loebnitz, Schuitema, & Grunert, 2015; Tsiros & Heilman, 2005).

Thus, consumers can be considered an important target group for reduce avoidable food waste. Behaviours that result into waste are considered environmentally significant behaviours (Farr-Wharton, Foth, & Choi, 2014) and interventions aimed at encouraging pro-environmental behaviours are necessary. Environmental behaviours depend of a broad range of casual factors (Stern, 2000). Therefore, developing an effective strategy requires consideration of the underlying motives for acting according to the behaviour, in this case, acceptance of suboptimal food products.

Analysing the environmental concern perspective, people are presumed to engage in environmental behaviours based on their expectations how the attitude object affects what they value (e.g. concern for the environment) (Stern and Dietz, 1994). This means that to engage in environmental behaviours consumers must, at some level, intrinsically care about environmental issues. When individuals have a concern for the environment it drives different green behaviors (Pagiaslis & Krontalis, 2014). Aditionaly, problem awareness is an important antecedent of pro-environmental behaviour (Stern, Dietz, & Black, 1985; Stern, 2000). When purchasing food products, people are more willing to accept visual imperfections when they report environmental concern (Yue, Alfnes, & Jensen, 2009) and when pursue knowledge about food waste issues (Loebnitz et al., 2015).

Despite personal characteristics that affect the acceptance of suboptimal food, being the intersection between producers and consumers, retailers should encourage consumers into this behaviour (Aschemann-Witzel et al., 2015; Young, Russell, Robinson, & Barkemeyer, 2017).

Attention is given to theories of social influence in trying to encourage pro-environmental behaviours (Abrahamse & Steg, 2013), described as a promising alternative (Nolan, Schultz, Cialdini, Griskevicius, & Goldstein, 2008; Schultz, 1999; Schultz, Khazian, & Zaleski, 2008). Social normative influences are used as a form of influencing preferences and behaviours (Cialdini, Reno, & Kallgren, 1990). Therefore, can be used in trying to reduce food waste levels by encouraging the purchase of suboptimal food products.

1.1 PROBLEM STATEMENT AND RELEVANCE

The importance of this study is due to the fact that pressures to have a food supply chain with less environmental impacts are visible. Food waste affects the environment, but also increases social inequalities. The gap between food production and consumption (Beretta et al., 2013) and the distance between the waste of the food and its consequences (Gjerris & Gaiani, 2013) worsen the problem. This study deals with changes in food-related behaviours as consumers, more specifically, in trying to encourage suboptimal food consumption. This study analyses consumer choice in the retail environment but has also implications to the household setting.

Previous studies explored consumer unwillingness to consume and buy suboptimal food (Aschemann-Witzel et al., 2015; de Hooge et al., 2017; Loebnitz & Grunert, 2015; Loebnitz et al., 2015; Tsiros & Heilman, 2005). However, the study of consumer food waste is predominant in industrialized countries, with little research in developing ones (Parfitt et al., 2010). With a number of studies taken in developed countries, there is a great opportunity to achieve sustainable development reducing food waste in developing ones (Thi, Kumar, & Lin, 2015).

Moreover, it is still unclear which strategic solutions can alter this pattern of behaviour. Thus far it was not explored what interventions can be used to increase the acceptance of suboptimal food and how different actors of the food supply chain can integrate these actions into their practices. Consumers are sensitive to small changes in the food environment (Cohen & Farley, 2008). In this sense, retailers could alter their usual practices to provide opportunity to individuals act against food waste by buying suboptimal food (Aschemann-Witzel et al., 2016a).

Different levels of abnormally influence intentions to purchase the products. Consumers have low intentions to purchase fruits and vegetables with unusual appearance when deviations are extreme (Loebnitz et al., 2015). The authors also identified that when products with extreme

deviation were labelled as organic, purchase intentions lower. When analysing products with a reduced expiration date, risk concerns play a key role. Individuals tend to consider quality risks and health risks when buying perishable products close to their expiration date (Tsiros & Heilman, 2005). For damaged package products, consumers exhibit strong avoidance behaviour toward the products (White et al., 2016).

Therefore, alternative solutions to these issues are necessary and food waste prevention should promote the acceptability of suboptimal food (Neff, Spiker, & Truant, 2015). The literature shows that personal characteristics can affect attitudes toward these products. Pro-environmental self-identity (Loebnitz et al., 2015), environmental concern (Loebnitz & Grunert, 2015), value orientation, commitment to environmental sustainability, and perceived consumer effectiveness in saving the environment (de Hooge et al., 2015) positively affect attitudes toward suboptimal food.

In this study, acceptance and purchase of suboptimal products are considered an environmental behaviour due to the fact that reducing food waste levels can produce positive impacts on the environment. An antecedent of pro-environmental behaviour intentions is awareness of environmental problems (Schwartz, 1977; Stern, 2000). Waste aspects, such as awareness of food waste issues, perceived food waste of the household and perceived importance of food waste affected behaviours toward suboptimal food (de Hooge et al., 2015; Loebnitz et al., 2015). Therefore, both concern and knowledge have positive impact on behavioural intention of green behaviour (Pagiaslis and Krontalis, 2014) and are used in this study to analyse their effects on suboptimal food consumption.

Nevertheless, when individuals have a value orientation, it predisposes them to be sensitive to information (Stern et al., 1993). The majority of campaigns try to encourage environmental behaviours exclusively focusing on educational and attitudinal models (Staats, Wit, & Midden, 1996). However, sometimes it lacks motivational incentive (Schultz et al., 2008). A strategy used to behaviours change is the use of social norms. Social norms are effective to influence behaviours with societal benefits (Melnyk, van Herpen, & Trijp, 2010). Experimental studies specially focused on environmental issues, such as energy conservation (Göckeritz et al., 2010; Nolan et al., 2008), recycling behaviour (Schultz, 1999), and towel reuse (Goldstein, Cialdini, & Griskevicius, 2008). In food waste issues, campaigns using social normative influences resulted as a promising alternative to promote food waste prevention (Schmidt, 2016), suggesting that future studies should test initiatives focusing on this motivational predictor.

In this sense, the study is developed in the basis of food waste issues and how to reduce

its levels. Specifically, it explored how suboptimal food products can have higher acceptance by consumers in order to reduce food waste levels. Therefore, the main goal of this study is to investigate the effect of social norms on purchase intentions toward suboptimal food products. It is intended to analyse the extent to which normative influences affect purchase intention and also how environmental concern and food waste problem awareness affect this behaviour. The findings provide new insights into consumer preferences for purchasing suboptimal food products. Moreover, results expand contributions for supply chain and policy makers.

1.2 RESEARCH QUESTION

This study aims at answering the following question: what are the effects of social norms on intentions to purchase suboptimal food products?

1.3 MAIN GOAL

To investigate the effect of social norms on purchase intentions toward suboptimal food products.

1.4 SPECIFIC GOALS

a) To verify whether using an appeal that conveys to normative influences toward suboptimal food consumption increases purchase intentions toward these products;
b) To identify the extend which environmental concern affects purchase intentions toward suboptimal foods;
c) To identify the extend which food waste problem awareness affects purchase intentions toward suboptimal foods.

This project is organized as follows. Chapter 1 presents an introduction to the subject, describing the research problems and goals to guide the research. Chapter 2 brings the research background, where main concepts and definitions are discussed. During the theoretical

discussions, the research hypotheses will be presented. Method is presented on Chapter 3. And results and conclusions follow on Chapter 4.

2. RESEARCH BACKGROUND

In this chapter, the literature review is presented. First, a discussion about food waste is performed, based on a systematic review. A systematic literature review was performed to analyse in the literature the main variables that affect consumer behaviour resulting in food waste. The systematic review only captured articles that exclusively focus on food waste and consumer/household relation. Additionally, the review also encompassed main ideas and definitions about food waste, its main problems, previous methodologies used to study consumer food waste and possible solutions. A total of 84 articles were analysed and major results are present on this section. The methodology used of the systematic review and the research protocol are described in Appendix A of this study.

This chapter is organized as follows. First, food waste discussion is brought (section 2.1), including concepts and definitions, problems associated with food waste (section 2.1.1). After, the main variables that affect consumer behaviour found on the systematic review (section 2.2) are discussed, followed by a brief description about suboptimal food and its consumption (section 2.3), closing the discussion about food waste with possible solutions for the issue (section 2.4). Normative influences are presented in sections 2.5. During the theoretical discussions, the research hypotheses are presented.

2.1 FOOD WASTE

Food losses and waste occurs throughout the entire food supply chain (Parffit et al., 2010). From a life-cycle assessment of the global food chain, about one-third of the world's food are lost or wasted annually (FAO, 2011, 2013), representing approximately 1.3 billion tonnes of food produced for human consumption. The main concept of food losses is originated from the Food and Agriculture Organization of the United Nations (FAO), from 1981, with the main idea of food that should be used by human consumption. The report defines food losses as "any change in the availability, edibility, wholesomeness or quality of the food that prevents it from being consumed by people" (FAO, 1981). It is related to food disposed, including composted, crops ploughed in/not harvested, anaerobic digestion, bio-energy production, co-generation, incineration, disposal to sewer, landfill or discarded to sea (Fusions, 2013). Food used to animal feed or energy and over-nutrition are also considered losses (Parfitt et al., 2010).

Previous research distinct food losses from food waste, even if these two concepts basically deal with the same problem, food not used for its main purpose. Nevertheless, it is

important to establish the main differences that each concept addresses. Food losses occur at the beginning to the middle of the supply chain, considered losses from agricultural produce, harvesting, transport, storage and processing activities (Gustavsson et al., 2011). Moreover, food losses are related to systems that need infrastructure improvements, where poor harvesting technologies, lack of transport, climatic conditions, pests, diseases and natural disasters can increase the amount of food lost (Beretta et al., 2013; Parfitt et al., 2010; Papargyropoulou et al., 2014; Porpino et al., 2015).

Food waste, on the other hand, represents losses in downstream stages, at the end of the food supply chain, in the distribution, retail and final consumption (Gustavsson et al., 2011; Parfitt et al., 2010). It is considered a complex issue (Aschemann-Witzel et al., 2015), mainly because what is defined as waste for a country, for example intestines and internal organs, are not considered by others (Gjerris & Gaiani, 2013). Moreover, food is discarded because it is considered "suboptimal" (Aschemann-Witzel, 2016), with different appearance standards, close to its "best-before" date or product flaws. Food waste is associated to behavioural issues (Parfitt et al., 2010), and associated with multiple moments of consumption, embedded in contextual and cultural factors (Porpino et al., 2015) and a result of multiple behaviours of food's journey (Quested, Marsh, Stunell, & Parry, 2013).

The main drivers of food losses and waste vary between regions. It is agreed that in developing countries losses may occur due to lack of infrastructure, poor harvesting conditions, storage inefficiencies, poor packaging and manufacturing processes (Parffit et al., 2010), in earlier stages of food supply chain. In developed countries, major issues are at the end of supply chain, in consumer level, with food spoilage, taste or high expectation for cosmetic standards (Parfitt et al., 2010). However, the authors point to similar pattern in BRIC countries, with their rapid development, wasting food at the end of the supply chain.

Food waste is classified in three categories (Quested & Johnson, 2009). The first category, avoidable losses, refers to food and drink that are no long wanted or exceeded the best before date. Food in this category was at some point completely edible, however it may be deteriorated when thrown away. The second category are possible avoidable losses, which are food and drinks considered edible for some people and inedible for others (e.g. bread crusts) or food eatable when prepared in a specific way (e.g. potato skins). Unavoidable losses, on the other hand, are food and drinks that are not edible under normal circumstances (e.g. coffee grounds, pineapple skin). A problem with this categorisation is whether food is in edible or inedible conditions (Beretta et al., 2013). This distinction depends on shared values, common practices, religious beliefs, social norms and personal preferences (Papargyropoulou et al.,

2014).

It is also necessary to highlight the differences between "food waste" and "food surplus" when analysing the issue (Papargyropoulou et al., 2014). However, differences between surplus and waste are not clear, and food can rapidly change from one category to another (Cappellini & Parsons, 2013). Surplus will not necessarily become into waste (Evans, 2012a). Waste, on the other hand, can be a product of food surplus (Papargyropoulou et al., 2014).

Even if these two concepts, food losses and food waste, are connected, for the purpose of this study it is adopted the idea of food waste. Once the consumer behaviour regard suboptimal food will be discussed, it is intended to analyse retail and consumer stages of the supply chain.

2.1.1 Food Waste Problems

Food production and consumption have their inherent impacts associated with their activities. When food is lost, however, it is necessary to consider the impacts associated with food disposal (Quested et al., 2013). Food loss and waste generate both environmental, economical and social problems. Food waste represents a waste of resources that should not be used inefficiently, such as water, cropland, fertilisers, energy, and agricultural inputs (Beretta et al., 2013; Kummu et al., 2012). Food production, manufacturing, transportation, storage, retailing and preparation demand those inputs that are lost when food is wasted (Abeliotis et al., 2014; FAO, 2013).

From an environmental perspective, food waste increases greenhouse gas (GHG) emissions (Dorward, 2012). Additionally, there are impacts related to disposal and decomposition in landfills, increasing accumulation in soil and water (Forkes, 2007), carbon emissions (Aschemann-Witzel, 2016) and methane (Graham-Rowe, Jessop, & Sparks, 2014; Ghani, Rusli, Biak, & Idris, 2013). The later is considered one of the most dangerous greenhouse gases (Grandhi & Singh, 2016), with 21 times greater impact on global warming than carbon dioxide (Ghani et al., 2013; Adhikari, Barrington, & Martinez, 2006). Furthermore, energy from agriculture, transportation, processing, food sales, storage, and preparation also are wasted (Cuéllar & Webber, 2010). Even if energy inputs may vary between food product categories, it is necessary to account the environmental consequences of them (Carlsson-Kanyama, Ekstrom, & Shanahan, 2003).

From an economic view, food loss and waste represent a waste of money (Gjerris & Gaiani, 2013; Koivupuro et al., 2012). When food is lost or wasted, food prices increase (Stuart,

2009), affecting the purchase of those products. In the same way, suppliers and producers lose sellable food (Parizeau et al., 2015). From a household perspective, it is expected a yearly waste of £420 to £680 in UK (WRAP, 2009, 2011), $936 in US (Buzby & Hyman, 2012), $616 in Australia (Baker, Fear, & Denniss, 2009) and €454 in Italy (Segrè & Falasconi, 2011).

Food waste and loss are equally considered a social issue (Salhofer et al., 2008). The food wasted could be used to combat hunger or malnutrition (Aschemann-Witzel, de Hooge, & Normann, 2016; Beretta et al., 2013; Parfitt et al., 2010). Moreover, food security issues (Beretta et al., 2013) increases with the losses, related to food access, such as purchasing power and prices of food (Papargyropoulou et al., 2014). With the expected increase on global population (Stancu, Haugaard, & Lähteenmäki, 2016; Godfray et al., 2010), food availability is a crucial issue (Stancu et al., 2016).

Therefore, it is visible that studies with a contribution to reduce food waste bring benefits to society as a whole (Porpino, 2016). A reduction of avoidable food waste can reduce greenhouse (GHG) emissions (Hoolohan, Berners-Lee, McKinstry-West, & Hewitt, 2013) from production to processing, packaging, distribution, consumption and from waste (Macdiarmid et al., 2012). Social inequalities (Aschemann-Witzel et al., 2016; Evans et al., 2013) could be diminished, such as hunger issues and food security improvement (Beretta et al., 2013). And food supply chain could improve economically with losses reduction and costs savings (Falasconi et al., 2016; Parizeau et al., 2015).

In the following section, relevant drivers of consumer food waste are described and discussed. These factors were captured from the systematic review, which focused in finding the main variables that affect consumer behaviour resulting in food waste.

2.2 CONSUMER-RELATED FOOD WASTE

Consumers have many opportunities to waste food. During decision process, in pre-acquisition or acquisition stage, through promotions, search for the perfect item, at consumption stage, during preparation, and through disposition, not using leftovers. Based on the systematic review, it is possible to affirm that consumer-related food waste is affected by a combination of different variables. It is important to discuss these variables and to find different ways to deal with food waste issues. However, an important difficulty is related to great differences on how, when, why and what people evaluate food until it is become waste (Blichfeldt, Mikkelsena, & Gram, 2015).

A number of behaviours have been shown to influence food waste generation, occurring at all stages of the food supply chain (Göbel et al., 2015). Results show a lack of consumer awareness (Lazell, 2016), with the perception that food waste is "not an issue as it is natural and biodegradable" (Grandhi & Singh, 2015). Therefore, consumers may not relate food waste with environmental issues, such as greenhouse gasses emissions (Marx-Pienaar & Erasmus, 2014). Nevertheless, mobility, energy used in households and food diets (principle with meat and dairy) are considered the activities that damage the environment the most (Tukker et al., 2008). The distance between the action of food waste and its consequences difficult the perception of its importance, especially in the individual level (Gjerris & Gaiani, 2013).

Consumer-related food waste can just be minimized, not totally abolished, requiring upstream actions (Aschemann-Witzel et al., 2015). The process starts at the point-of-sale, where marketing activities influences consumer behaviour, being the intersection between producers and consumers (Block et al., 2016; Parfitt et al., 2010). These marketing and sales strategies may negatively impact food waste behaviour (Mondéjar-Jimenez, Ferrari, Secondi, & Principato, 2016). Therefore, retailers have an important role in preventing food waste (Mondéjar-Jimenez et al., 2016; Quested et al., 2011), creating the right environment for consumers to behave positively.

However, little is known about consumer behaviour regard food waste (Stancu et al., 2016). It is known that consumer it is a complex behaviour (Quested et al., 2013; Papargyropoulou et al., 2014). Once the food is thrown away, the opportunity to prevent the waste has passed (Quested et al., 2013). Behaviours leading to food waste are not necessarily waste-related behaviours, rather, they are related to food provisioning (Evans, 2011, 2012a).

Therefore, in the following, it is discussed the main findings obtained from the systematic review, which analysed the factors and variables that affect consumer food waste and how they contribute to food waste reduction.

2.2.1 Variables affecting consumer food waste

Variables found on the literature were divided into three main categories: *societal factors, personal factors, behavioural factors*. These categories were adapted from Quested et al. (2013) framework, which included in the analyses two routes for household food waste reduction: influencing the behaviour and actions that result into waste or changing the way that food is sold. Our categories were adapted from this framework and encompasses: (1) external

context of influence, with sociocultural and retail factors that influence the individual, having both direct and indirect effect, - *societal factors*; (2) households characteristics and psychological influences, particular from each individual - *personal factors*; and (3) the behaviour, habits and routines related to food provisioning - *behavioural factors*. Culture directly influence all variables. That is, the variables described as influencing consumers' behavior are influenced by the predominant culture. Therefore, culture is presented as an integrated variable affecting all dimensions analyzed.

Figure 1 presents the framework with the factors found on the literature. The following variables can affect the waste in a positive way, increasing the amount of food waste (+), or in a negative way, reducing it (-).

2.2.1.1 External Factors

There are three subgroups of external factors that can influence consumers' waste: *historical; supply chain factors;* and *regulatory*. In *historical factors,* when society faced specific moments, such as the Second World War, where food rationing was frequent, they suffer influences in a way to reduce food waste (Quested et al., 2013). This group of people usually "over 65 years old" and are the ones that waste less. Additionally, recession periods are reported as one of the main drivers to reduce food waste (Abeliotis et al., 2014).

From *supply chain factors,* an important barrier to waste reduction is packages (Marangon et al., 2014). Their characteristics (difficulty in emptying/large sizes) are responsible for 20 to 25% of the food wasted in the household (Williams et al., 2012). Moreover, food supply chain is accused to provide misleading expiration date labelling (Aschemann-Witzel et al., 2016; Gjerris & Gaiani, 2013), affecting consumers' perceptions of whether the food is proper to eat.

Consumers accuse supermarkets for selling products in poor conditions, which ends up on the bin (Graham-Rowe et al., 2014; Jörissen et al., 2015), being an important barrier to food waste reduction. Additionally, quantity discounts were stated as a retailer practice that directly influences household food waste, encouraging consumers to buy more than they actually need (Gjerris & Gaiani, 2013). A different barrier to waste reduction is the aesthetic standards required by retailers, avoiding suboptimal food products (Aschemann-Witzel et al., 2017a).

Some practices help in food waste reduction. Retailers can encourage consumers to buy the right amount and help with storage conditions (Hebrok & Boks, 2017; Quested et al., 2011), informing about the right temperature of the food and how to improve their storage in

households. Additionally, sell suboptimal food with a reduced price can be implemented in stores and help to reduce food waste in the food supply chain (Symmank, Zahn, & Rohm, 2018)

Food industry can help by extending product shelf life (Aschemann-Witzel et al., 2016; Hebrok & Boks, 2017; Quested et al., 2011). All these changes with the creation of awareness campaigns and the importance of reducing the waste (Quested et al., 2011; Sharp, Giorgi, & Wilson, 2010; Arous et al., 2017; Hebrok & Boks, 2017; Richter, 2017; Romani, Grappi, Bagozzi, & Barone, 2018; Young et al., 2018) should be part of policy makers to increase awareness of food waste issues and how to avoid it. Therefore, supportive infrastructure (Geislar, 2017) and system level collaboration between actors (Jellil, Woolley, & Rahimifard, 2018) are necessary in the food supply chain to facilitate food waste reduction.

To *regulatory factors*, regulations, policies and strategies can be a driver to food waste reduction. Compared to economic incentives, food waste related legislation and regulation are accused to be more effective (Arous et al., 2017; Chalak et al., 2016). Polices should act as facilitators, allowing, for example, the use of suboptimal food products (Aschemann-Witzel, 2016).

Table 1 presents a synthesis of the main variables of influence on consumer-related food waste found in the systematic review aforementioned and their sources.

Table 1 - Variables of influence on consumer food waste and their sources

SOCIETAL FACTORS	
Historical Factors	**Sources**
Scarcity periods (ex. Second World War) (-)	Quested et al. (2013)
Recession (-)	Albeliotis et al. (2014)
Supply Chain	**Sources**
Misleading expiry date labelling (+)	Gjerris & Gaiani (2013); Aschemann-Witzel et al. (2016)
System level collaboration between actors (-)	Jellil et al. (2018)
Packages attributes (+)	Jörissen et al. (2015); Koivupuro et al. (2012); Marangon et al. (2014); Williams et al. (2012); Graham-Rowe et al. (2014); Aschemann-Witzel et al. (2016)
Retail asthetic standards (+)	Aschemann-Witzel et al. (2017a)
Poor quality of purchased groceries (+)	Jörissen et al. (2015); Graham-Rowe et al. (2014)
Quantity discount (+)	Gjerris &Gaiani (2013); Graham-Rowe et al. (2014); Aschemann-Witzel et al. (2016)
Encourage consumers to buy the right amount (-)	Quested (2011)
Extending the shelf life of the products (-)	Quested (2011); Aschemann-Witzel et al. (2016); Hebrok &Boks (2017)
Help in storage conditions (-)	Quested (2011); Hebrok &Boks (2017)
Price reduction of suboptimal food (-)	Symmank et al., 2018
Supportive infrastructure (-)	Geislar (2017)
Awareness campaigns (-)	Quested (2011); Sharp et al. (2010); Arous et al. (2017); Hebrok &Boks (2017); Richter (2017); Romani et al. (2018); Young et al. (2018)
Regulatory	**Sources**
Legislation and Regulations (-)	Chalak et al. (2016); Arous et al. (2017)
Legislation to suboptimal food (-)	Aschemann-Witzel (2016)

Source: Elaborated by the author.

2.2.1.2 Personal factors

Personal factors are those particular factors of each individual and are categorized as *demographic factors* and *psychological factors*. *Demographic factors* are associated with family composition and household characteristics. The first factor of influence in food waste reduction is household size. Smaller households produce less waste than larger ones (Jörissen et al., 2015; Koivupuro et al., 2012; Silvennoinen et al., 2014; Tucker & Farrelly, 2015). However, on a per capita basis, when analyzing the amount of food waste per person, single households waste more (Jörissen et al., 2015; Koivupuro et al., 2012; Silvennoinen et al., 2014).

Therefore, larger households produce less waste.

In relation to gender, women tend to produce more waste than men. When women are responsible for grocery shopping, the amount of waste generated is higher (Koivupuro et al., 2012; Silvennoinen et al., 2014). When analyzing household composition, the ones with children have higher levels of waste (Cappellini & Parsons, 2012; Evans, 2012a; Evans, 2012b; Marangon et al., 2014; Parizeau et al., 2015; Tucker & Farrelly, 2015; Visschers et al., 2016; Parfitt et al., 2010). This problem occurs specially with "younger households" (Marangon et al., 2014; Visschers et al., 2016; Blichfeldt et al., 2015; Radzyminska et al., 2016; Parfitt et al., 2010; Leray et al., 2016). A possible explanation for this phenomenon is that mothers tend to avoid the use leftovers to feed their children and prefer to serve a "new" food (Evans, 2012b). Additionally, high workload from young parents reduces the time of food care (Jörissen et al., 2015).

Households with individuals with higher education tend to produce more waste (Marangon et al., 2014; Secondi et al., 2015). The authors also found that households in rural areas produce less waste than the ones in urban areas. When analyzing income results diverge, but generally individuals with lower incomes tend to waste less. However, this relationship changes depending on the product category (Setti et al., 2016; Stancu et al., 2016; Stefan et al., 2013).

Psychological factors are intrinsic factors of each individual. The good provider identity appears as one of the major barriers to food waste reduction. There is a desire to be a good parent, partner or host, associated with affection and abundance, leading individuals to buy and prepare more food than necessary, and to hold a high stock of food at home (Porpino et al., 2016; Graham-Rowe et al., 2014; Visschers et al., 2016). The good provider identity results in a compensation effect (Porpino et al., 2016). When mothers prepare unhealthy meals, they tend to compensate them preparing also healthy food. Additionally, they tend to over-buy healthy foods, even if they will not eat them (Graham-Rowe et al., 2014).

Cooking from scratch is also linked with the good provider identity (Porpino et al., 2015). Notwithstanding, even if consumers have the perception that cooking too much results in food waste (Koivupuro et al., 2012), this over-preparation is justified by the importance of abundance and the desire to be a good provider (Graham-Rowe et al., 2014; Porpino et al., 2015; Porpino et al., 2016; Visschers et al., 2016). Additionally, when individuals pursue materialitic values, their tend to waste more food than individuals that do not have this characteristic (Abdelradi, 2018; Diaz-Ruiz, Costa-Font, & Gil, 2018).

An essential psychological factor that is a driver of food waste reduction is the feeling

of guilt when throwing food away (Graham-Rowe et al., 2014; Quested et al., 2011; Jagau and Vyrastekova, 2017; Richter, 2017). The great majority of individuals report guilt when food waste occurs. Therefore, creating social norms to waste management can influence individuals to behave in a manner to reduce their waste (Bernstad, 2014; Geislar, 2017; Hamerman, Rudell, & Martins, 2018). Moreover, individuals that express high environmental concern produce lower levels of waste and tend to behave in a more responsible way (Diaz-Ruiz et al., 2018; Hamerman et al. 2018; Melbye, Onozaka, & Hansen, 2017).

Table 2 presents a synthesis of the main variables of influence on consumer-related food waste categorized as personal factors and their sources.

Table 2 - Variables of influence on consumer food waste and their sources

PERSONAL FACTORS	
Demographic	**Sources**
Household size and composition (+/-)	Gjerris & Gaiani (2013); Jörissen et al. (2015); Koivupuro et al. (2012); Marangon et al. (2014); Silvennoinen et al. (2014); Tucker and Farrelly (2015); Visschers et al. (2016); Stancu et al. (2016); Aschemann-Witzel et al. (2016); Aschemann-Witzel et al. (2015); Parfitt et al. (2010); Chakona &Shackleton (2017)
Woman mainly responsible for grocery shopping (+)	Koivupuro et al. (2012); Silvennoinen et al. (2014)
Age over 65 (-)	Jörissen et al. (2015); Quested et al. (2013); Secondi et al. (2015)
High educational qualification (+)	Marangon et al. (2014); Secondi et al. (2015)
Living in urban areas (+)	Secondi et al. (2015)
Household with children (+)	Cappellini &Parsons (2013); Evans (2012a); Evans (2012b) Parizeau et al. (2015); Visschers et al. (2016); Tucker &Farrelly (2015); Marangon et al. (2014); Parfitt et al. (2010); McCarthy & Liu (2017)
Younger households (+)	Visschers et al. (2016); Marangon et al. (2014); Blichfeldt et al. (2015); Radzymińska et al. (2016); Parfitt et al. (2010); Leray et al. (2016)
Income (+/-)	Setti et al. (2016); Stancu et al. (2016); Stefan et al., (2013); Filipova et al. (2017); McCarthy &Liu (2017); Szabó-Bódi et al. (2018)
Psychological	**Sources**
Good provider identity (+)	Porpino et al. (2015); Porpino et al. (2016); Graham-Rowe et al. (2014); Visschers et al. (2016)
Affection and abundance (+)	Porpino et al. (2016)
Social norms (-)	Bernstad et al. (2014); Geislar (2017); Hamerman et al. (2018)
Materialitic values (+)	Abdelradi, 2018; Diaz-Ruiz et al. (2018)
Environmental concern (-)	Diaz-Ruiz et al. (2018); Hamerman et al. (2018); Melbye et al. (2017)
Felling guilt - do the right thing (-)	Graham-Rowe et al. (2014); Quested et al. (2011); Jagau & Vyrastekova (2017); Richter (2017)

Source: Elaborated by the author.

2.2.3 Behavioral factors

Behavioural factors are directly associated with the food purchase and consumption cycle, and are divided into: *planning, purchasing, storage, preparing, consumption, leftover storage,* and *disposal.* When analysing *food planning*, the majority of behaviours increase the levels of food waste. Not using shopping list (Jörissen et al., 2015; Stefan et al., 2013; Fonseca,

2014; Clark & Manning, 2018; Diaz-Ruiz et al., 2018; Ponis, Papanikolaou, Katimertzoglou, Ntalla, & Xenos 2017) and lack of information on food already stocked at home (Farr-Wharton et al., 2014; Gaiani et al., 2018) are variables related to inefficiencies in food planning routines that increase the amount of waste.

Food purchasing behaviours have the greatest number of variables influencing the final waste. Overbuy food is the most mentioned barrier to food waste reduction (Falasconi et al., 2016; Evans, 2011; Leray et al., 2016; Gaiani et al., 2018). This is related to bulk buying, large packages and stocking food at home (Porpino et al., 2015; Koivupuro et al., 2012; Radzymińska et al., 2016; Graham-Rowe et al., 2014). In buying more food than needed, it can spoil, get out-of-date, be forgotten in the fridge, or can have bad smell or taste along time (Koivupuro et al., 2012). The overbuying barrier to waste reduction is related to impulse buying (Porpino et al., 2015; Fonseca, 2014).

When analysing in-store behaviours, consumers use appearance to infer product quality, choosing the more attractive product (Aschemann-Witzel et al., 2015). Consequently, retailers reject suboptimal food and consumers don't perceive them as valuable. Unwillingness to buy suboptimal foods increases waste levels, affecting the whole supply chain (de Hooge et al., 2017; Loebnitz & Grunert, 2015; Loebnitz et al., 2015; Helmert et al., 2017; Symmank et al., 2018). In the same direction, consumers' high demand of freshness increases the waste (Aschemann-Witzel et al., 2015; Gjerris & Gaiani, 2013; Principato et al., 2015; Evans, 2011).

Buying at large supermarkets is a different barrier to waste reduction (Jörissen et al., 2015; Marangon et al., 2014). This may be associated with low value to food when buying in convenient large supermarkets and the high availability of different products. The frequency of shopping also impacts the final waste. When shopping once-a-week, the food wasted is higher than when shopping occurs more frequently (Marangon et al., 2014; Williams et al., 2012; Fonseca, 2014). This effect is due to the fact that people who buy in a less frequency tend to buy more food avoiding go to shopping stores.

It is not clear the effect of special offers, such as "Buy One, Get One Free" or products with discounts. Usually, who buys special offers waste less (Jörissen et al., 2015; Silvennoinen et al., 2014; Koivupuro et al., 2012; Clark & Manning, 2018; Ponis et al., 2017). Even if this marketing strategy encourage consumers to buy more than needed, buying promotional products may be associated with money restrictions (Jörissen et al., 2015; Koivupuro et al., 2012). However, at the same time, there is an association with buying special offers and food waste increase (Fonseca, 2014; Radzyminska et al., 2016).

When analysing motivators to waste reduction, research shows that economic problems of food waste are usually considered more relevant than the environmental ones (Principato et al., 2015; Stancu et al., 2016). Saving money was considered an important driver to reduce waste (Lazell, 2016; Quested et al., 2011). Therefore, financial concerns play a key role, specially for those that changed lifestyles and need to save money (Graham-Rowe et al., 2014).

To *food storage*, improper habits to store food are barriers to waste reduction (Gjerris & Gaiani, 2013; Romani et al., 2018). Long storage (Jörissen et al., 2015; Porpino et al., 2015; Mallinson et al., 2016; Leray et al., 2016) and low visibility (Farr-Wharton et al., 2014) leads household members to forget food in the fridge and throw it away after a long period. Improper storage conditions lead to quality loss, through spoilage, drying, bad small or taste (Koivupuro et al., 2012). These factors are closely related to lack of knowledge about storage conditions (Porpino et al., 2015).

A similar barrier to waste reduction is food not used in time. Individuals tend to reject food when it passed the 'use by'/'best before' dates (Evans, 2012a; Parfitt et al., 2010; Parizeau et al., 2015; Falasconi et al., 2016; Blichfeldt et al., 2015; Leray et al., 2016; Jörissen et al., 2015; Clark & Manning, 2018; McCarthy & Li, 2017a; McCarthy & Liu, 2017b). This is maximized for consumers that misinterpret date labels (Farr-Wharton et al., 2014).

A driver of food waste reduction in the food storage phase is to froze the food before storing it. Researches show that household food waste is minimized when they use frozen foods (Janssen et al., 2017; Martindale & Schiebel, 2017).

In *food preparing*, the variable that is the most mentioned to increase food waste levels is over-preparing. In preparing too much, food can be stored on the fridge as a leftover, not going to the bin immediately (Evans, 2012b). However, the unwillingness to consume leftovers, prejudice against them or freshness preference are barriers to waste reduction (Farr-Wharton et al., 2014; Koivupuro et al., 2012; Porpino et al., 2015; Mallinson et al., 2016; Stancu et al., 2016; Tucker & Farrelly, 2015; Blichfeldt et al., 2015; Mylan et al., 2016; Cappellini & Parsons, 2014; Evans, 2012b; Fonseca, 2014; Leray et al., 2016; Chakona & Shackleton, 2017; Gaiani et al. 2018; Ponis et al., 2017; Clark & Manning, 2018; Richter, 2017).

Even if consumers perceive that overcooking results in waste, it is justified by the importance of abundance and the good provider identity (as aforementioned). Food damages during cooking (e.g. burning) are also associated with over-preparation (Parizeau et al., 2015; Parfitt et al., 2010). Convenience (Bernstad, 2014; Porpino et al., 2015) and lack of experience are basic variables related to preparing more food than needed (Jörissen et al., 2015; Radzyminska et al., 2016). Aligned with this, high work load results in higher amounts of waste

due to lack of time to deal with household issues (Jörissen et al., 2015; Leray et al., 2016; Clark & Manning, 2018).

Moreover, confusions in interpreting labels lead consumers to throw away perfectly edible food (Abeliotis et al., 2014; Falasconi et al., 2016; Principato et al., 2015; Wilson et al., 2017; Arous et al., 2017; Richter, 2017). Trim from food preparation is the only food waste considered unavoidable (Parizeau et al., 2015; Tucker & Farrelly, 2015).

To reduce food waste levels in this phase of food consumption, developing cooking skills (Gjerris & Gaiani, 2013; Mylan et al., 2016; Graham-Rowe et al., 2014; Ponis et al., 2017) and better understanding of foods edibility can reduce the amount of waste (Farr-Wharton et al., 2014). Additionally, connection with food is a key driver to reduce food waste (Blichfeldt et al., 2015). Individuals that are more aware of the importance of food and different ways to prepare it seem to be more proactive to reduce their waste.

In *food consumption*, food smell, taste, appearance (Jörissen et al., 2015; Lazell, 2016; Chakona & Shackleton, 2017; Gaiani et al., 2018) and dissatisfaction with food freshness (Koivupuro et al., 2012; Principato et al., 2015) increase the waste whereas consumers demand the perfect condition of the food. Individuals tend to rely on food appearance, smell, or taste to judge its edibility when there is a lack knowledge necessary to drawn inferences about them (Grahm-Rowe et al., 2014; Lazell, 2016). Consequently, the use of multiple methods to detect food waste (e.g. smelling with appearance) increases the amount of food thrown away (Parizeau et al., 2015).

In addition, the same occurs for rejecting suboptimal food (Aschemann-Witzel et al., 2015; de Hooge et al., 2017). Individuals justify this behaviour with safety and risk concerns (Graham-Rowe et al., 2014; Evans, 2011; Lazell, 2016; Abdelradi, 2018). Therefore, a better understanding of the food edibility can help in strategies to waste reduction (Farr-Wharton et al., 2014; Blichfeldt et al., 2015).

Serving too much food also affects waste. Consumers leave food on the dishes that go straight to the bin (Parfitt et al., 2010; Porpino et al., 2015; Mallinson et al., 2016). As well as special occasions, like eating out, tend to increase waste, especially from the leftovers from previous meals (Evans, 2012a; Parizeau et al., 2015; McCarthy & Liu, 2017b; Ponis et al., 2017).

A driver to food waste reduction is eating together. Food waste is reduced when household members eat together at home (Chakona & Shackleton, 2017).

To *leftover storage*, food can be stored in the refrigerator, not going to the bin immediately. However, the "procrastination" of the consumption of these leftovers makes food

loses value and ends up to the bin (Porpino et al., 2016; Blichfeldt et al., 2015). The unwillingness to consume leftovers is usually associated with safety conditions (individuals believe it can cause some harm) or simply because different meal options occur (eating out). Therefore, with improper storage of the leftovers, the food can be forgotten in the refrigerator or loses its qualities (Gjerris & Gaiani, 2013; Koivupuro et al., 2012; Porpino et al., 2015; Farr-Wharton et al., 2014; Mallinson et al., 2016; Leray et al., 2016).

The final phase of the food cycle is *food disposal.* Consumers have habits related to food disposal that are different routes to avoid waste. The act of giving food excess to pets is a solution that consumers find to deal with over-preparation (Porpino, 2016) However, it is still considered waste (Stuart, 2009). Some practices, on the other hand, can be considered drivers to food waste reduction. Redistribution initiatives, such as food banks, are alternative ways of reducing waste at the consumer and food supply chain levels, by redistributing food that will not be consumed in time (Aschemann-Witzel et al., 2017a). The same occurs to food gifting between households (Soma, 2017).

Table 3 presents a synthesis of the main variables of influence on consumer-related food waste categorized as behavioural factors and their sources.

Table 3 - Variables of influence on consumer food waste and their sources

BEHAVIOURAL FACTORS	
Food planning	**Sources**
No shopping list use (+)	Jörissen et al. (2015); Stefan et al. (2013); Fonseca (2013); Clark & Manning (2018); Diaz-Ruiz et al. (2018); Ponis et al. (2017)
Unaware of their food stock (+)	Farr-Wharton et al. (2014); Gaiani et al. (2018)
Food purchasing	**Sources**
Overbuy (+)	Koivupuro et al. (2012); Porpino et al. (2015); Falasconi et al. (2016); Evans (2011); Leray et al. (2016); Gaiani et al. (2018)
Impulse purchase	Porpino et al. (2015); Fonseca (2013)
Buying special offers (+/-)	Jörissen et al. (2015); Koivupuro et al. (2012); Silvennoinen et al. (2014); Radzymińska et al. (2016); Fonseca (2013); Clark & Manning (2018); Ponis et al. (2017)
Shopping in large supermarkets (+)	Jörissen et al. (2015); Marangon et al. (2014)
Buying big packages (+)	Porpino et al. (2015); Koivupuro et al. (2012); Radzymińska et al. (2016)
Buying in less frequency (+)	Marangon et al. (2014); Williams et al. (2012); Fonseca (2013)
Use of appearance as product quality (+)	Aschemann-Witzel et al. (2015)
Demand of freshness (+)	Aschemann-Witzel et al. (2015); Gjerris & Gaiani (2013); Principato et al. (2015); Evans (2011)
Un-willingness to buy suboptimal food (+)	Aschemann-Witzel et al. (2015); de Hooge et al. (2017); Loebnitz et al. (2015); Loebnitz & Grunert (2015); Helmert et al. (2017); Symmank et al. (2018)
Consider food price when buying food (-)	Williams et al. (2012); Aschemann-Witzel et al. (2017b)
Financial waste concerns (-)	Lazell (2016); Graham-Rowe et al. (2014); Quested et al. (2011)
Changes in lifestyles (-)	Graham-Rowe et al. (2014)
Confusion on food labels (+)	Abeliotis et al. (2014); Falasconi et al. (2016); Principato et al. (2015); Wilson et al. (2017); Arous et al. (2017); Richter (2017)
Food storage	**Sources**
Food not used in time (+)	Parfitt et al. (2010); Jörissen et al. (2015); Parizeau et al. (2015); Evans (2012a); Falasconi et al. (2016); Blichfeldt et al. (2015); Leray et al. (2016); Clark & Manning (2018); McCarthy & Liu (2017a); McCarthy & Liu (2017b)
Improper storage (+)	Gjerris & Gaiani (2013); Koivupuro et al. (2012); Porpino et al. (2015); Farr-Wharton et al. (2014); Mallinson et al. (2016); Leray et al. (2016); Romani et al. (2018)
Low visibility of food in the refrigerator (+)	Farr-Wharton et al. (2014); Gaiani et al. (2018); McCarthy & Liu (2017a); McCarthy & Liu (2017b)
Use frozen foods (-)	Janssen et al. (2017); Martindale & Schiebel (2017)
Stocking food at home (+)	Porpino et al. (2015); Graham-Rowe et al. (2014)
Food preparing	**Sources**

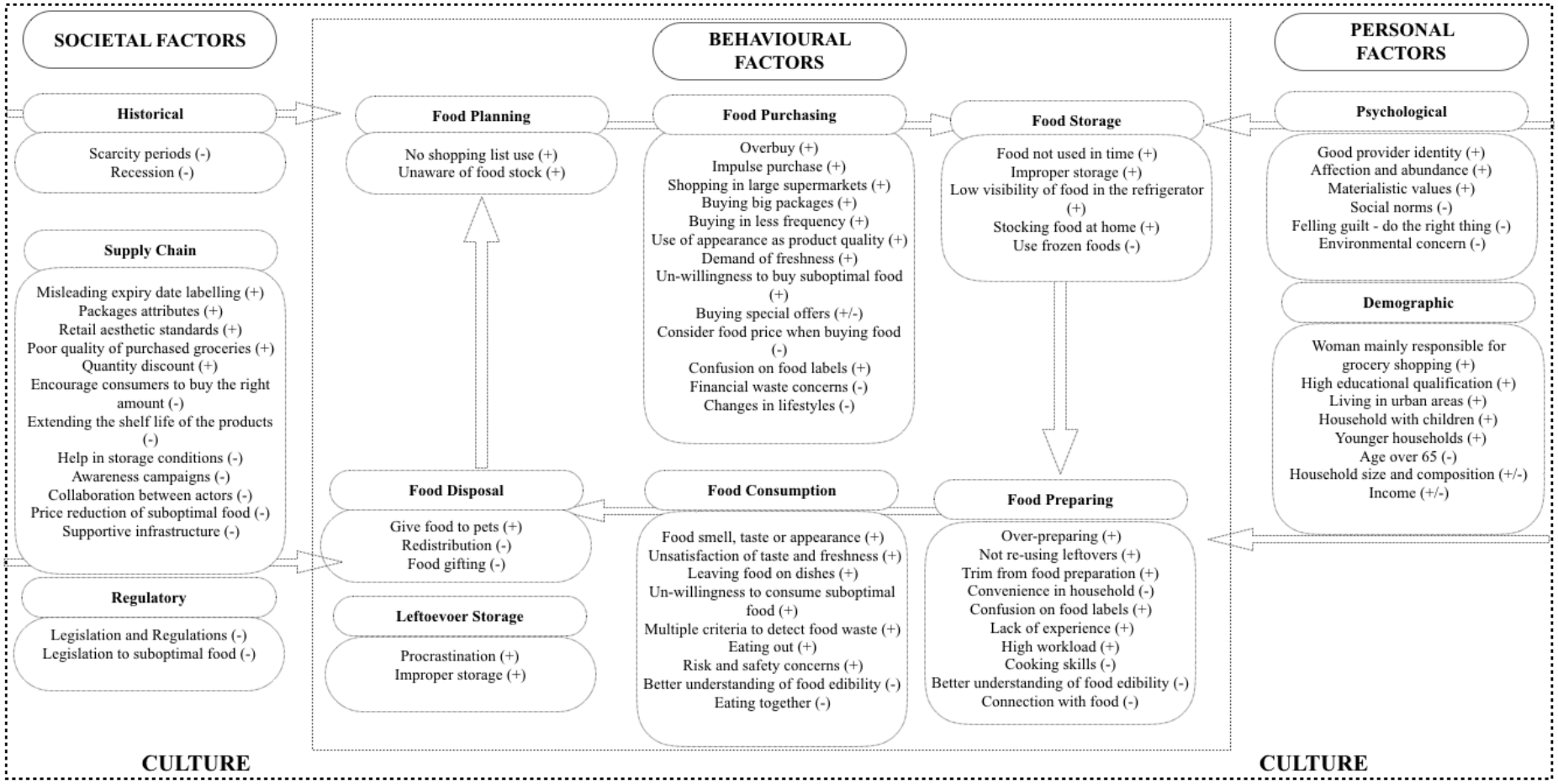
Over-preparing (+)	Parfitt et al. (2010); Jörissen et al. (2015); Koivupuro et al. (2012); Porpino et al. (2015); Porpino et al. (2016); Parizeau et al. (2015); Falasconi et al. (2016); Mallinson et al. (2016); Leray et al. (2016); Chakona & Shackleton (2017); Gaiani et al. (2018); Ponis et al. (2017)
Not re-using leftovers (+)	Koivupuro et al. (2012); Porpino et al. (2015); Farr-Wharton et al. (2014); Mallinson et al. (2016); Stancu et al. (2016); Tucker & Farrelly (2015); Blichfeldt et al. (2015); Mylan et al. (2016); Cappellini & Parsons (2014); Evans (2012b); Fonseca (2013); Leray et al. (2016); Chakona & Shackleton (2017); Clark & Manning (2018); Richter (2017)
Trim from food preparation (+)	Parizeau et al. (2015); Tucker & Farrelly (2015)
Convenience in household (-)	Bernstad et al. (2014)
Confusion on food labels (+)	Abeliotis et al. (2014); Falasconi et al. (2016); Principato et al. (2015); Wilson et al. (2017)
Lack of experience (+)	Jörissen et al. (2015); Radzymińska et al. (2016)
Connection with food (-)	Blichfeldt et al. (2015)
Cooking skills (-)	Gjerris & Gaiani (2013); Mylan et al. (2016); Graham-Rowe et al. (2014); Ponis et al. (2017)
High workload (+)	Jörissen et al. (2015); Leray et al. (2016); Clark & Manning (2018)
Better understanding of food edibility (-)	Farr-Wharton et al. (2014); Blichfeldt et al. (2015)
Food consumption	**Sources**
Food smell, taste or appearance (+)	Jörissen et al. (2015); Lazell (2016); Chakona & Shackleton (2017); Gaiani et al. (2018)
Unsatisfaction of taste and freshness (+)	Koivupuro et al. (2012); Principato et al. (2015)
Risk and safety concerns (+)	Graham-Rowe et al. (2014); Evans (2011); Lazell (2016); Abdelradi (2018)
Leaving food on dishes (+)	Porpino et al. (2015); Mallinson et al. (2016)
Un-willingness to consume suboptimal food (+)	Aschemann-Witzel et al. (2015); de Hooge et al. (2017)
Multiple criteria to detect food waste (+)	Parizeau et al. (2015)
Eating out (+)	Evans (2012a); Parizeau et al. (2015); McCarthy & Liu (2017a); McCarthy & Liu (2017b); Ponis et al. (2017)
Eating together (-)	Chakona & Shackleton (2017)
Better understanding of food edibility (-)	Farr-Wharton et al. (2014); Blichfeldt et al. (2015)
Leftover storage	**Sources**
Procrastination (+)	Porpino et al. (2016); Blichfeldt et al. (2015)
Improper storage (+)	Gjerris & Gaiani (2013); Koivupuro et al. (2012); Porpino et al. (2015); Farr-Wharton et al. (2014); Mallinson et al. (2016); Leray et al. (2016)
Food disposal	**Sources**
Give food to pets (+)	Porpino (2016)

Redistribution (+)	Aschemann-Witzel et al. (2017a)
Food gifting (-)	Soma (2017)

Source: Elaborated by the author.

All those factors can affect the waste in a positive way, increasing the amount of food waste (+), or in a negative way, reducing it (-). The integrative framework with the variables found in the literature is presented in Figure 1.

Figure 1 - Variables of influence on consumer food waste from systematic review



Source: Elaborated by the author.

After a deep analysis in the data collected in the systematic review, aiming at assessing the main variables affecting consumer behaviour and food waste levels, it is possible to affirm that individuals have many opportunities to waste food. In general terms, Figure 1 proposes that external and personal factors impact behavioural factors, which are aligned with attitudes and food purchasing habits. Some of these factors are considered fixed, such as household size and composition and historical period, some influences are more difficult to change, such as regulatory and psychological factors. However, a thorough analysis of the drivers and barriers allows the integration of efforts to waste reduction.

This study uses a combination of variables to deal with food waste reduction. First, the main focus is to increase the acceptance of suboptimal food, which is related to *supply chain* and *food purchasing factors* (Figure 1). From this, it is intended to change a pattern of behaviour (increase suboptimal food consumption). A variable found to motivate individuals to reduce their waste is creating social norms, categorized in the *psychological factors*. Therefore, from the variables found in the systematic review, this study integrates a problem in the *societal* and *behavioural factors* and a solution from the *personal factors*.

In the following section, definition about suboptimal food products are described and discussed.

2.3 SUBOPTIMAL FOOD

Food supply chain rejects food that deviate the usual visual standards, even if its nutritional value remains the same (Göbel et al., 2015). It is considered an important contributor for food losses (Gustavsson et al., 2011; Stuart, 2009). First, it is important to distinguish between products that do not meet hygiene and quality requirements and food products with different visual appearance, but with normal nutritional quality (Salhofer et al., 2008). The first group is associated with safety issues, while the latter only is created due to market requirements, acting as barriers (Hyde, Smith, Smith, & Henningsson, 2001).

Concerns regard food safety are considered important aspects to waste food (Canali et al., 2016; Neff et al., 2015). Nevertheless, consumers demand for food and packaging aesthetic appearance, selection of the freshest product, and misinterpretation of date labels (Canali et al., 2016) equally represent a great impact on food waste and could be reduced with acceptance of suboptimal food products among consumers.

Suboptimal food products can be a result of natural variability, poor processing, physical or chemical reactions accelerated through incorrect handling (Raak, Symmank, Zahn,

Aschemann-Witzel, & Rohm, 2016). De Hooge et al. (2017) define suboptimal food into three main deviations of food's characteristics. The first includes variation on food appearance standards, food weight, shape or size, being cosmetically appealing or not. The second variation is related to food close to or beyond its best-before date. And the third variation is related to food packages with visual damages, such as a dented can or a torn wrapper (de Hooge et al., 2017). These deviations, however, do not represent safety risks and the food is still proper for human consumption.

In the following, the three categories of suboptimal food are discussed.

2.3.1 Food appearance

A significant amount of food waste may be caused by appearance standards (Gustavsson et al., 2011). Food rejected in agricultural production is a consequence of cosmetic standards previously defined by consumers' preferences (Beretta et al, 2013), affecting earlier stages of the supply chain (Stuart, 2009). Appearance is likewise the most used criterion for food disposal in the household level (Parizeau et al., 2015). These standards, however, are not based on safety criteria (Halloran, Clement, Kornum, Bucatariu, & Magid, 2014).

Food is mainly discarded for visual deviations in its size, shape, texture, and colour (Göbel et al., 2015; Lebersorger & Schneider, 2014; Sobal & Wansink, 2007). The ones that deviate from the "normal" form are discarded by farmers (Buzby & Hyman, 2012; Gustavsson et al., 2011), producers (Buzby & Hyman, 2012; Kantor, Lipton, Manchester, & Oliveira, 1997) and retailers (Buzby & Hyman, 2012; Loebnitz et al., 2015b), in a way that consumers receive only food with perfect appearance (Gustavsson et al., 2011).

Those products that do not fulfil visual expectations are eliminated from the food supply chain (Raak et al., 2016). Fresh vegetables account for the great amount of avoidable losses if compared to other food categories (Beretta et al., 2013). In analysing the potato supply chain, almost half of the losses occur due to quality standards, with a focus on consumers' preferences (Willersinn, Mack, Mouron, Keiser, & Siegrist, 2015). A research shows that 61.1% of the respondents would pay more for products with visual standards (Marx-Pienaar & Erasmus, 2014), inferring product quality (Göbel et al., 2015; Loebnitz et al., 2015b). Therefore, retailers offer high product standards in order to meet consumers demand (Göbel et al., 2015). Consumers, on the other hand, attribute to supermarkets the responsibility of rejecting imperfect food (Hoek, Pearson, James, Lawrence, & Friel, 2017).

Both consumers and food industry reject food that present different sizes or with cosmetic defects (Buzby et al., 2011). It is known that the appearance of the raw product has an influence on the expectation of its future cooked form (Hurling & Shepherd, 2003). This may explain why the rejection occurs. Moreover, communication between consumers and retailers and between producers and retailers is necessary (Hyde et al., 2001).

A research shows consumers' acceptance of cosmetically imperfect food after provisioning information about the reduced use of pesticides (Bunn, Feenstra, Lynch, & Sommer, 1990). Besides, consumers seem to accept moderate deviations when compared to extreme ones (Loebnitz & Grunert, 2015; Loebnitz et al., 2015) and when have higher environmental concern are more open to cosmetically imperfections (Yue et al., 2009).

2.3.2 Expiration Date

Food is discarded when not use it in time (Evans, 2012a; Jörissen et al., 2015; Parfitt et al., 2010; Parizeau et al., 2015). In household context, this occurs mainly with dairy products (Lebersorger & Schneider, 2014). In supermarkets, consumers' willingness to pay (WTP) decreases with a reduced product shelf life (Aschemann-Witzel et al., 2015; Tsiros & Heilman, 2005). Therefore, consumers tend to buy products with the longest shelf life (Mena & Whitehead, 2008), choosing the freshest onde (Neff et al., 2015) due to safety reasons and to store it for a longer period (Canali et al., 2016). Products near to their expiration date, even with the same nutritional properties, are not considered valuable (Girotto, Alibardi, & Cossu, 2015). In this way, products are disposed before they reach their best before date (Göbel et al., 2015; Payne, 2014), increasing avoidable waste (Waarts et al., 2011).

Date labels are differently interpreted and handled (van Boxstael et al., 2014) and consumers misinterpret them (Canali et al., 2016; Graham-Rowe et al., 2014; Jörissen et al., 2015; WRAP, 2008). Moreover, they tend to rely only on the date indicated on the label (Block et al., 2016). However, expiration dates do not represent a deadline to food consumption (Raak et al., 2016).

Consumers are more likely to consume products that passed its expiration date when they own the product than when they do not (Sen & Block, 2009). With the ownership of the product, endowment effect makes individuals perceive the product as less risky, increasing willingness to consume the food after its expiration date (Sen & Block, 2009).

As a retail strategy, discounts on products that are close to their expiration date are an option (Aschemann-Witzel et al., 2015; Halloran et al., 2014), being a win-win solution for

both consumers and retailers (Tsiros & Heilman, 2005). However, it is necessary to develop consumers' awareness and interpretation of expiration dates and their acceptability to buy those products (Tsiros & Heilman, 2005).

2.3.3 Package Damages

Consumers usually do not buy food products with package defects (Canali et al., 2016; Mena, Adenso-Diaz, & Yurt, 2011). Products damages are not appealing, even if they present the same nutritional characteristics (Girotto et al., 2015). Therefore, supermarkets throw away food that has a minimal damage on the package (Payne, 2014).

Ripped labels, for example, represent contamination cues, activating health and safety concerns (White et al., 2016). Consumers may perceive that the product is contaminated if touched by others (Argo, Dahl, & Morales, 2006). The major problem is that the entire package is discarded if just a single item is damaged (Salhofer et al., 2008) and this damage may occur simply due to logistic operations (Raak et al., 2016).

Bakery defects and broken wafers can be used as ingredients to novel products (Raak et al., 2016). In the same way that branding the product as organic could promote positive brand associations (White et al., 2016).

2.3.4 Suboptimal Food Consumption

The choice of suboptimal foods may occur in the purchasing environment (buy or do not buy) or in household context (consume or do not consume) (Aschemann-Witzel et al., 2015). A major problem is that the judgment of foods' edibility varies significantly from person to person (Blichfeldt et al., 2015). In the same way, there seems to have differences in preferences with context changes. When decisions are taken in supermarkets, consumers have the option to select or not the product, whereas decisions at household level food is already possessed (de Hooge et al., 2017). It is necessary, therefore, to define the context where the consumption of suboptimal food occurs.

Create accessibility, visibility and availability is essential (Hoek et al., 2017), opening markets to these products (Priefer, Jörissen, & Bräutigam, 2016). Whereas, with the same attributes, consumers will choose the visual perfect ones (Canali et al., 2016; Creusen & Schoormans, 2005). However, this pattern of perfection creates a cycle of behaviour (Block et al., 2016) and, therefore, a cycle of waste.

Consumers seem to need an external motivation to buy suboptimal food products. It is important, therefore, to create the opportunity to consumers buy suboptimal foods (Aschemann-Witzel et al., 2016). The literature shows some aspects that affect purchases intentions toward suboptimal food.

When purchasing food products, people are more willing to accept visual imperfections when they report environmental concern (Yue et al., 2009) and when pursue knowledge about food waste issues (Loebnitz et al., 2015). Behaviours that result into waste are considered environmentally significant behaviours (Farr-Wharton et al., 2014). Therefore, purchasing suboptimal food products may constitute pro-environmental behaviour (Loebnitz et al., 2015) and a way to act environmentally friendly (de Hooge et al., 2017). For environmental behaviours, when individuals have a value orientation it predisposes them to be sensitive to information (Stern, Dietz, & Kalof, 1993).

Analysing an environmental concern perspective, people are presumed to engage in environmental behaviours based on their expectations how the attitude object affects what they value (e.g. concern for the environment) (Stern & Dietz, 1994). This means that to engage in environmental behaviours consumers must, at some level, intrinsically care about the environmental issues. When individuals have a concern for the environment it drives different green behaviors (Pagiaslis & Krontalis, 2014).

An antecedent of pro-environmental behaviour intentions is awareness of environmental problems (Schwartz, 1977; Stern, 2000). Waste aspects, such as awareness of food waste issues, perceived food waste of the household and perceived importance of food waste affected behaviours toward suboptimal food (de Hooge et al., 2015; Loebnitz et al., 2015).

Therefore, both concern and knowledge have positive impact on behavioural intention of green behaviour (Pagiaslis and Krontalis, 2014) and are used in this study in trying to influence a pro-environmental behaviour (Schwartz, 1977; Stern, 2000; Stern et al., 1993), named suboptimal food consumption.

With that mentioned, the following hypothesis emerge:

H1a: Environmental concern will positively influence intentions to purchase suboptimal food products.

H1b: Food waste problem awareness will positively influence intentions to purchase suboptimal food products.

2.4 FOOD WASTE SOLUTIONS

There is not only one solution to deal with food waste, especially with suboptimal food products. This section explores some solutions found on the systematic review that can help consumers to reduce their levels of waste. Strategies and actions require a combination of multiple actors (Aschemann-Witzel et al., 2015). From the food waste hierarchy, the most advantageous action to deal with food waste is prevention (Papargyropoulou et al., 2014). Avoiding food surplus from the entire supply chain, including the consumption phase, preventing avoidable food to be disposed, is the most favourable solution. The efforts found to move to an anti-wastage behavior are classified in *macro-environmental change, retailers' engagement*, *raise awareness of the issue,* and *creating anti-wastage social norms* and are based on the results of the systematic literature review.

Macro-environmental changes can be hep efforts to food waste reduction. First, well defined regulations and policies are more effective than fiscal measures (Chalak et al., 2016). Therefore, clear regulations in the way that date labels are used to help consumers' understanding (Aschemann-Witzel et al., 2016), can move to a less wasteful behavior. The same applies to suboptimal food consumption, with regulations to extinguish aesthetical standards (Aschemann-Witzel et al., 2016).

Institutional changes in food waste collection systems (Parizeau et al., 2015) and creation of necessary infrastructure (Bernstad, 2014) to push household members to participate in recycling activities can also be a food waste reduction effort. Laws encouraging the development of close-loop supply chains (Parfitt et al., 2010) can stimulate business behavior to develop more sustainable operations and engage their customers in their activities toward waste reduction.

Retailers' engagement in helping consumers to avoid food waste is created with actions in the way that the food is sold and with alternative solutions. Retailers should start to sell suboptimal food, with price reduction or create different categories of products (Aschemann-Witzel et al., 2015). Moreover, it is necessary to create a context where consumers can have an opportunity act against food waste (Aschemann-Witzel et al., 2017a). Accessibility, convenience and infrastructure seems to impact household waste recycling behaviour (Bernstad et al., 2014). This could also be applied to waste reduction as a whole. Packaging solutions should be provided, with food protections improvements (Silvenius et al., 2014) and innovative alternatives (Aschemann-Witzel et al., 2015). For example, if different packages sizes were an option, consumers could choose the one that fits the best on his demand. The same applies to

excessive purchase due to high availability of fresh produce (Marx-Pienaar & Erasmus, 2014). With a reduced offer, consumers would have a different purchase environment and, therefore, may gradually change old habits. Likewise, practical interventions, such as sensory skills (Principato et al., 2015), could help with proper freshness and expiration dates awareness.

A great barrier in trying to reduce consumer food waste lays on their idea that only food industry and retailers are responsible for the issue, diminishing the individual responsibility (Graham-Rowe et al., 2014). However, it is possible to find three approaches to reduce food waste in the retail-consumer interface (Aschemann-Witzel et al., 2017a). The first is related to information and capacity, focused on consumers' motivation to deal with the issue. Second, in redistribution initiatives, food that would be discarded is transferred to other parts (e.g. food banks). And with supply chain initiatives it is possible to develop new opportunities to consumers behave against food waste, changing retail usual practices (Aschemann-Witzel et al., 2017a). These three approaches encompass multiple non-exclusive actions with different results to reduce food waste.

It is possible to observe a movement going towards change. The French retailer Intermaché created a campaign, called "inglorious" fruits and vegetables, Albert Heijn from Netherlands used baskets of suboptimal fruits and vegetables to sell on their store, Imperfect redistribution from US sells boxes with suboptimal food (Aschemann-Witzel et al., 2017a). About marketing and sales strategies, retailers can use innovative solutions to sell products with special offers. For example, TESCO supermarkets in the UK started to sell "buy one, get one free later" (Mondéjar-Jimenez et al., 2016). This initiative avoids products to expire when buying more than needed.

An additional effort to move to anti-waste behavior is *raising awareness of food waste issues*. There is a focus in educating consumers in food management skills, which are related to behavioral factors (Figure 1). In trying to rise awareness, campaigns should be directed to specific topics, instead of generic approaches (Sharp, Giorgi, & Wilson, 2010), focusing on daily routines changes (Abeliotis et al., 2014): starting by a systematic approach to food storage, mainly to inform about food items they already have can reduce stockpiling and over-purchasing. Planning meals in advance, re-se of leftovers, understanding of date labelling, reduce consumption of perishable foods and adequate storage need to be integrated in food management skills to reduce food waste as part of an effective food management strategies. Information should be repeatedly provided and using different sources to reach different consumers segments (Aschemann-Witzel et al., 2015).

Domestic practices from food cycle include planning, shopping, storage, preparation,

consumption, storing prepared food and final disposal (Farr-Wharton et al., 2014; Porpino et al., 2015) and each of them can generate significant amounts of avoidable food waste. In household food provisioning, the Waste and Resources Action Programme (WRAP, 2007) established a plan for consumers reduce food waste, including: planning meals, checking food before shopping, using a shopping list, using right storing packages for specific types of food, storing vegetables on the fridge (apples and carrots), using the freezer to extend the shelf-life of food, portioning food, using leftovers, and using date-labels on food. Therefore, planning routines play an important role (Principato et al., 2015; Stefan et al., 2013).

Consumers programs could have a positive impact with the aforementioned (Secondi et al., 2015), focusing on the desire to do the "right" thing as motivations to minimise food waste (Graham-Rowe et al., 2014).

Finally, c*reating anti-wastage social norms* can stimulate negative attitudes toward wasteful behaviours (Gjerris & Gaiani, 2013; Radzyminska et al., 2016). The awareness of food waste production potentially reduces the amount of waste (Parizeau et al., 2015; Principato et al., 2015) and intention to not waste food is determined by social norms and attitudes toward food waste (Stancu et al., 2016). This is reinforced for individuals that have a strong concern to the environment (Diaz-Ruiz et al., 2018; Hamerman et al. 2018; Melbye et al., 2017). Informing about the issues associated with food waste, focusing on the environmental problems of it, can induce individuals to act in an anti-wastage behaviour. Therefore, an environment where individuals known the consequences and the importance of reducing their waste is a potential driver to food waste reduction. The behaviours and actions against waste reduction need to become visible (Sharp et al., 2010) as part of the prevalent social norms.

Based on the solutions for food waste problems, the next section explores interventions to support efforts to waste reduction and ways to help individuals to behave in a less wasteful way in buying suboptimal food products. For this, social influence mechanisms are discussed.

2.5 NORMATIVE SOCIAL INFLUENCES

Social norms have the power to drive consumer decision making (Melnyk al., 2010). They represent the common and accepted behaviour for a specific situation (Göckeritz et al., 2010), directly influencing attitudes, intentions, preferences and choices (Cialdini et al., 1990; Melny et al., 2011). The theory of normative conduct (Cialdini et al., 1990) differentiate between two normative influences, injunctive norms and descriptive norms. Injunctive normative beliefs represent what someone thinks others approve or disapprove, while

descriptive normative beliefs refer to what someone thinks others do in a particular situation. Therefore, the first refers to "ought" norms, while the latter refers to "is" norms.

Injunctive norms inform social rules (Lapinski & Rimal, 2005) and consumers may adhere them in order to avoid disapproval (Melnyk et al., 2013). These norms may generate positive and negative thoughts about the behaviour (Melnyk et al., 2011), representing action to conform positively with others' expectations (Deutsch & Gerard, 1955).

Descriptive norms act as a "behavioural standard" that consumers may choose not to deviate from (Schultz et al., 2007). They signal what is likely to be effective or the usual behaviour in a particular situation (Cialdini et al., 1990; Cialdini & Trost, 1998) and the adopted behaviour of a specific group (White & Simpson, 2013). These norms motivate through preferred behaviours and appropriate actions (Melnyk et al., 2013).

Injunctive norms and descriptive norms operate independently from each other (Rimal & Real, 2005). Injunctive norms have a larger effect on attitudes, whereas descriptive norms have a greater effect on behaviour (Melnyk et al., 2010). Individuals, though, tend to deny the influence of normative influences. "Naïve explanations" deceive people to understand the true cause of the behaviour (Nolan et al., 2008). With a survey, consumers rated descriptive norms as the least influencing factor on their behaviour (energy conservation). However, a field experiment showed in the same study that descriptive norms had the strongest effect on consumers' behaviour toward energy conservation (Nolan et al., 2008). This effect suggests that social norms influence the behaviour unconsciously (Göckeritz et al., 2010).

Social norms are maximized in uncertain, ambiguous and unclear situations (Cialdini & Goldstein, 2004; Lapinski & Rimal, 2005; White & Simpson, 2013). When consumers are uncertain of a particular behaviour, they tend to look to the behaviour of others (Rimal & Real, 2005), searching evidences of how to act (Griskevicius et al., 2008). The authors stress that this mechanism will particularly occur when conditions have changed, such as an introduction of a new green product.

This may be the case when retailers stop rejecting suboptimal food (Loebnitz et al., 2015) and start to sell them. Consumers may face confusion or uncertainty when fruits and vegetables with different appearance, products with close expiration date or products with damages in package start being sold. Normative influences could, therefore, guide consumers' behaviour towards buying suboptimal food products. With behaviours occurring in public settings, such as supermarkets, normative influences have greater effects (Lapinski & Rimal, 2005).

As afordmentioned, creating anti-wastage social norms can help individuals to reduce

their waste levels (Gjerris & Gaiani, 2013; Radzyminska et al., 2016; Stancu et al., 2016). However, thus far this mechanism was not use with suboptimal food products.

With this logic, it is presented the second hypothesis:

H2a: Suboptimal food products with injunctive norms will produce higher purchase intentions toward the products than suboptimal food products with no influence.
H2b: Suboptimal food products with descriptive norms will produce higher purchase intentions toward the products than suboptimal food products with no influence.

It is also important to analyse under which mechanisms the norms influence behaviour. Lapinski and Rimal (2005) postulated that norms have greater effects when self-identity is closer to the behaviour. Additionally, stronger influences occur when individuals receive the norms from a group that they perceive to be similar to themselves (Rimal & Real, 2005). Group identity refers to affinity or desire connections with the group and increases the explicative mechanism of the norms (Lapinski & Rimal, 2005).

Moreover, the effectiveness of normative influences depends on whether consumers believe or not the message (Polonec, Major, & Atwood, 2006). Individuals that believe in the message have higher intentions to follow the behaviour (Melnyk et al., 2011). This occurs through outcome expectations, which represents an engagement in the behaviour that is perceived to be beneficial (Rimal & Real, 2005), maximized when the outcomes are more positive for others than for the self (Verplanken & Holland, 2002).

After receiving the message with the norm, individuals need to perceive that there are actions which could help to achieve the goal of the message and also that are problems that need to be solved (Schwartz, 1977). In this way, awareness of the consequences of the behaviour is central, specially when promoting environmental behaviours (Redman & Redman, 2014). To suboptimal food, Loebnitz et al., (2015) found that intentions to purchase fruits and vegetables with an unusual appearance are influenced by awareness of food waste problems. Schwartz (1977) postulates that the trait awareness of consequences mediated the impact of norms on altruistic behaviours.

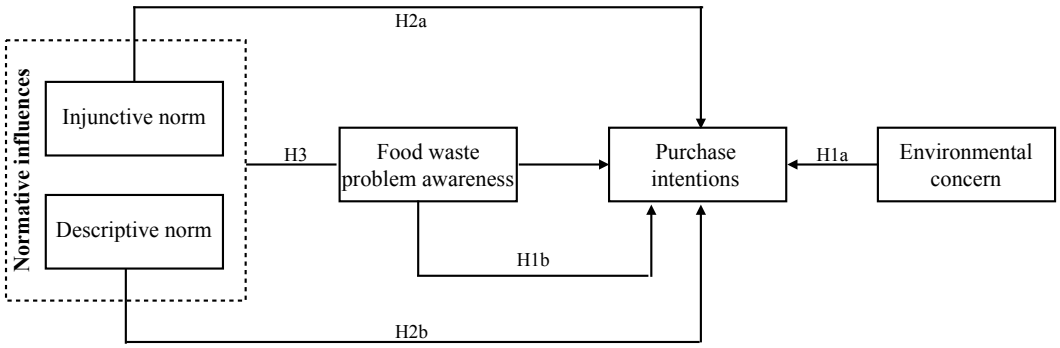
In this way, in line with previous research, food waste problem awareness positively influences intentions to purchase suboptimal food (Hypothsis 1b) and a possible explanation for the mechanism of influence of the norm is trough this awareness. Consequently, for the purpose of this study, it is assumed that the effect of the normative influences on purchases intentions toward suboptimal food (Hypothesis 2a and Hypothesis 2b) will be mediated by

awareness of food waste issues. With that mentioned, the following hypotheses emerge:

H3a: Food waste problem awareness mediates the relationship between norms and purchase intentions toward the products.

Based on the research hypotheses presented during the theoretical discussion, the theoretical model of analysis is presented in Figure 2. In this model, we start with what was found in the literature, that suboptimal foods decrease purchase intention, being already tested (de Hooge et al., 2017; Loebnitz & Grunert, 2015; Loebnitz, et al., 2015). From this, we assume that environmental concern (Hypothesis 1a) and food waste problem awareness (Hypothesis 1b) will positively impact intentions to purchase suboptimal food products. Moreover, it is assumed that suboptimal food products with injunctive and descriptive normative influences (Hypotheses 2a and 2b) will produce higher purchase intentions toward those products. Finally, the model also describes the indirect path of the effect of norms on purchase intentions, through food waste problem awareness (Hypothesis 3).

Figure 2 - Proposed hypotheses



3. METHOD

This research started with a thorough literature review on the subject, to develop research background and identifying research gaps. Then, a systematic review was performed to analyse food waste in the consumer level. From the results of this phase, it was possible to find different approaches to deal with food waste issues and find alternative solutions to this problem (in the previous chapter). Based on this phase, the hypotheses were created.

The following methodology used was designed to test the hypotheses. The first study was a preliminary study to support the second one. It was used different messages appeals to capture real purchases frequencies of suboptimal food products to use as the prevalent norm in the second study.

The second study was designed to test hypotheses: H1a) Environmental concern will positively influence intentions to purchase suboptimal food products; H1b) Food waste problem awareness will positively influence intentions to purchase suboptimal food products; H2a) Suboptimal food products with injunctive norms will produce higher purchase intentions toward the products than suboptimal food products with no influence; H2b) Suboptimal food products with descriptive norms will produce higher purchase intentions toward the products than suboptimal food products with no influence; and H3) Food waste problem awareness mediates the relationship between norms and purchase intentions toward the products.

The best approach for the study is the quantitative one. Quantitative studies enable the researcher to measure and test the relationships between variables, using statistical calculations. The experimental method was chosen due to the fact that with experiments it is possible to use a combination of different variables and variations to discover what can happen with the phenomenon studied (Shadish, Cook, & Campbell 2002). This is the causal relationship, where an intervention is deliberately introduced in order to analyse its effects. Therefore, the experimental method seems to fit with the hypotheses created, being appropriate for this study.

In the following the studies that compose this dissertation are described.

3.1 STUDY 1

The first study was created to test different messages appeals and to analyse which one produced higher frequencies of purchases toward suboptimal food products. Specifically, the study analysed the influence of environmental, social and financial messages on the acceptance of suboptimal food. These three claims are motivators for food waste reduction (Graham-Rowe

et al., 2014; Lazell, 2016; Parizeau et al., 2015; Principato et al., 2015; Quested et al., 2011; Stancu et al., 2016), being in accordance with the sustainability dimensions (Elkington, 2002). To create a realistic scenario in study 2, with normative influences, study 1 was used to select the message type that produced higher purchase frequencies toward the products and the frequency of individuals that would by them, as an indication of the prevalent norm.

3.1.1 Research Design

Studies with one independent variable are called single-factor designs, whereas studies involving more than one independent variable (factors) are defined as factorial design (Goodwin & Goodwin, 2013). This study was composed by two factors. The first one, message type, had three levels (environmental message, social message, and financial message). The second factor, suboptimal products, had three levels (food appearance, expiration date, damaged package). A control group was used, where respondents received no message in the first factor, just receiving instructions of the study and the suboptimal products images. Therefore, this study was a 4 (message type: environmental, social, financial, without message) X 3 (suboptimal food: appearance, expiration date, package damaged).

When subjects are exposed to one treatment and its analysed differences between subjects in different treatments, the study is considered a between-subject design (Hernandez et al., 2014). When subjects are exposed to all treatments, participating in each level of the independent variable, the study is within-subject design. When using both previous options, exposing subjects to different treatments of one or more factors and to all treatments of other factor (Hernandez et al., 2014) the study is considered a mixed-design. This study is classified as mixed-design, whereas in the first factor, participants where exposed to only one type of message (environmental, social, financial or no message), and in the second factor, respondents visualized the three different images, one for each type of suboptimal food.

Experimental studies can be described as randomized experiment or quasi-experiment (Malhotra, 2006). In the first case, subjects are assigned to conditions randomly, whereas in the second case subjects are not randomly assigned to conditions. Participants' randomization is used to keep unsystematic variation to a minimum level to achieve a more sensitive measure of the manipulation (Field, Miles, & Field, 2012). In this way, study 1 can be considered a randomized experiment, where subjects were randomly assigned one of the four conditions.

3.1.2 Participants

An experiment was conducted with participants from a university of the south of Brazil, in Rio Grande do Sul State. Total sample size was 127 students. The age mean was 24.78 (σ = 4.43), with the majority of respondents (52%) being female.

Participants were invited to participate in a study about food consumption in their classroom using their smartphone or notebook. The website of the research was written in the blackboard and participants answered the experiment in their smartphone. When opening the research, participants were automatically assigned to one of the four conditions.

The number of participants in each experimental condition ranged from 29 to 33 subjects. Among the experimental groups, no gender ($\chi 2(3) = 3.547$; p = .315) or age ($F(3,123) = 0.605$; p = .613) differences were found, which implies that the groups are homogenous in demographic aspects.

3.1.3 Procedures

Even if this study was not performed in a specific laboratory, it can be considered a laboratorial experiment, since it was applied in a room using a simulation of the situation. To avoid socially acceptable responses, the study was not applied in disciplines related to environmental issues.

The study was applied at the beginning or at the end of the classes and it was asked to participants answer the study individually and not to talk after finished. After a brief introduction of the researcher, participants were invited to participate in a study about food consumption. However, the main goal of the research was not mentioned. The study was created on Qualtrics and the research link was used to access the questionnaire. The link was simplified by "Google URL Shortener" in trying to avoid typing errors. Participants had to copy the link in their smartphones or notebooks to access the research. After the access was succeed, participants were automatically assigned to one of the four conditions.

Participants read the following situation:

Imagine that you are going to buy three different food products in the supermarket. You will be exposed to the products and should indicate whether you would buy them or not. Please see these options as if you were actually in the supermarket.

After, participants saw one of the three images with the message of their condition and had to indicate whether they would purchase the product or not. The same was repeated with the other two images. To avoid order effects, the images were counterbalanced.

In the environmental condition, each product had the following message:

Knowing that you can show respect for nature and help save the environment buying this product, would you buy this product?

In the social condition, the images were presented with the following message:

Knowing that millions of people live in extreme hunger and that you can help future generations buying this product, would you buy this product?

In the financial condition, the message with the products was:

Knowing you can save your money buying this product, would you buy this product?

Finally, the control group received no message, the products were exposed with by the following question:

Would you buy this product?

Additionally, it was collected demographics and control variables to describe subjects. The final configuration of the study was verified by a previous pre-test, described in section 3.1.5. The scenario is presented in Appendix B.

When the research was completed, participants were asked to not talk to their colleague in order to not disturb who was still answering the survey. When the study was applied at the end of the class, who finished the research could leave the room.

3.1.4 Measurements

In this study it was used different types of measurements. The order used in the study was: dependent variable; manipulation check measures; write down the thoughts, variables of control; and demographics.

Dependent Variable

The dependent variable was a binary categorical question. After seeing the images of each product, participants were asked if they would buy those products, with "yes" or "no"

options. In the end, each participant answered three dependent variables. The purpose of this questions was to analyse purchase rates of each product.

Manipulation Check

Manipulation check measurements were used to very the effectiveness of the independent variable manipulation. Whereas this study had two independent variables manipulated (message type and suboptimal food), there was different manipulation checks, one to each independent variable. The manipulation check of the type of message was a categorical question and participants were asked to indicate if when asked about the products they read a question about:

- Issues related to the environment;
- Issues related to social problems;
- Financial issues;
- None of the above options.

The manipulation check occurred by checking the frequency of responses to each alternative in each experimental condition, mainly analysing whether these corresponded to the experimental situation in which the individual was assigned.

The manipulation check of the product appearance and damaged package was made asking the subject to give their opinion, in a 7-point scale, about:

- The appearance of the carrot previously viewed (1- appearance very similar to traditional patterns; 7 - appearance very different from traditional patterns);
- The packaging conditions of the biscuit previously viewed (1 - packing not damaged; 7 - packing too damaged).

Finally, the manipulation check about the expiration date was an open question asking to indicate the remaining days until the yogurt expire.

Write the thoughts

In this section of the study, participants were asked to write down the thoughts they had after seeing the products. This question was based on Melnyk et al. (2011) and intended to capture the participants' perceptions about the images, what sometimes it is not possible to achieve with closed-ended questions. Also, it was captured the valence of the thoughts (positive

and negative), that could influence the behaviour (Melnyk et al., 2011). This question was qualitatively analysed in order to capture different insights about the study.

Control Variables

Variables of control were used to control possible intervening conditions. It was controlled the number of times the respondents cook in a week ($M = 3.21$); how many times in one week respondents buy at the supermarket ($M = 2.00$); if the individuals usually consume carrot (yes or no) (74.80% yes), yogurt (61.42% yes), and biscuit (61.90% yes).

Additionally, in the end of the study there was an open answer question used as debriefing. Participants were invited to write if they had difficulty to answer the survey or any have questions or suggestions.

3.1.5 Pre-test

Before applying study 1, two different pre-tests were performed. The first one intended to select the images to use in the main study. Whereas the second pre-test was performed to verify the effectiveness of the manipulation, using the scenarios, the scales and main procedures.

Pre-test with images

To select a product with different visual appearance, with a damaged package and one close to its expiration date a pre-test was conducted, consisting of a short survey applied with a convenience sample ($n = 21$). To select the products, different sources were consulted in order to choose relevant products to the Brazilian scenario.

First, it was analysed the categories of products with higher levels of food waste in FAO's reports (2013, 2014). The main categories presented in the reports were fruits, with 55% of the fruits produced being wasted, and roots and tubers (40%). Additionally, it was used the Analysis of Personal Food Consumption in Brazil (2008-2009) from the Brazilian Institute of Geography and Statistics (IBGE, 2011), to select products most consumed by Brazilian population. The analysis shows that meet, milk and dairy products, baking and drinks and infusion represent the categories of food most consumed. To complement the analysis, it was visited local supermarkets and searched in the internet real cases of Brazilian supermarkets that

already sell suboptimal food[1], mainly to understand which categories of products are usually used by them as suboptimal food. From this, it is possible to affirm that supermarkets usually sell cheese and yogurt close to its expiration date (usually with reduced price).

After initial analyses, a short online survey with 11 different products was applied. The products used were: 4 vegetables with different visual appearance (carrot, tomato, sweet potato and manioc); 2 fruits with different visual appearance (apple and banana); 3 products with a damaged package (a package of biscuit, a juice and a coffee package); and 2 products with a close expiration date (a yogurt and a package of cheese). The images were selected on the internet or artificially created by the researcher[2].

The products with an unusual appearance were selected from the internet, with real cases of fruits and vegetables different from usual standards. For the products with a close expiration date, the images were selected from the internet and the expiration date was edited. It was chosen to use two days remaining until the expiration date. This decision was made by the researcher after analysing the conditions under which supermarkets could sell the products and after searching for real cases to compare. Also, the time to the expiration date in previous studies was one day (Aschemann-Witzel, 2018).

It is important to note that it is prohibited for supermarkets to sell products after the expiration date has passed with a law number 8.137 from December 27 of 1990. In the cases analyzed usually the products had at least a week until the date expires. In this way, it was chosen two days reaming in order to balance between the law and the real cases found. And for products with damaged packaging, the researcher bought some products and damaged the package in order to have a "suboptimal appearance".

The pre-test captured 21 answers from a convenience sample with people that did not know the purpose of the research. The questionnaire was sent via social media and questions were about characteristics of the products. With fruits and vegetables, participants were asked to rate in a 7-point scale about the appearance of each product (1 = appearance very different from usual standard and 7 = appearance very similar from usual standard). In the products with a damaged package and close expiration date, respondents were asked to rate in a 7-point scale about the ease to find a product in those conditions on the supermarket shelves (1 = very

[1] This term is not commonly used. The author searched for products with different visual appearance, close to its expiration date and/or with a damaged packaging being sold by Brazilian supermarkets.
[2] This means that the researcher bought some products and damaged their packages. It is important to note that the products were consumed later.

difficult to find and 7 = very easy to find). After each image an open question allowed the respondents to write their impressions, if wanted.

The images with the lowest mean evaluation provided the appearance very different and very difficult to find in the supermarkets (Table 4).

Table 4 - Products analysed

Product	N	Mean	Std. Deviation
Carrot	**21**	**1.95**	**1.16**
Banana	21	2.3	1.35
Tomato	21	2.9	1.64
Manioc	21	3.7	1.62
Apple	21	3.8	1.81
Sweet potato	21	3.95	2.06
Juice	**21**	**4.55**	**1.47**
Cheese	**21**	**4.95**	**1.80**
Yogurt	21	5.15	1.77
Coffee	21	5.55	1.32
Biscuit	21	5.6	1.46

The mean results of the products with damaged package (M_{juice} = 4.55) and close expiration date (M_{cheese} = 4.95) were considerable high. However, the analysis of the open answer questions revealed that respondents perceived that the juice box was kneaded and the cheese was about to expire *"Some were broken or about to be expire."* R8, *"Damaged packaging can damage the product and the expiration it depends on the product and form of consumption."* R14. Therefore, the products used in the second pre-test were: a carrot with unusual appearance; a juice box damaged; and a package of cheese with two days remaining to its expiration.

Pre-test with scenarios

The second pre-test was created to check for manipulations efficacy. Therefore, the study was applied with 29 graduation students, in their classroom. The procedures of the study were the same described above.

When asking to participants answer if they *"Believe that the benefit related to the purchase of the products was..."* (an environmental appeal, social, financial or no appeal), only 44.83% of the respondents chose the right option. Also, respondents usually changed the environmental message for the social one. In this way, two modifications for the final study were made. The first one was to change the messages, specially the environmental and social. It was chosen words that were exclusively related to the environment in the environmental

message and the use of social aspects in the social message. In doing this we hoped to highlight these aspects in each message. The second modification was in the way that the manipulation check was measured[3]. The final description of the question is described above.

When analysing the open answer question (write the thoughts), a considerable rate of the respondents answered wrote about safety concerns when visualizing the juice: R16 *"...the fact that the packaging is damaged may have some remnants of the inner packaging material...and gone into the juice, which would cause poor health ...";* R25 *"But the packaging of an industrialized product damaged may represent a change in the quality of the product contained therein..."*. In order to reduce intervenient effects, such as safety concerns, we decided to change the product with a damaged package. Therefore, in the next study we used a broken biscuit.

Additionally, in the same question, some participants indicated that they would not buy the package of cheese because *"I do not know if I would eat everything until it expired"* (R14) and *"...it would certainly like to spoil my refrigerator, since I need more than two days to consume"* (R27). It seems that some individuals would not buy the product because they anticipate the waste of the food in the household level. This attitude is desirable and signals that individuals are conscious about their purchases. Therefore, we decided to change the product to a package of yogurt, due to the fact that is easier to consume a single yogurt in just one occasion (unlike a package of cheese).

After these adjustments, a sample of 25 students were recruited and participated in the study. Since no modification was needed and participants did not highlight any problems or doubts, they were added to the final database.

3.1.6 Data analyses techniques

To analyse categorical data, specific techniques are necessary. Logistic regression is used when the outcome variable is a categorical variable (Hair et al., 2009). One of the assumptions of this test is that responses of different cases are independent of each other (Tabachnick & Fidell, 2007). However, cases in this study are assumed to be both independents, with between-subjects design, and dependent, with within-subjects. Therefore, usual logistic regression procedures are inappropriate because of correlated errors (Tabachnick & Fidell,

[3] Mainly because in the way it was the MC measured it was requested to participants to make an evaluation, what is not necessary in this study. We only want to measure their impression about the message used.

2007).

For study 1, a solution to analyse this data was to use Generalized Estimating Models (GEE) (Zeger & Liang, 1986). The GEE method estimates the regression parameters when the data is correlated (Zeger & Liang, 1986; Liang & Zeger, 1986) and it is a generalized model of logistic regression for within-subjects design (Ge, Häubl, & Elrod 2011; Liang & Zeger 1986).

With this model, it is possible to test main effects and interactions from categorical or continuous variables. GEE is a solution to test hypotheses with factors on binary distributed response variables collected within subjects (Zeger & Liang, 1986). Being an extension of generalized linear models, the regression analysis on the depended variable are possible when data are not normally distributed (Ballinger, 2004).

3.1.7 Statistical assumptions for analyses

Before proceeding to the main results of analyses, it is essential to check possible errors in the data (Pallant, 2011). In this way, frequencies analyses of each variable were performed in order to look for values outside the range of possible values for the variables and also to detect missing values. In this study, no missing data and outliers were identified in the observed variables.

After the identification of the outliers, the tests were performed to verify the suitability of the base to the statistical assumptions necessary. GEE method is not very sensitive to the violation of normality, so no tests were necessary on this assumption.

3.1.8 Results

Based on the procedures mentioned, data from study 1 was analysed. In this way, first the manipulation check was analysed, followed by the main analysis.

Manipulation Check

To analyse the manipulation check, a cross table between the manipulation check variable and the message type was made of each individual. Table 5 presents the results of the frequencies (%).

Table 5 - Manipulation Check of the message type

	Message Type - Frequency %			
Manipulation Check	**Environmental**	**Social**	**Financial**	**No message**
Issues related to the environment	**75.8**	-	12.1	21.9
Issues related to social problems	3.0	**79.3**	18.2	3.1
Financial issues	-	3.4	**66.7**	9.4
None of the options above	21.2	17.2	3.0	**65.6**
Total	100	100	100	100
N	33	29	33	32

According to the results, it is possible to affirm that from the individuals assigned to the environmental message, 75.8% of them perceived that the questions they read had issues related to the environment; in the social message condition, 79.3% of the individuals belied the question read had issues related to social problems; 66.7% of the individuals assigned to the financial message answered they read questions presenting financial issues; and in the control group, 65.6% of the individuals answered none of the options above. To compare differences in the results between those that correctly answer the manipulation check and the entire sample, main analysis was performed only with individuals that answered the manipulation correctly. However, the results between the two samples did not differ and main analysis was performed with all respondents.

When analysing the manipulation check of the suboptimal food products, the image with an unusual appearance (M = 5.91; p = 0.328)[4], with a close expiration date (M = 1.81; p = 0.119)[5], and a damaged package (M = 4.01; p = 0.284)[6] were perceived as suboptimal, with no difference between conditions.

Dependent Variable

The analysis of the dependent variable (buy or not the product) was made with frequencies analyses. Table 6 shows the results for each message type and each suboptimal product.

[4] 7-point scale, where 1 = appearance very similar, 7 = appearance very different.
[5] This MC asked participants to indicate the remaining days until the product expire (correct answer = 2).
[6] 7-point scale, where 1 = package not damaged, 7 = package too damaged.

Table 6 - Frequency of puchases (yes) %

Message type	Appearance	Expiration date	Package
Environmental	66.7	45.5	45.5
Social	**72.4**	**58.6**	**69.0**
Financial	63.6	57.6	57.6
Control	28.1	43.8	21.9

Across the four experimental groups, the generalized estimating equations model was performed to analyse if individuals buy the product considering the type of message, image, and interaction between these two factors. The suboptimal food was the repeated measured in the model. From the results, there is a significant difference to the message type effect (X^2Wald (2) = 24.501, $p < .000$) (see Table 7). The suboptimal food factor and the interaction between the suboptimal type and the message were not significant ($p = .270$ and $p = .237$, respectively).

Table 7 - Score statistics for GEE analysis

	Type III		
Source	**Wald Chi-Square**	**df**	**Sig.**
(Intercept)	.641	1	
Message type	24.501	2	0.000
Suboptimal food type	2.615	2	0.270
Message type*suboptimal food type	8.014	6	0.237

Pairwise comparisons show that there is a significant difference between the control group and the other types of messages. It was not found significant differences between the three messages types (environmental, social and financial), see Table 8.

Table 8 - Contrast Results for GEE analysis

(I) Message	(J) Message	Mean Difference (I-J)	Std. Error	df	Bonferroni Sig.	95% Wald Confidence Interval for Difference	
						Lower	Upper
Environmental	Social	-0.14	0.085	1	0.561	-0.36	0.08
	Financial	-0.07	0.081	1	1.000	-0.28	0.15
	Control group	.22[a]	0.075	1	0.019	0.02	0.42
Social	Environmental	0.14	0.085	1	0.561	-0.08	0.36
	Financial	0.07	0.081	1	1.000	-0.14	0.29
	Control group	.36[a]	0.075	1	0.000	0.17	0.56
Financial	Environmental	0.07	0.081	1	1.000	-0.15	0.28
	Social	-0.07	0.081	1	1.000	-0.29	0.14
	Control group	.29[a]	0.071	1	0.000	0.1	0.48
Control group	**Environmental**	**-.22[a]**	**0.075**	**1**	**0.019**	**-0.42**	**-0.02**
	Social	**-.36[a]**	**0.075**	**1**	**0.000**	**-0.56**	**-0.17**
	Financial	**-.29[a]**	**0.071**	**1**	**0.000**	**-0.48**	**-0.1**

a The mean difference is significant at the .05 level.

From the results, it is possible to affirm that the messages in fact influenced consumers to buy suboptimal food, seeing that the control group, that received no message, had the lowest frequency for the buying option when compared to the other groups (28.1% for appearance, 43.8% for expiration date, 21.9% for package damaged). However, there was no significant difference between the three messages. In order to create a prevalent norm to use in the second study, the social message was used due to the fact that it produced higher frequencies of purchases (%).

Write the thoughts

To analyse the open answer question, a qualitative approach was used. Each answer was analysed in NVivo Software according to pre-defined categories. From the analysis, it is possible to affirm that respondents had different opinions and perceptions about the products. The great majority commented about the different appearance of the products and how unusual it is to find them in the supermarkets.

Some of them had positive thoughts when visualizing the three images, as mentioned by R1 *"Products different from the standard generally found, but still good for consumption."* and R5 *"(...)even if the products are different, they do not lose their functional characteristics."*. However, some of the respondents had negative thoughts after seeing the products. It is the case of R9, who mentioned *"Products with strange appearance and close expiration date. I would*

not buy them, because if I am buying something it has to be in perfect condition and with a longer shelf life". R24 has a similar opinion, when writing *"(...) high standard of requirement when we are in the role of consumers".* This only reinforces the search for perfection when buying food products.

In the same way, some of the respondents blamed the retailers for the bad condition of the products: *"The environment that sells these products does not have quality inspection, could be sold at cost price, as hardly people buy products with this appearance." R65*; and *"Products that have not been sold because they are defective."* R30.

Some of the respondents perceive the unusual appearance and conditions of the products, but at the same time recognize that they are in perfect conditions for consumption. R49 mentions that *"They are products that are not perfect from the point of view of the consumer but does not mean that they are spoiled products. Only the yogurt would have to be consumed in a shorter time frame".* At the same time, the individuals recognize their search for perfection, as R51 mentions *"I imagine that it would be the last items to be chosen in a supermarket if they were to be chosen. Were good images to instigate the importance we give to visual perception of food at the time of purchase.".*

About each product, it is possible to find comments on their condition. Some respondents believed that the carrot with a different appearance was not natural and refers to *"(...) pesticides, poison (...)"* R12, and R38 *"(...) I would not buy a carrot deformed by the probability of using toxic components and visible mutations in the product (...).".* R45 *"I would not buy the carrot because when I buy vegetables I look for the most beautiful one (...)".*

When analysing the thoughts of the yogurt, respondents noticed the close expiration date. Some of the respondents, in predicting that they would not consume the product until reach the expiration date, decided not to buy the product, as mentioned by R21 *"(...) The only thing I would not buy is the yogurt because I would not know if I would consume it on time.".* Moreover, some of the respondents have safety concerns when buying a product with a close expiration date *"(...) the yogurt could give me a health problem by its expiration date (...)"* R23. However, if the consumption of the product would happen before the expiration date, respondents seems to accept the product, *"I do not see a problem in buying a product that will expire in two days if I want to consume it soon."* R4 and *"The yoghurt I do not see any problem if I had bought to use it on the day of the purchase."* R2.

About the biscuit damaged, respondents tend to search for a perfect product, as stated by R9 *"The broken biscuits would make me look for another package without "defects"."* and R13 "*If the package is closed I do not see any problems, but initially I would try to find a*

package with the biscuits not broken.".

At the same time, it seems that the messages used in the study have positive influences on the respondents. For example, R7 mention that *"They are not aesthetically beautiful products, but with an interesting purpose."*, R20 *"They were good quality products, but with different aspects of the market standards that could be consumed. Even more taking into account that there are several people hungry and that buying these products would help these people."*, and R59 *"They are products that normally I would not buy, because they are not in the desired standards, but in the case of the biscuit and the carrot, the purchase is acceptable if it was to help the environment."*. The financial message also had a positive effect on the respondents, *"When viewing the food, the first impression is that it is defective or of poor quality. However, knowing that buying them would be saving money makes them more attractive."* R57 and *"The economy that would have at the end of the purchases, despite the appearance out of the normal standards."* R58.

The results of the qualitative analysis show that the messages have an effect on the respondents' opinions, regardless of the type of message, as seeing in the first analysis.

3.1.9 Discussion

By investigating the pillars of sustainability in order to promote environmentally friendly food choices, it is possible to affirm that the variations of communication in environmental, social or financial appealing significantly influenced the purchases of suboptimal food products. However, differentiations between environmental, social and financial messages were not significant in this study. Consumers might choose to buy suboptimal food products due to economic reasons (financial message), but at the same time for ethical reasons (environmental and social messages).

This study was created to capture the frequencies of purchases of each product, to use in the following study, as a proxy of the prevalent norm. Even if the three messages did not differ between them, it was decided to use the social message and its frequencies of purchase to create the normative influence in study 2.

3.2 STUDY 2

Study 2 was designed in order to analyse hypotheses 1a and 1b, the effect of environmental concern and food waste problem awareness on purchase intentions toward

suboptimal foods, hypotheses 2a and 2b, the effect of social normative pressures, and hypothesis 3 the, mediator role of food waste problem awareness.

3.2.1 Research Design

Study 2 combined the message from the first experiment, using the one that produced higher purchase levels (social message) with normative influences. This study was composed by two factors. The first one, normative influences, used injunctive norms and descriptive norms to analyse the effect of the norms on purchase intentions toward suboptimal food. The second factor, suboptimal products, had the same levels of the previous study (food appearance, expiration date, package damaged). A control group was used, where respondents received no message in the first factor, just receiving instructions of the study and suboptimal products images.

Therefore, this study was a 3 (normative influence: injunctive norm, descriptive norm, without norm) X 3 (suboptimal food: appearance, expiration date, package damaged). Similar from study 1, this study was a mixed-design, with the first factor (normative influence) between-subjects and the second (suboptimal food) within. Participants were randomly assigned to one of the three conditions. Environmental concern and food waste problem awareness (hypotheses 1a and 1b) were measured with a pre-defined scale and not manipulated.

3.2.2 Participants

Participants from the south of Brazil received mailed and emailed invitations to participate in a survey about food consumption[7]. Total sample size was 119 participants. The age mean was 32.49 (σ = 10.14), with the majority of respondents (61.2%) being female.

The number of participants in each experimental condition ranged from 30 to 51 subjects. Among the experimental groups, there was no gender differences ($\chi 2(2) = 5.707$; p = .058) or age ($F(2,115) = 1.840$; p =.164) differences, which implies that the groups are homogenous in demographic aspects.

[7] First, we tried to have a sample of university students only. However, due to the low response rate we decided to open the survey to different individuals, sharing in social medias and different e-mail groups.

3.2.3 Procedures

The study was created on Qualtrics and participants received an online invitation to participate in a survey about food consumption. After the access was succeed, participants were automatically assigned to one of the four conditions.

Participants read the following situation:

Imagine you went to a supermarket to buy, among other things, the categories of products presented below. You visualized the products in the supermarket and found the following products:

To manipulate the levels of injunctive and descriptive norm, participants were provided with the results from a recent survey. The results of this survey emerged from study 1. In the injunctive norm condition, participants were informed that:

Buy this product! The results from a recent survey show that 72.4% of the respondents approved the purchase of this product (for the carrot) / *58.6%* (for the yogurt) / *69%* (for the biscuit). *And believe that people should buy them in trying to help the future generation and millions of people that live in extreme hunger.*

In the descriptive norm manipulation, participants read the following message:

Buy this product you too! The results from a recent survey show that 72.4% of the respondents buy this product (for the carrot) / *58.6%* (for the yogurt) / *69%* (for the biscuit) *in trying to help the future generation and millions of people that live in extreme hunger.*

The control group did not receive a message and only visualized the three products.

To avoid order effects, the images were counterbalanced. After manipulations, it was collected purchase intentions, environmental concern and food waste problem awareness, with the other measurements (control variables, manipulations check and demographics). The final configuration of the study was verified by a previous pre-test, described in section 3.2.5. The scenario is presented in Appendix C.

3.2.4 Measurements

Measurements from this study were similar from the previous one. However, some variables were added or modified in study 2. In the following they are presented.

Dependent Variable

The dependent variable in this study was purchase intentions, measured with a single-item on a seven point Likert-scale (Loebnitz et al., 2015). After seeing the images of each product, participants were asked "How likely would you be to purchase this food item?" (1 = "very unlikely", 7 = "very likely").

Manipulation Check

Manipulation check measurements were used to very the effectiveness of the independent variable manipulation. Whereas this study had two independent variables manipulated (normative influences and suboptimal food), there was different manipulation checks, one to each independent variable. Perceptions of the suboptimal food images were assessed with the same items as in Experiment 1. In the expiration date product, the open answer question was changed for a Likert-scale (1 = very far from the expiration date, 7 = "very close from the expiration date").

The manipulation check of the product appearance, damaged package and close expiration date was made asking the subject to give their opinion, in a 7-point scale, about:

- The appearance of the carrot previously viewed (1= appearance very similar to traditional patterns; 7 = appearance very different from traditional patterns);

- The packaging conditions of the biscuit previously viewed (1 = packing not damaged; 7 = packing too damaged);

- The days remaining until the product expire of the yogurt previously viewed (1 = very far from the expiration date, 7 = very close from the expiration date).

The manipulation check occurred by checking the frequency of responses to each alternative in each experimental condition, mainly analysing whether these corresponded to the experimental situation in which the individual was assigned.

One item measured injunctive norms condition: "Would you say that respondents approve the purchase of those products?" (1 = definitely no, 7 = definitely yes); and descriptive

norms "Would you say that respondents used to buy those products? (1 = definitely no, 7 = definitely yes).

It was decided to keep in the main analysis only cases that answered more than 2 for the manipulation checks of the messages. This decision was due to the fact that in order to analyse the norms effect in the intentions to purchase (H2a and H2b), individuals had to perceive the message and the prevalent norm.

Write the thoughts

In this section of the study, participants were asked to write down the thoughts they had after seeing the products. This question was based on Melnyk et al. (2011) and intended to capture the participants' perceptions about the images, what sometimes it is not possible to achieve with closed-ended questions. Also, it was captured the valence of the thoughts (positive and negative), that could influence the behaviour (Melnyk et al., 2011). This question was qualitatively analysed in order to capture different insights about the study.

Environmental Concern and Food Waste Problem Awareness

Two different scales were used to capture respondents' environmental concern and food waste problem awareness, both measured in a Likert scale with 7 points. The items were translated to Portuguese by the researcher and validated by an expert in the area of sustainability.

The first (EC) was adapted from Ellen, Wiener and Cobb-Walgren (1991) and was composed by four items (α = .537)[8]. For the final analysis, the items were reversed:

- Environmental problems are not affecting my life personally;
- Environmental problems are exaggerated, because in the long run things balance out;
- I have too many obligations to take an active part in an environmental organization;
- I can think of many things I'd rather do than work toward improving the environment.

Food waste problem awareness (PA) was adapted from Loebnitz et al. (2015) and was composed by eight items (α = .757):

[8] The Cronbach Alpha increases to .568 by deleting the first item, but we chose to keep all four items for analysis because we do not think that the change is big enough to justify the exclusion of one item.

- Food waste increases the burden on the environment;
- We can avoid food waste by selling fruits and vegetables with 'abnormal' shapes;
- We can avoid food waste by selling products with close expiration date;
- We can avoid food waste by selling food products with damaged package;
- It is a good thing that atypical products are not being sold in regular shops (reversed);
- Most 'abnormal' fruits and vegetables are wasted;
- Most products with close expiration date are wasted;
- Most products with package damaged are wasted.

Control Variables

Variables of control were used to control possible intervening conditions. It was controlled the number of times in a week respondents buy at the supermarket (M=2.40); if the individuals usually consume carrot (yes or no) (83.6% yes), yogurt (71.6% yes), and biscuit (65.5% yes). No differences emerged between the three groups ($F(2, 114) = .287$, $p = .751$; $\chi 2(2) = .287$; $p = .870$; $\chi 2(2) = 3.153$; $p = .207$; and $\chi 2(2) = .579$; $p = .749$, respectively).

Additionally, in the end of the study there was an open answer question used as debriefing. Participants were invited to write if they had difficulty to answer the survey or any have questions or suggestions.

3.2.5 Pre-test

Before applying study 2, a pre-test was conducted to verify the effectiveness of the manipulation, using the scenarios, the scales and main procedures. The study was pre-tested with students ($n = 11$), procedures were the same described above. Also, it was explicitly asked participants to identify any ambiguities stemming from the scenarios. Thus, a few questions were subject to slight modifications.

3.2.6 Data analyses techniques

To analyse data in study 2, mixed-design ANOVA was used. This method is appropriate for mixed design studies, with at least two independent variables (Field, 2009). In this case, we have two independent variables, one measured between-subjects and the second within. Therefore, mixed-design ANOVA is appropriate for this study.

To analyze the mediation, Zhao et al. (2010) determined that, in order to establish a mediation, the indirect effect of the independent variable on the dependent variable must be significant. With the use of bootstrapping, the indirect effect is considered significant when the confidence interval (95%) does not contain zero, occurring when this interval does not contain a null effect. For the indirect effect, the paths between the independent variable and the mediator variable, and between the mediator variable and the dependent variable must be significant. Thus, the mediation analysis was performed following the procedures described by Zhao et al. (2010) using the scripts proposed by Preacher and Hayes (2004).

3.2.7 Statistical assumptions for analyses

Before proceeding to main analysis, it is essential to check possible errors in the data (Hair et al., 2009; Pallant, 2011; Tabachnick & Fidell, 2007). Initially, it was verified the consistency of the specific variables, analysing missing data and atypical observations or outliers. In a second moment, it was checked the distribution of data and the relationship between the variables, such as multivariate outliers, normality, linearity and homoscedasticity tests.

First, frequencies analyses of each variable were performed in order to look for values outside the range of possible values for the variables and also to detect missing values (Tabachnick & Fidell, 2007). Descriptive analysis in this study revealed that variables presented values within the maximum and minimum limits, as well as averages and coherent standard deviations, with all cases being maintained. To analyse missing data (Hair et al., 2009), frequencies analysis revealed no missing values. Qualtrics platform was programmed to require mandatory response to all questions proposed, reducing missing data issues.

Additionally, it was analysed the period of time to finish the questionnaire. It was identified that some cases took a long time to finish the questionnaire. For example, some cases finished it within 174 minutes or 100 minutes. This period of time to finish the questionnaire is questionable due to the fact that external interruptions may have changed the coherence in the sequence of response. In this way, it was analysed that the mean answering time of the pre-test, which was 10.29 minutes (SD = 4.65). Therefore, it was decided to remove from the final database cases that used more than 35 minutes to answer the questionnaire and the ones that used less than the mean answering time minus one standard deviations. In the end, 11 cases were removed from the main analysis.

An outlier is a case that presents extreme values in a variable (univariate outlier) or presents a strange combination of scores in two or more variables (multivariate outlier), causing statistical distortions, leading to results that are not generalizable (Tabachnick & Fidell, 2007). For continuous variables, univariate outliers are cases that present high scores in one or more variables. Cases with standardized scores greater than |3| are potential outliers (Hair et al., 2009). Purchases intentions toward suboptimal food, environmental concern and food waste problem awareness had their standardized scores calculated separately in each experimental condition, in which five of them presented a value around 3, being eliminated from the final database.

The distribution of the normality of the data, which compares its distribution to a normal distribution, was verified by the calculation of the skewness and the kurtosis of the distribution (Hair et al., 2009). In addition, the Kolmogorov-Smirnov test was used. Table 9 presents the results of the tests for the dependent variables involved in this study. It was verified that the differences between the data distribution for the analysed variables were significant ($p < 0.05$), demonstrating that the differences are significant for a normal distribution (Hair et al., 2013). Thus, the data distribution of the study is identified as not being normal.

Table 9 - Tests of Normality

Groups				Kolmogorov-Smirnov			Shapiro-Wilk		
		Skewness	Kurtosis	Statistic	df	Sig.	Statistic	df	Sig.
appearance	injunctive norm	-0.545	-0.329	0,150	35	0,044	0,913	35	0,009
	descriptive norm	-0.430	-1.050	0,144	30	0,173	0,879	30	0,003
	control	0.623	-0.955	0,202	51	0,000	0,854	51	0,000
expiration date	injunctive norm	0.119	-1.525	0,182	35	0,005	0,884	35	0,002
	descriptive norm	0.609	-0.742	0,176	30	0,020	0,873	30	0,002
	control	0.671	-0.685	0,202	51	0,000	0,833	51	0,000
package damaged	injunctive norm	-0.149	-1.300	0,159	35	0,025	0,900	35	0,004
	descriptive norm	0.136	-1.253	0,158	30	0,065	0,903	30	0,010
	control	1.048	0.004	0,246	51	0,000	0,803	51	0,000

As normality was not found in any of the variables tested, the transformation was performed by the inverse base, square root and log, according to procedures recommended by Hair et al. (2009). It was verified, however, that the results after the transformations were similar to those found with the variables without transformations. In addition, the researcher has to analyse the benefits of the transformation (Field, 2009) what sometimes offers a margin

of criticism due to artificiality in the data (Tabachnick & Fidell, 2007), being more advantageous the use of the original data, even with the risk that the generalization of the results will be compromised. Therefore, it was used the original base.

Additionally, homoscedasticity was verified. Hair et al. (2009) state that the homoscedasticity of the data occurs when dependent variables present equal variations between different domains of the predictor variable. The Levene's test was used to verify if the variances are equal between the groups (Levene, 1960). For the product appearance and expiration date, the variances were equal between groups ($F(2, 113) = 2.538$, $p = .083$, and $F(2, 113) = 1.068$, $p = .347$, respectively). But for the package damaged the variances were significantly different in the four groups analysed, $F(2, 113) = 5.199$, $p = .007$).

An assumption of repeated-measures design is the assumption of sphericity. This assumption is liked with the assumption of homogeneity of variance in between-group ANOVA (Field, 2009). It is assumed that the variation in experimental conditions is similar between groups. Mauchly's test indicates if the variances of the differences between conditions are equal (Field, 2009). In study 2, Mauchly's Test of Sphericity indicated that the assumption of shericity has not been violated, $\chi 2(2) = .998$; $p = .019$.

Finally, an exploratory factor analysis was performed with items from purchases intentions toward the three products, environmental concern and food waste problem awareness to analyze method collection bias. The factor solution (based on eigenvalues greater than 1) found 6 factors, with variances explained between 5.96% and 22.38% and the total variance explained was 69.21%. This result indicates that there is no bias in the method collection in this study with more than one factor solution.

3.2.8 Results

Manipulation Check

The manipulation check of the products revealed that they were perceived as suboptimal: the image with an unusual appearance ($M = 6.19$; $SD = 1.30$), a damaged package ($M = 4.59$; $SD = 1.85$), and close to the expiration date ($M = 6.18$; $SD = 1.18$), with no differenced between message conditions ($p = .855$, $p = .927$, $p = .761$, respectively). Additionally, it was analysed the effect of the messages in each experimental condition. It was kept in the analysis only cases that answered more than 2 in the manipulation checks of the messages due to the fact that to analyse the effect of the messages it was necessary that individuals perceived them in the study: $M_{injunctive} = 5.20$ ($SD = 1.30$) and $M_{descriptive} = 4.57$ ($SD = 1.30$).

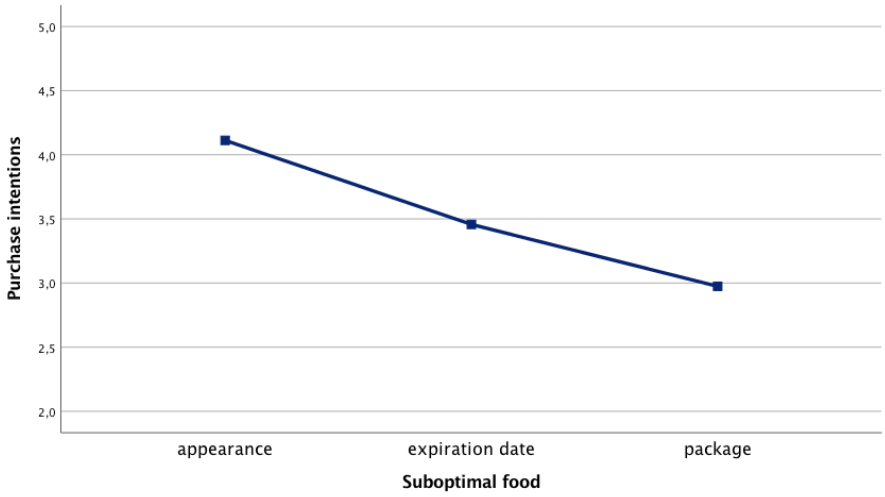
Environmental Concern and Food Waste Problem Awareness

To analyse the effect of environmental concern in purchases intentions toward suboptimal food these two variables were first added in the analysis as covariates in different analyses. When environmental concern was included in the analysis as a covariate, its positive association with purchase intentions is significant ($F(1, 112) = 6.769$, $p < .05$; $\eta 2_p = 0.057$) supporting Hypothesis 1a. The same occurs for food waste problem awareness, when added in the analysis as a covariate, its positive association with purchase intentions is significant ($F(1, 112) = 10.207$, $p. < .005$; $\eta 2_p = 0.084$), supporting Hypothesis 1b.

Dependent variable

To analyse the effect of the suboptimal food products on purchases intentions, a repeated-measures ANOVA was performed. The results show that the type of suboptimal product affects the intentions to purchase the products ($F(2, 230) = 13.438$, $p < .000$; $\eta 2_p = 0.105$). Simple post hoc tests of differences with Bonferroni correction for multiple comparisons revealed that individuals have higher purchases intentions when the product is a carrot with an unusual appearance ($M = 4.112$) than when the product has a close expiration date ($M = 3.457$, $p < .05$) and a damaged package ($M = 2.974$, $p < .000$). When comparing the products with a close expiration date and a damaged package, no significant difference in the intentions to purchase was found ($p = .101$). The results are presented in Figure 3.

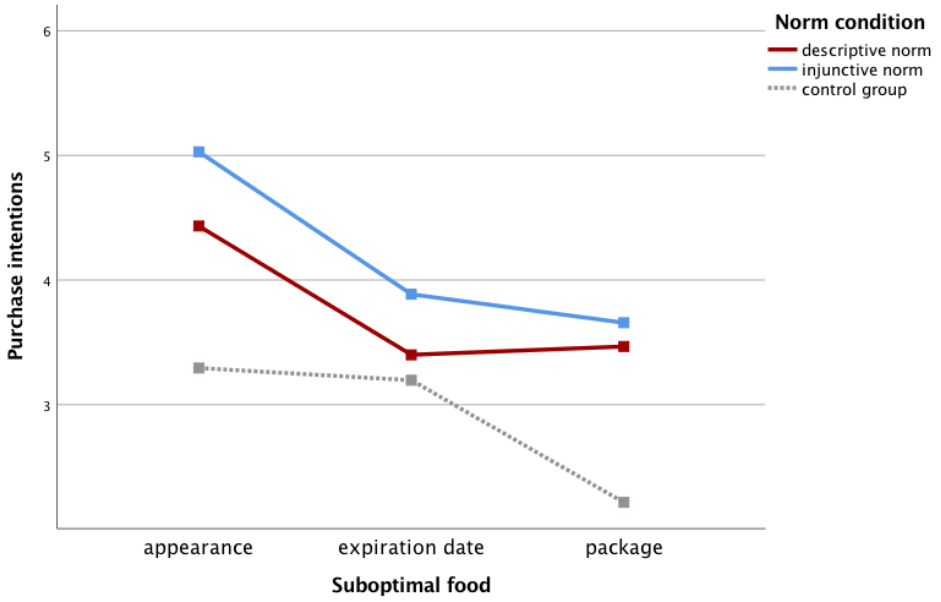
Figure 3 - Purchase intentions toward suboptimal food



To analyze Hypothesis 2a and Hypothesis 2b norms were added in the analysis. A mixed-design ANOVA with norms as the between-subjects variable and suboptimal food as the within-subjects variable revealed a main effect for the message condition ($F(2, 113) = 9.801$, $p < .000$; $\eta 2p = 0.148$) and the suboptimal factor ($F(2, 226) = 13.329$, $p < .000$; $\eta 2p = 0.106$), without interaction ($F(4, 226) = 1.657$, $p = .161$). Post hoc tests using the Bonferroni correction revealed that purchases intentions toward suboptimal food was higher in the injunctive normative group ($M = 4.190$) than the control group ($M = 2.902$, $p < .000$). However, this effect only occurs when analyzing the product appearance and the package damaged. The injunctive norm had a significant effect in the carrot with an unusual appearance ($M = 5.029$) when comparing to the control group ($M = 3.294$, $p < .000$) and in the product with a damaged packaged ($M = 3.657$) compared to the control group ($M = 2.216$, $p < .001$. However, for the product with a reduced expiration date, no significant difference was found between the injunctive norm ($M = 3.886$) and the control group ($M = 3.196$, $p = .377$). In this way, Hypothesis 2a was partially supported.

When analyzing the descriptive norm group, post hoc tests using the Bonferroni correction revealed that purchases intentions toward suboptimal food was higher in the descriptive normative group ($M = 3.767$) than the control group ($M = 2.902$, $p < .05$). However, this effect only occurs when analyzing the product appearance and the package damaged. The descriptive norm had a significant effect in the carrot with an unusual appearance ($M = 4.433$) when comparing to the control group ($M = 3.294$, $p < .05$) and in the biscuit with a damaged packaged ($M = 3.467$) when comparing to the control group ($M = 2.216$, $p < .05$). However, for the product with a reduced expiration date no significant difference was found between the descriptive norm and the control group ($p = 1.0$). In this way, Hypothesis 2b was partially supported.

Figure 4 - Purchase intentions toward suboptimal food considering the norm



Mediation

In order to test Hypothesis 3, to analyze an indirect path of the effect of the norms in the purchases intentions, it was tested the mediation role of food waste problem awareness. The analysis followed the procedures described by Preacher and Hayes (2004) and Zhao et al., (2010). It was used model 4 of PROCESS v2.16.

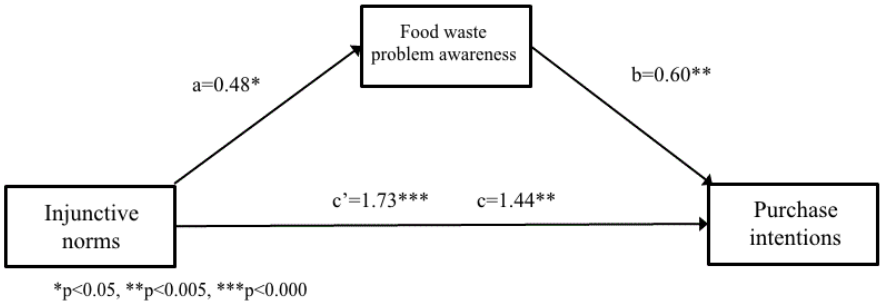
To investigate the role of food waste problem awareness as a mediator in the relationship between norms and purchase intentions, analyses were run separately between the message groups. First, it was analyzed the injunctive norm and the control group. The independent variable was transformed into a dummy variable, which 0 was the control group (without message) and 1 was the injunctive norm group. Also, the analysis was performed for each suboptimal food product individually.

The first analysis was with the product appearance. The relationship between injunctive norm and purchase intentions toward the product with an unusual appearance was mediated by food waste problem awareness. As Figure 5 illustrates, the standardized regression coefficient between injunctive norm and food waste problem awareness was statistically significant (a = 0.48; t = 2.12; $p < 0.05$), as was the standardized regression coefficient between food waste problem awareness and purchase intentions toward the carrot with an unusual appearance (a = 0.60; t = 3.09; $p < 0.005$). It was tested the significance of this indirect effect using bootstrapping procedures. The confidence interval (95%) for the indirect effect, computed for each of 5.000 bootstrapped samples, does not include zero or zero effect (0.08 to 0.66). The total effect of injunctive norms on purchases intentions was significant (c' = 1.73; t = 4.02; p <

.000), as was the direct effect (c = 1.44; t = 3.41; p < .001). When the direct effect is significant, the mediation is considered partial (Zhao et al., 2010).

The result of this mediation analysis is presented in Figure 5.

Figure 5 - Mediation role of food waste problem awareness



Next, still analysing the injunctive norm, the mediation analyses were performed with the product with a reduced expiration date. The relationship between food waste problem awareness and purchases intentions toward the product with a reduced expiration date (a = 0.17; t = .83; p = .40) was not significant, which makes it impossible to analyse the mediation analysis, since the relationship between the moderator variable and the dependent variable should be significant (Zhao et al., 2010). The same occurs for the product with a damaged package: food waste problem awareness and purchases intentions toward the product with a damaged package (a = 0.14; t = .84; p = .39) was not significant.

The following analysis was between descriptive norm and the control group. However, in these analyses the indirect effect of the descriptive norm and the mediator food waste problem awareness was not significant (a = 0.15; t = 1.37; p = .17), which makes it impossible to analyse the mediation analysis, since the relationship between the independent variable and the mediator should be significant for an indirect effect (Zhao et al., 2010).

Write the Thoughts

When analysing the open answer question, respondents recognize that the three products have a different visual pattern, as stated by R5 *"Products different than commonly standards"*. Some of the respondents even infer that the products are *"(...)out of quality standards(...)"* (R48), which represents the importance given to products in perfect conditions. Individuals are aware that they buy and select the products by their appearance, as mentioned by R92 *"I often buy by the appearance, which attracts me..."*. There are some respondents that state the

importance of discounted products when they have similar characteristics from the ones analysed, *"I buy if I have a discount"* (R108).

However, at the same time, there seems to have respondents with awareness of the consequences of rejecting those products, who mentioned that *"I am aware that the traditional standard excludes "ugly" foods which, in a merely popular concept, are rejected because it is attributed to poor quality of the product."* (R13) and *"We waste a lot of food even in conditions of consumption"* (R94). R106 stated the importance of creating awareness of the issue:

> *"I have seen several reports from some countries that only sell products with the characteristics presented in the research, and I find it incredible (...), just for its appearance individuals should not stop consuming these foods. I think there are many people who go hungry in the world, and many foods are wasted (...). I would buy these products without any problem and would encourage people to buy. If the reason for this search is this, I would be one of the customers to buy this type of product.".*

When analysing the thoughts about the carrot with an unusual appearance, some of the respondents associate the product with organic production: *"The carrot looked like an organic product."* (R37), and *"The carrot, because it is not a traditional format, seems to be organic."* (R42). Some of the respondents would by this product only if it was organic, as R21 mentioned: *"I would only buy if it had some certificate that it was organic."*. On the other hand, some individuals would not buy this product because they believe it is associate with high levels of pesticides: *"(...) excessive use of pesticides, it does not look natural, healthy."* (R74), and *"(...) to me it seemed to be defective due to overuse of agro toxics or something like that (...) an unnatural product."* (R28). These results reveal the differences in levels product awareness.

About the product with a reduced expiration date, some individuals predict that they will not consume the yogurt before its date labelling expire and reject to purchase it due that: *"I will not consume it because I may want to eat days after the purchase, not necessarily on that day."* (R1) and *"(...) my first thought was that I do not consume everyday, so I would not buy it so close to the expiration."* (R44). Some respondents are aware of their consumption habits and are positive about purchasing the yogurt: *"(...) is not a problem! (...) I have bought several times because normally I consume on the same day."* (R7); *"(...) it does not bother me that it is almost expiring, I can consume on the same day of purchase (...)"* (R8). Therefore, it is important to predict what will be consumed in order to purchase the right amount of food and to avoid waste in the household setting.

Still about the product with a reduced expiration date, some respondents mentioned risk and food safety concerns: *"It cause health problems due to being close to its expiration date."* (R74); *"The expiration date of products that must be kept refrigerated are riskier."* (R34).

For the biscuit with a damaged package, respondents associate it with poor handling: *"(...) appears to have been handled incorrectly."* (R82) and *"(...) indicates poor handling of the product."* (R89).

When analysing the messages effect, some individuals disbelieved in the message, as R3 says *"They looked like products with some problem and that is why they presented the message.",* or R38 *"The supermarket wants to make more money by providing information about a research to persuade its customers to buy products they do not want."*. Other respondents believe that the message was too subjective: *"If it were a more objective message like: for each product purchased will be donated x% to charity, my answer would be different."* (R25), and *"(...) there is no information on how the purchase of this product can actually affect them (people in extreme poverty)"* (R31).

3.2.9 Discussion

This study was created with the purpose to the Hypothesis 1a, Hypothesis 1b, Hypothesis 2a, Hypothesis 2b and Hypothesis 3. First, results of study 2 corroborate Loebnitz et al. (2015) that environmental concern and food waste problem awareness affect on purchase intentions toward suboptimal food, supporting Hypothesis 1a and Hypothesis 1b.

Second, results indicate that social norms indeed affect intentions to purchase suboptimal food, but only when the product is a carrot with an unusual appearance or a biscuit with a package damaged. For the product with a close expiration date, none of the norms had an effect. Therefore, Hypothesis 2a and Hypothesis 2b are partially supported.

The acceptance of suboptimal food depends on the type of sub-optimality (de Hooge et al., 2017). The results of this study corroborate this finding and add to the discussion that suboptimal food purchase can be stimulated by the use of normative influences, but different strategies are necessary for products with a reduced expiration date. A possible explanation to this result is that when the product exceeds certain basic characteristics, individuals tend to reject the products (Symmark et al., 2019). From the trade-offs emerged during the purchase of products (Grunert et al., 2011), individuals may perceive that the product with a reduced expiration date has achieved their limits of acceptance. Therefore, purchase intentions toward

suboptimal food can be stimulated with the use of normative influences, but there is a certain limit of acceptance.

To extend knowledge about the effects of the norms on purchase intentions toward the products, this study tested the mediator role of food waste problem awareness. Results show that an explanation mechanism to the effect of the norms on purchase intentions is attributed to individuals' awareness of food waste problems. However, this effect only occurred for the injunctive norm and the product with an unusual appearance, which leads to Hypothesis 3 to be partially accepted. The partial mediation shows the possibility of another mediator that was not included in the model and the direct path complements the indirect path.

An explanation for the mediator role of food waste problem awareness in the injunctive norm and the suboptimal appearance may be explained by the fact that respondents associate food waste issues only with the vegetable with a different appearance. This means that maybe a damaged package or a product about to expire are not associated with food waste and the effect of the norms (on the product with a damaged package) is not partially explained by individuals' awareness. When analysing information that consumers receive, campaigns and business strategies usually use this category of suboptimal food: fruits or vegetables with unusual appearance (Aschemann-Witzel et al., 2016; do Canto et al., 2017). Little is communicated about the effect of rejecting products with a reduced expiration date and a damaged package on food waste levels.

Additionally, it was used an open answer question to capture the valence of the thoughts (positive and negative), that could influence the behaviour (Melnyk et al., 2011). Even if this question was not the main focus of this study, it provided some insights. First, it seems that some of the respondents anticipate that they would not be able to consume the products and avoid do buy them in order to not waste in their households, what was already found in previous studies (Graham-Rowe et al., 2014; Stefan et al., 2013). Some respondents did not trust the message and blamed retailers for trying to deceive them to buy those products. Therefore, retailers need to create a good brand image and trust in food safety (Aschemann-Witzel et al., 2017a). It is important to create the right communication for suboptimal food and to use objective norms, with facts and numbers about the impacts of those products. This study used a general message and may have confused some of the respondents.

In Table 10, the test of hypotheses is presented.

Table 10 - Hypotheses testing

Hypotheses	Results
H1a: Environmental concern will positively influence intentions to purchase suboptimal food products.	Accepted
H1b: Food waste problem awareness will positively influence intentions to purchase suboptimal food products.	Accepted
H2a: Suboptimal food products with injunctive norms will produce higher purchase intentions toward the products than suboptimal food products with no influence.	Partially accepted
H2b: Suboptimal food products with descriptive norms will produce higher purchase intentions toward the products than suboptimal food products with no influence.	Partially accepted
H3: Food waste problem awareness mediates the relationship between norms and purchase intentions toward the products.	Partially accepted

A discussion about these results is presented in the following chapter.

4. GENERAL DISCUSSION

In order to discuss stimuli to increase acceptance of suboptimal food products, this study proposed and tested the effectiveness of normative influences on consumers' purchase intentions toward them. This problem has emerged from concern about the impacts of the food supply chain on the environment, more specifically, with issues associated with food waste. It is increasing in the literature discussions about the importance of consumers change their usual behaviours to cope with more sustainable practices. A way to achieve that is through consumption and purchase of suboptimal food, whereas preferences for these products affect both retailer and consumer-food waste issues (Achemann-Witzel et al., 2015).

This study advances in testing different aspects of sub-optimality, as suggested by de Hooge et al. (2017). Moreover, it advances in using a stimulus well-known from its power, especially in prosocial behaviours (Goldstein et al., 2008): the theory of normative influence (Cialdini et al., 1990). In general, literature shows that social norms have the power to drive and influence behaviour. Manipulation of descriptive norms and injunctive norms in this study confirms that normative influences have an impact on intentions to purchase some, but not all types of suboptimal foods. The type of sub-optimality plays a key role in the acceptance of the products (de Hooge et al., 2017). Theoretically, suboptimal food are products that deviate from normal products on the basis of the appearance, their date labelling to expire, and their packaging conditions. However, when analysing the stimulus to increase their acceptance, the products should be analysed separately. The effects of the norms on the three products operate differently, with results pointing to the fact that the effect of the norms is reduced when products don't present certain basic characteristics (Symmark et al., 2019).

Intentions to purchase the product with a reduced expiration date was neither influenced by injunctive nor by descriptive norms when compared to the group that received no stimulus, which leads to partially accept Hypothesis 2a and Hypothesis 2b. This signals that external *stimulus* toward this type of sub-optimality would have no effect. A possible explanation for this is that in Brazil there is a predominant norm that products that have reached their expiration date can not be sold. According to the law number 8.137 from December 27 of 1990, it is forbidden to sell products that are not suitable for consumption. And, in Brazil, products that reached the expiration date are not consider proper for consumption. Two days remaining for the product expire could have induced respondents to believe that product was no longer suitable for consumption, which is confirmed by the products association in the open answer question. Additionally, individuals pursue concerns related to safety and risk of the food when

expiration date is approaching (Qi & Roe, 2016) and the influence of the norm was minimized in this case.

To have an effect on behaviour, individuals need to believe in the relevance of the norm (Biel & Thøgersen, 2007). Additionally, consumers perceive that the costs of acting pro-environmentally are not shared with other members, individuals may not adhere to the behaviour (Fehr & Fischbacher, 2004). A disbelief in the norms about the product with a reduced expiration date could have reduced their effects on intentions to purchase the products.

Additionally, the results of the mediating role of food waste problem awareness in intentions to purchase suboptimal food (Hypothesis 3), revealed that the effect of the norm can be partially explained by individuals' awareness of food waste issues. Stancu et al. (2016) found that injunctive norms were the strongest predictor of intention not to waste food. Through mediation, the study provides additional support for the explanation of the effect of injunctive norms on intentions to purchase the carrot with an unusual appearance, showing that food waste problem awareness mediates the relationship between injunctive norms and intentions to purchase the product with a suboptimal appearance. In this sense, when the norm is activated as a behaviour approved by a group of people, which is the role of injunctive norms (Cialdini et al., 1990), an explanation of the mechanism of influence is trough awareness that individuals have about food waste, which, in turn, impacts intentions to purchase the product.

A possible explanation for this effect occur only for the carrot with a different appearance is related to the fact that campaigns in trying to raise awareness of food waste and business practices that deal with the issue focus more on the case of fruits and vegetables that deviate in their appearance. The French retailer Intermaché created a campaign, called "inglorious" fruits and vegetables, Albert Heijn from Netherlands used baskets of suboptimal fruits and vegetables to sell on their store, Imperfect redistribution from US sells boxes with suboptimal food (Aschemann-Witzel et al., 2017a). In Brazil, a research shows that companies started to focus on food waste solutions for of fruits and vegetables with unusual appearance (do Canto et al., 2017). Therefore, consumers in Brazil are more aware of the impact of this type of sub-optimality on food waste issues. When a prescription informing that others approve the purchase of a different vegetable is activated, a mechanism that explains its effect is trough awareness of the issue.

Schwarts (1977) found that awareness mediates the effect of norms on the behaviour. However, in his study there was not differentiation between injunctive and descriptive norms. This study adds to the discussion by showing that only injunctive norms was mediated by this trait. A possible explanation for the mediator role of food waste problem awareness only for

injunctive norms is that Schwartz (1977) did not distinguish conceptually between injunctive and descriptive norms. He differentiates between perceived social norms and personal norms, the latter being the one that makes people feel obligated to follow and are internalized norms. The present study focused on external injunctive and descriptive norms, results could alter if internalized norms were the focus of this research.

This study used a text-based injunctive norm and descriptive norms messages, using information about what is approved in the situation of purchasing suboptimal food and about the purchase behaviour of others, respectively. In this case, the desire to behave correctly, outlined by the injunctive norm, has a mechanism of explanation that is awareness of food waste issues.

When analysing the open answer question, some of the respondents mentioned that did not liked the presence of the message. However, results confirm that social norms influence the behaviour unconsciously (Göckeritz et al., 2010). Consumers tend to underestimate the effect of the norms (Nolan et al., 2008) and the positive effect that both injunctive and descriptive norms shows that individuals adhere to the norm without recognizing its effects.

Results point to the importance of discussing food waste issues, solutions, and what individuals could do as consumers to change that. Perhaps individuals are more conditioned to fruits and vegetables with unusual appearance and they simply did not recognize the purchase of the other two foods as a type of behavior that increases the waste. Rejection of products close to their expiration date and with ripped label should be communicated as safe products, still suitable for consumption and aggravators of food waste levels. With that, awareness that products with these characteristics are also aggravators of food waste.

4.1 THEORETICAL IMPLICATIONS

Given the recent interest in studying suboptimal foods in the food waste literature (Aschemann-Witzel et al., 2015; Achemann-Witzel et al., 2017b; de Hooge et al., 2017; Loebnitz & Grunert, 2015; Loebnitz et al., 2015; Tsiros & Heilman, 2005), this study fills an important gap by studying interventions to increase their acceptance. This study brought a different approach in the study of food waste issues. By using the theory normative influences, a well-developed and well-known conceptual model of behaviour influence, this study proposed to analyse the effect of this stimulus in suboptimal food consumption. Results show that, in a general way, the theory of normative influences is applied to food waste reduction

issues, more specifically, with suboptimal food consumption. However, it is necessary to consider the type of sub-optimally when using this influence.

Following Loebnitz et al., (2015) suggestion of using communication strategies to understand purchase intentions toward suboptimal food, this study explored the effect of injunctive norms and descriptive norms (Cialdini et al., 1990) in suboptimal food consumption. This study presents three main theoretical contributions to the literature. The first one confirms previous studies that the acceptance of suboptimal food depends on its characteristics and levels of sub-optimality (de Hooge et al., 2017). Using different categories of products, it was possible to analyse how norms affected intentions toward them.

Second, this research supports the results from Stancu et al. (2016), who used injunctive norms in trying to predict food waste behaviour. The authors found that these norms were the strongest predictor of intention not to waste food (Stancu et al., 2016). Results also add to the discussion the applicability of descriptive norms in food waste issues. Rimal and Real found that the processes of injunctive and descriptive norms operate independently of each other. Results show that for suboptimal food consumption, both injunctive and descriptive can be used in trying to increase their acceptance.

Finally, the third contribution is related to the theoretical mechanism by which injunctive norms influences intentions to purchase the products. The result of the mediation analysis in study 2 shows that norms (only injunctive) has an impact on the intentions to purchase the carrot with an unusual appearance mediated by the levels of food waste problem awareness of the individuals. The direct effect of this norm on intentions was also significant. However, corroborating Schwartz (1977), awareness mediates the impact of norms.

On the whole, by examining the activation of social norms to promote pro-environmental behaviour, this research enriches the literature on social influence, applied in a different context (suboptimal food consumption) and also enriches the literature of consumer-related food waste and food waste reduction.

4.2 PRACTICAL IMPLICATIONS

This research has several practical implications. For food marketers, the study explored consumers' acceptance of suboptimal food products. This research may be the first to empirically examine strategies to increase acceptance of these products and shed light on consumers' evaluation of this category of foods in trying to help food waste reduction. First,

the effects of descriptive norms and injunctive norms on intentions to purchase suboptimal food indicate that retailers and food marketers can use this strategy in the point of purchase. Retailers reject suboptimal food due to a concern with their consumers it (Loebnitz & Grunert, 2015). Indeed, the intentions to purchase the products are small (results from the control group). However, there are significant differences in their intentions when receiving injunctive or descriptive norms. Consumers' decision-making regard suboptimal food is positively influenced if they are provided with the appropriate message for that.

Additionally, this research holds important implications for advertisers. Campaign designers should use normative influences in trying to communicate the importance of consuming suboptimal food. Moreover, efforts toward exploring the possibility of consuming products that are close to their expiration date can help consumers to perceive value in these products as well. This research also can be assimilated with nudge marketing. A nudge is any aspect in the choice architecture that help people change their behaviour in a predictable way without limiting their freedom of choice (Thaler & Sustein, 2000). In this study, the activation of both injunctive and descriptive norms can be considered a type of nudge used o encourage suboptimal food purchase.

Results show that there is an acceptance to purchase suboptimal food in terms of appearance and package damaging when external cues are provided. Food marketers should contribute to the cause of food waste reduction by selling suboptimal food and also have brand benefits with that, increasing, perhaps, their corporate social responsibility (CSR) (Aschemann-Witzel et al., 2016) and use as part of their social marketing communication campaign (Pearson & Perera, 2018). Additional effort can be directed to convince consumers that the products have the same attributes of taste, flavour and smell (Symmank et al., 2018). This practice can be explored with practical interventions, such as sensory skills (Principato et al., 2015), increasing freshness and expiration dates awareness.

Governments can also include in their ads communication about others behaviours about suboptimal food. Such appeal can be used with both injunctive and descriptive norms by reflecting what is approved and providing clued about general behaviour.

Once consumers are accustomed with the idea and importance of buying these products as part of food waste reduction efforts, it may become a habitual practices and routines. Habits and routines are significant predictors of food waste reduction (Stancu et al., 2016) and the benefits are maximized once consumers start to have an anti-wasteful pattern of consumption.

A movement exploring food waste is open to find solutions to this problem. This research explored a promising solution to the issue: normative influences is a strategy for

suboptimal food problems. Suboptimal fruits and vegetables are generally wasted in the initial phases of the food supply chain. After a change in consumers' pattern of behaviour, farmers can commercialize these products and reduce the impacts of wasting them. Additionally, food distribution and retailers tend to throw away products with package imperfections even when their content remains the same. These habits lead to unnecessary waste. Whereas the use of these products lies in consumers' acceptance of such foods, results show that appropriate communications has important contributions.

In the food waste hierarchy, the most advantageous solution for food waste is prevention (Papargyropoulou et al., 2014). This study contributes to prevent the waste of suboptimal food, which is food still suitable for human consumption. Additionally, it adds by offering to individuals suggestions on how they can contribute to food waste reduction. However, communicating strategies show to be fundamental, specially to increase awareness of the issue and to educate consumers of different cause of wasted food, such as products about to expire or a damaged packaging.

As food waste consequences affect both environmental and social problems, this study moves to a different way to reduce food waste along the food supply chain.

4.3 LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

A limitation of this study is related to the willingness of respondents to give the most socially desired answers. It cannot be ruled out that participants gave socially desirable answers and results are subject to social desirability bias. The same applies to the attitude-behaviour gap (Vermeir & Verbeke, 2006). Even if this effect is inherent of every research about attitudes, it is necessary to be aware of this issue. Another limitation is that sample sizes in both studies were small. Moreover, convenience samples consisting of college students and the use of social medias to distribute the survey may raise questions about the generalisability of the findings to other populations.

Aligned with that, findings are specific of Brazilian context and need to be analysed with caution. In this way, lack of external validity is considered a limitation of this study. Moreover, differences to define suboptimal food in Brazil limits this study. The research was based on the concept of suboptimal food emerged from a study of fie Northern European countries (de Hooge et al., 2017), with different realities and concerns about environmental issues. In Brazil, due to the law restrictions, as aforementioned, the applicability of using and

studying expiration date as suboptimal food is limited. Additionally, this study considered that the three sub-optimality variations would suffer similar norms effects. However, the products are different and have different attributes and characteristics. In this way, it is suggested in the future to clearly define and differentiate the analysis under each type of product, with researches focusing in only one of the three categories of suboptimal.

Given that the study of suboptimal food consumption is relatively limited, this study is still exploratory in nature and does not provide cues for generalization. Additionally, the realism of experimental studies and behaviour measured by self-reports are important limitations of the present study. Manipulations are distant from reality, whereas respondents created their impressions with an online photograph of the products, what limits the results found. In this respect, it is suggested that future studies use natural settings with real products as a natural experiment. Additionally, it is recommended to replicate the present study across other types of food and different deviations.

Another limitation of this study is that in some cases, it is more advantageous to have food waste than trying to find solutions for that. There are some cases where for farmers it is more economical to plow under a field of produce rather than pay for its harvest and processing (Aschemann-Witzel et al., 2015). And, therefore, in some cases, it may be preferable to waste fruits and vegetables with unusual appearance than find solutions for that.

Results show a mediator role of food waste problem awareness on injunctive norms and the carrot with an unusual appearance. However, there may have a several different mediators that could have significant effects. Future studies could test different dimensions in this analysis. It is also recommended to analyse what variables can mediate the effect of descriptive norm as well.

Activating status motives is a strategy to foster pro-environmental behaviour (Griskevicius et al., 2010), what can ads credibility as part of social influence processes (Elgaaied-Gambier, Monnot and Reniou, 2018). Therefore, a suggestion for future studies is to use suboptimal food products with celebrity endorsers focusing on waste reduction and analyse if this strategy can also impact intentions toward suboptimal food consumption.

De Hooge et al. (2017) found that suboptimal food acceptance differs in the household and retail setting. In this way, it is recommended to test the effects of the norms when the consumption is in the household. Due to the invisibility of the behaviour (Quested et al., 2013), norms could have a different effect because actions in public influence more than actions than in private settings (Griskevicius et al., 2010).

Additionally, the message presented with injunctive and descriptive norms had a social

appeal (emerged from study 1), future studies could change de valence of the message to analyse its effect. The open answer question revealed that consumer associated the carrot with organic production, but also with excessive use of pesticides. Future studies could explore these differences and how they are related with awareness and risk and food safety concerns. Finally, it is suggested to complement the variable awareness of food waste with different aspects of food waste to have a better measure of analysis.

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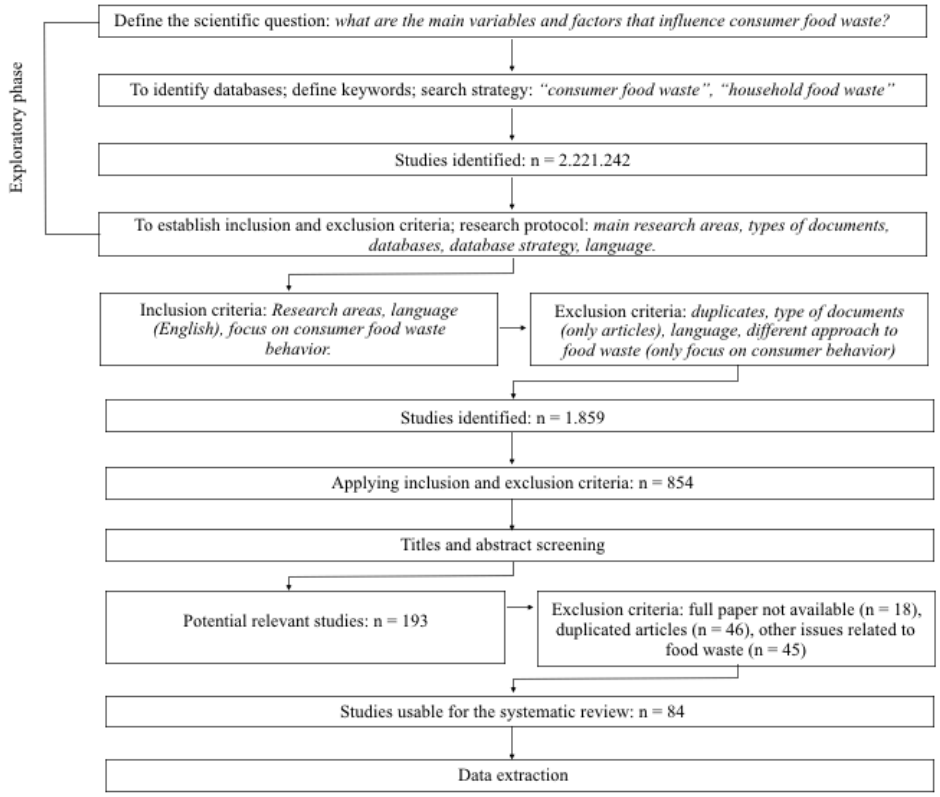
Appendix A - Systematic review methodology

Figure 6 shows the design of the research protocol.

Figure 6 - Research protocol



Source: adapted from Sampaio and Mancini (2007), Petticrew and Roberts (2006), Kitchenham (2004), Tranfield *et al.* (2003) and Bossle *et al.,* (2016).

First, an exploratory phase was conducted to elaborate the inclusion and exclusion criteria, and to have an overview the topic consumer-related food waste. Since the beginning some criteria were already defined: to include only peer-reviewed articles and only articles that analyse the relationship with food waste in a consumer perspective, otherwise the results wouldn't be in accordance with the main objective of this research. In addition, the search was not restricted by date, to capture studies from different periods. This decision was taken in order to deep analyse what has been published about consumer food waste, having no intention to restrict the results. It was used "consumer food waste" and "household food waste" as keywords in the topic field, applying the Boolean operator "OR" when possible, in five databases (Web of Science – 1.220 results; Scopus – 1.896 results; Scielo – 8 results; Google Scholar – 2.218.000 results; Ebsco Host – 118 results). It was used more than one database to compare results and to obtain a broad view about the topic in different researches.

After an exploratory analysis, researchers decided to maintain the same keywords in the second phase ("consumer food waste" and "household food waste"), once they have captured

different contexts and different variables of influence. Web of Science, Ebsco Host and Google Scholar databases were selected, due to the fact that they resulted in a great variation in the results. The research was taken in field "Topic", except for Google Scholar database, where the research was limited to "Title" field. This decision was due to the fact that the results in Google Scholar were greater than 2.212.000 files. In this way, we searched papers only in the "Title" field to limit the results to 293 studies.

As inclusion criteria, the choice was only for peer-reviewed articles, as aforementioned, only English as a language, no restriction by date. In Web of Science database, the areas of research were limited to: environmental sciences ecology; business economics; sociology; social sciences other topics; behavioural sciences; psychology; social issues; food science and technology; anthropology. These areas were selected in the exploratory phase, different areas did not explore the relation between consumer behaviour and food waste.

The final search comprised only peer-reviewed papers (in English) from the ISI Web of Knowledge (within the areas stated above), EBSCO and Google Scholar (for this one, only in the title field) databases. A search for the keywords "consumer food waste" and "household food waste", applying the Boolean operator "OR" for ISI Web of Knowledge and EBSCO databases and separately for Google Scholar database. The results were: ISI Web of Knowledge – 1.411 articles; EBSCO – 155 articles; Google Scholar – 293 articles. Applying the inclusion and exclusion criteria of selecting only articles in English language, only peer-reviewed articles, in the main areas, the results stay as it follows: ISI Web of Knowledge – 607 articles; EBSCO – 94 articles; Google Scholar – 153 articles (a total of 854 articles).

First, titles and abstracts were screened for relevance to assess which met the inclusion criteria – mainly focusing on consumer-related food waste. Full papers were consulted when the abstract did not clearly meet the inclusion. From 854 titles and abstracts analysed, it was selected 193 potentially relevant studies for the review. From these, 18 articles were not available and 46 were duplicated. Finally, 84 articles were selected for full analyses, all focusing exclusively on factors that may influence the consumer behaviour regard food waste.

To extract relevant information from each study, data extraction should be performed (Petticrew and Roberts, 2006), containing general information (title, author, publication details), study features, and specific information and notes on emerging themes (Tranfield *et al.*, 2003). All papers were fully analysed within the qualitative software program Nvivo. Analysis was organized around key concepts and definitions and coded at the most detailed level of information. When analysing main results of the studies variables that affect consumer behaviour and food waste levels were also coded.

Appendix B - Scenario study 1

MANAGEMENT SCHOOL

UFRGS

Caro respondente,

Esta pesquisa é sobre comportamento do consumidor.

Você será convidado a responder um questionário que leva aproximadamente 10 minutos para ser respondido.

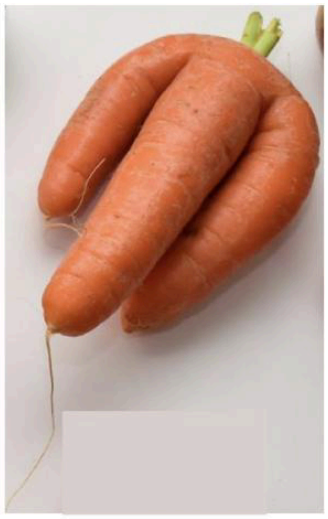
Não há nenhum risco envolvido ao participar dessa pesquisa. Sua participação é voluntária, o que significa que você é livre para participar ou não, bem como desistir a qualquer momento.

Sua resposta é anônima e será utilizada apenas para fins acadêmicos.

Sua participação é muito importante para nós.

Desde já agradecemos sua atenção!

Imagine que você vai comprar três produtos alimentícios diferentes no supermercado. Você será exposto aos produtos e deverá indicar se compraria eles ou não.
Por favor, veja estas opções como se estivesse realmente no supermercado.



Você compraria esse produto?

- ○ Sim
- ○ Não

Você compraria esse produto?

- Sim
- Não

Você compraria esse produto?

- Sim
- Não

Junto com as questões que você leu anteriormente havia:

- questões relacionadas ao meio ambiente
- questões relacionadas à problemas sociais
- questões financeiras
- nenhuma das alternativas anteriores

Indique a sua opinião em relação à aparência da cenoura visualizada anteriormente, em uma escala de 1 a 7. Sendo que 1 representa aparência muito semelhante aos padrões tradicionais encontrados e 7 aparência muito diferente dos padrões tradicionais encontrados.

1 - aparência muito semelhante aos padrões tradicionais	2	3	4	5	6	7 - aparência muito diferente dos padrões tradicionais
○	○	○	○	○	○	○

Indique a sua opinião em relação às condições da embalagem da bolacha visualizada anteriormente, em uma escala de 1 a 7. Sendo que 1 representa embalagem não danificada e 7 embalagem muito danificada.

1 - embalagem não danificada	2	3	4	5	6	7 - embalagem muito danificada
○	○	○	○	○	○	○

Em relação ao iogurte visualizado anteriormente, indique quantos dias restavam até o vencimento do produto:

Por favor, escreva no espaço abaixo as principais impressões e pensamentos que você teve ao visualizar as imagens dos três produtos:

Indique seu nível de concordância com os ítens abaixo, em uma escala de 1 a 7. Sendo 1 = discordo totalmente e 7 = concordo totalmente.

	Discordo totalmente						Concordo totalmente
	1	2	3	4	5	6	7
Problemas ambientais não afetam minha vida pessoal	○	○	○	○	○	○	○
Os problemas ambientais são exagerados, porque, a longo prazo, o meio ambiente se recupera	○	○	○	○	○	○	○
Tenho muitas outras coisas para fazer e não tenho tempo para participar de uma ONG ambiental	○	○	○	○	○	○	○
Eu prefiro fazer outras coisas do que trabalhar para melhorar o meio do ambiente	○	○	○	○	○	○	○

Indique seu nível de concordância com os ítens abaixo, em uma escala de 1 a 7. Sendo 1 = discordo totalmente e 7 = concordo totalmente.

	Discordo totalmente 1	2	3	4	5	6	Concordo totalmente 7
O desperdício de alimentos aumenta o impacto sobre o meio ambiente	○	○	○	○	○	○	○
Podemos evitar o desperdício de alimentos vendendo frutas e vegetais feios e fora do padrão tradicional	○	○	○	○	○	○	○
Podemos evitar o desperdício de alimentos vendendo produtos com data de validade próxima do seu vencimento	○	○	○	○	○	○	○
Podemos evitar o desperdício de alimentos vendendo produtos alimentícios com embalagem danificada	○	○	○	○	○	○	○
É bom que os produtos atípicos (feios/fora do padrão tradicional) não sejam vendidos em lojas tradicionais	○	○	○	○	○	○	○
É bom que os produtos com o pacote danificado não sejam vendidos em lojas tradicionais	○	○	○	○	○	○	○
É bom que os produtos com data de validade próxima do seu vencimento não sejam vendidos em lojas tradicionais	○	○	○	○	○	○	○
A maioria das frutas e vegetais consideradas feias ou fora do padrão tradicional são desperdiçadas	○	○	○	○	○	○	○
A maioria dos produtos com data de validade próxima do seu vencimento são descartados	○	○	○	○	○	○	○
A maioria dos produtos com o pacote danificado são descartados	○	○	○	○	○	○	○

Quantas vezes na semana você faz compras no supermercado?

Quantas vezes na semana você costuma cozinhar?

Você costuma consumir cenoura?

- ○ Sim
- ○ Não

Você costuma consumir iogurte?

- ○ Sim
- ○ Não

Você costuma consumir bolacha?

- ○ Sim
- ○ Não

Qual o seu sexo?

- ◯ Masculino
- ◯ Feminino

Quantas pessoas moram na sua casa, incluindo você?

Qual a sua idade?

Qual o seu grau de escolaridade?

- ◯ Não-alfabetizado
- ◯ Fundamental incompleto
- ◯ Fundamental completo
- ◯ Médio incompleto
- ◯ Médio completo
- ◯ Superior incompleto
- ◯ Superior completo
- ◯ Pós-graduação incompleta
- ◯ Pós-graduação completa

Qual a sua renda familiar mensal aproximada?

- ◯ até R$ 1.874,00
- ◯ de R$ 1.8874,01 a R$ 3.740,00
- ◯ de R$ 3.740,01 a R$ 5.622,00
- ◯ de R$ 5.622,01 a R$ 7.496,00
- ◯ de R$ 7.496,01 a R$ 9.370,00
- ◯ de R$ 9.370,01 a R$ 11.244,00
- ◯ de R$ 11.244,01 a R$ 13.118,00
- ◯ de R$ 13.118,01 a R$ 14.992,00
- ◯ de R$ 14.992,01 a R$ 16.866,00
- ◯ Mais de R$ 16.866,01

Você encontrou dificuldades para responder essa pesquisa ou teve dúvidas ou sugestões? Se sim, liste-os por favor:

Appendix C - Scenario study 2

Caro respondente,

Esta pesquisa é sobre o consumo de alimentos. Você será convidado a responder um questionário que leva aproximadamente 10 minutos para ser respondido.

Não há nenhum risco envolvido ao participar dessa pesquisa. Sua participação é voluntária, o que significa que você é livre para participar ou não, bem como desistir a qualquer momento.

Sua resposta é anônima e será utilizada apenas para fins acadêmicos.

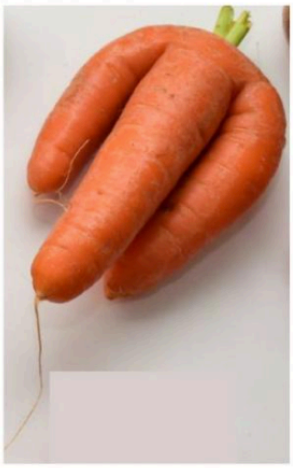
Pedimos que enquanto você responde a pesquisa focalize a sua atenção somente nas respostas, sem interrupções na aplicação.

Sua participação é muito importante para nós.

Desde já agradecemos sua atenção!

Imagine que você foi em um supermercado comprar, entre outras coisas, as categorias dos produtos apresentados a seguir. Você visualiza os produtos no supermercado e encontra os seguintes produtos:

Junto com o produto havia a seguinte mensagem:



Compre este produto!

Os resultados de uma pesquisa realizada recentemente revelam que 72.4% dos respondentes aprovam a compra deste produto.

E acreditam que as pessoas devam comprá-lo visando ajudar as futuras gerações e milhões de pessoas que vivem na condição de fome extrema.

Sabendo disso, indique a probabilidade de você comprar um produto semelhante ao apresentado na foto:

Não é provável						Muito provável
1	2	3	4	5	6	7
○	○	○	○	○	○	○

Junto com o produto havia a seguinte mensagem:

Compre este produto!

Os resultados de uma pesquisa realizada recentemente revelam que 58.6% dos respondentes aprovam a compra deste produto.

E acreditam que as pessoas devam comprá-lo visando ajudar as futuras gerações e milhões de pessoas que vivem na condição de fome extrema.

Sabendo disso, indique a probabilidade de você comprar um produto semelhante ao apresentado na foto:

Não é provável						Muito provável
1	2	3	4	5	6	7
○	○	○	○	○	○	○

Junto com o produto havia a seguinte mensagem:

Compre este produto!

Os resultados de uma pesquisa realizada recentemente revelam que 69% dos respondentes aprovam a compra deste produto.

E acreditam que as pessoas devam comprá-lo visando ajudar as futuras gerações e milhões de pessoas que vivem na condição de fome extrema.

Sabendo disso, indique a probabilidade de você comprar um produto semelhante ao apresentado na foto:

Não é provável						Muito provável
1	2	3	4	5	6	7
○	○	○	○	○	○	○

Você diria que os participantes da pesquisa mostrada anteriormente aprovam quem compra os produtos visualizados?

Definitivamente não						Definitivamente sim
1	2	3	4	5	6	7
○	○	○	○	○	○	○

Você diria que os participantes da pesquisa mostrada anteriormente costumam comprar os produtos visualizados?

Definitivamente não						Definitivamente sim
1	2	3	4	5	6	7
○	○	○	○	○	○	○

Indique a sua opinião em relação à data de vencimento do iogurte visualizado anteriormente, em uma escala de 1 a 7. Sendo que 1 representa muito longe da data de vencimento e 7 muito perto da data de vencimento.

Muito longe da data de vencimento						Muito perto da data de vencimento
1	2	3	4	5	6	7
○	○	○	○	○	○	○

Indique a sua opinião em relação às condições da embalagem da bolacha visualizada anteriormente, em uma escala de 1 a 7. Sendo que 1 representa embalagem não danificada e 7 embalagem muito danificada.

Embalagem não danificada						Embalagem muito danificada
1	2	3	4	5	6	7
○	○	○	○	○	○	○

Indique a sua opinião em relação à aparência da cenoura visualizada anteriormente, em uma escala de 1 a 7. Sendo que 1 representa aparência muito semelhante aos padrões tradicionais encontrados e 7 aparência muito diferente dos padrões tradicionais encontrados.

Aparência muito semelhante aos padrões tradicionais						Aparência muito diferente dos padrões tradicionais
1	2	3	4	5	6	7
○	○	○	○	○	○	○

Por favor, escreva no espaço abaixo as principais impressões e pensamentos que você teve ao visualizar as imagens dos três produtos:

Indique seu nível de concordância com os ítens abaixo, em uma escala de 1 a 7. Sendo 1 = discordo totalmente e 7 = concordo totalmente.

	Discordo totalmente						Concordo totalmente
	1	2	3	4	5	6	7
Problemas ambientais não afetam minha vida pessoal	○	○	○	○	○	○	○
Os problemas ambientais são exagerados, porque, a longo prazo, o meio ambiente se recupera	○	○	○	○	○	○	○
Tenho muitas outras coisas para fazer e não tenho tempo para participar de uma ONG ambiental	○	○	○	○	○	○	○
Eu prefiro fazer outras coisas do que trabalhar para melhorar o meio do ambiente	○	○	○	○	○	○	○

Indique seu nível de concordância com os ítens abaixo, em uma escala de 1 a 7. Sendo 1 = discordo totalmente e 7 = concordo totalmente.

	Discordo totalmente						Concordo totalmente
	1	2	3	4	5	6	7
O desperdício de alimentos aumenta o impacto sobre o meio ambiente	○	○	○	○	○	○	○
Podemos evitar o desperdício de alimentos vendendo frutas e vegetais feios e fora do padrão tradicional	○	○	○	○	○	○	○
Podemos evitar o desperdício de alimentos vendendo produtos com data de validade próxima do seu vencimento	○	○	○	○	○	○	○
Podemos evitar o desperdício de alimentos vendendo produtos alimentícios com embalagem danificada	○	○	○	○	○	○	○
É bom que os produtos atípicos (feios/fora do padrão tradicional) não sejam vendidos em lojas tradicionais	○	○	○	○	○	○	○
É bom que os produtos com o pacote danificado não sejam vendidos em lojas tradicionais	○	○	○	○	○	○	○
É bom que os produtos com data de validade próxima do seu vencimento não sejam vendidos em lojas tradicionais	○	○	○	○	○	○	○
A maioria das frutas e vegetais consideradas feias ou fora do padrão tradicional são desperdiçadas	○	○	○	○	○	○	○
A maioria dos produtos com data de validade próxima do seu vencimento são descartados	○	○	○	○	○	○	○
A maioria dos produtos com o pacote danificado são descartados	○	○	○	○	○	○	○

Em relação ao consumo de alimentos na sua casa, junto com os outros moradores do lar, indique seu nível de concordância com os ítens abaixo, em uma escala de 1 a 7. Sendo 1 = discordo totalmente e 7 = concordo totalmente.

	Discordo totalmente						Concordo totalmente
	1	2	3	4	5	6	7
Não conseguimos comer sobras de refeições que tínhamos armazenado na geladeira para comer em outra ocasião.	○	○	○	○	○	○	○
Existem produtos que não foram abertos no armário, geladeira ou freezer e que decidimos jogar no lixo.	○	○	○	○	○	○	○
Não conseguimos usar produtos que compramos na oferta (leve 2 pague 1, reduções de preços, etc.).	○	○	○	○	○	○	○
Eu mesmo ou alguém da família serviu muita comida no prato e acabou indo para o lixo.	○	○	○	○	○	○	○
Convidamos amigos/família para uma refeição e preparamos muito mais comida do que poderíamos comer.	○	○	○	○	○	○	○
Jogamos comida fora pois passou do prazo de vencimento indicado na embalagem.	○	○	○	○	○	○	○
Comemos mais do que queríamos para evitar o desperdício de alimentos ou as sobras.	○	○	○	○	○	○	○

Quantas vezes na semana você faz compras no supermercado?

Você costuma consumir cenoura?

Sim	Não
○	○

Você costuma consumir iogurte?

Sim ○ Não ○

Você costuma consumir bolacha?

Sim ○ Não ○

Qual o seu sexo?

Masculino ○ Feminino ○

Qual a sua idade?

Quantas pessoas moram na sua casa, incluindo você?

Qual o seu grau de escolaridade?

- ○ Não-alfabetizado
- ○ Fundamental incompleto
- ○ Fundamental completo
- ○ Médio incompleto
- ○ Médio completo
- ○ Superior incompleto
- ○ Superior completo
- ○ Pós-graduação incompleta
- ○ Pós-graduação completa

Qual a universidade em que você está matriculado?

- ○ UFRGS
- ○ PUC - RS
- ○ Unisinos
- ○ IMED
- ○ UFSM
- ○ Outra
- ○ Não estou matriculado em universidade

Qual a sua renda familiar mensal aproximada?

- ○ até R$ 1.874,00
- ○ de R$ 1.8874,01 a R$ 3.740,00
- ○ de R$ 3.740,01 a R$ 5.622,00
- ○ de R$ 5.622,01 a R$ 7.496,00
- ○ de R$ 7.496,01 a R$ 9.370,00
- ○ de R$ 9.370,01 a R$ 11.244,00
- ○ de R$ 11.244,01 a R$ 13.118,00
- ○ de R$ 13.118,01 a R$ 14.992,00
- ○ de R$ 14.992,01 a R$ 16.866,00
- ○ Mais de R$ 16.866,01

Você encontrou dificuldades para responder essa pesquisa ou teve dúvidas ou sugestões? Se sim, liste-os por favor: