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# Preventing household food waste via nudging: An exploration of consumer perceptions

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## ABSTRACT

Current food consumption and production cannot be considered sustainable due to extensive ecological, social and economic issues along the supply chain. Reducing food waste is a major instrument in increasing food security and alleviating environmental pressure and thus increasing sustainable food consumption. In Germany, the main generators of food waste are private households. The typical approach to mitigate this is to better inform consumers by means of awareness campaigns. However, research shows that additional solutions are required to tackle the problem of household food waste. Nudging is a relatively new approach to guide consumer behavior gently into a certain direction but there is little experience with its application in the field of consumption politics, let alone food waste reduction. The study addresses this research gap and conducts a first exploratory analysis of the possibilities to reduce household food waste via nudging. The study focuses on the use of food purchase plans as a means to reduce household food waste. It analyses 101 personal questionnaires which were carried out to extract consumers' preferences in this respect. The evidence shows that respondents are open to a change of behavior and also to the use of purchase plans. Furthermore they are interested in feedback on individual food wasting behavior, specific advice on meal planning and social interaction on this topic with their communities. The results also show that young respondents and those living in large households with families are more open to changing their behavior in this respect. These results may be used to gain first experiences in using nudging to reduce household food waste; however, future research is needed to validate and build on these results.

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## 1. Introduction

Currently, the food system has caused many concerns regarding its sustainability. Governments and societies around the world are confronted with a major problem. On the one hand, there are environmental problems resulting from food production and processing along the entire value chain, an increased demand for food, water and energy caused by global population growth, as well as hunger, malnourishment (Reisch et al., 2013) and greenhouse gas emissions from food waste treatment (Parry et al., 2014). On the other hand, there are obesity, increasing health problems and costs and decreasing social cohesion (Reisch et al., 2013). The main drivers responsible for this are the actual and perceived distance between producer and consumer, the loss of biomass between field and table (including waste) and the

high consumption of animal products (Reisch et al., 2013). Numerous solutions to these issues are discussed widely in science, society and politics. A potential leverage point that has received growing attention recently is food waste. The reduction of food waste is widely discussed as a potential contribution to alleviating environmental pressures of food production, counteracting the increased demand for food, water and energy caused by the global population growth, supporting the prevention of hunger and malnutrition and reducing economic losses (Priefer et al., 2013; Reisch et al., 2013; Reutter et al., 2016). Additionally, ambitions to tackle obesity and other diet-related health problems could be combined with food waste reduction efforts (Wansink and Van Ittersum, 2013). Accordingly, the United Nations have called for action to halve the per capita food waste at retail and consumer level by 2030 (United Nations, 2015).

It is estimated that globally about 1/3 of all food produced is lost or wasted (Gustavsson et al., 2011). Food loss and waste occur at all levels of the food system (Parfitt et al., 2010). In

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Germany, as in many other European countries, the main generators of food waste are private households (Bräutigam et al., 2014; Priefer et al., 2016; Stenmarck et al., 2016, see Jepsen et al., 2014 for details). An established approach to mitigate such waste is to better inform consumers by means of general awareness campaigns (see Halloran et al., 2014; Kranert et al., 2012; Langen et al., 2015). Though this is a first and vital step in transforming consumer behavior, existing research suggests that the provision of information as a stand-alone approach is insufficient to tackle the problem of household food waste. While general information can create the motivation and ability for behavior change (van Trijp, 2014; Parry et al., 2014), this alone is unlikely to facilitate a transformation to sustainable behavior at sufficient scale or speed (Aschemann-Witzel et al., 2017). Research also shows that consumers do not necessarily desire more information on food waste, indicating that this is indeed ineffective (Langen et al., 2015). Hence, in addition to merely raising motivation and ability, opportunities need to be created in order to transform consumer behavior holistically (van Trijp, 2014). Creating the right opportunity can be as simple as increasing the possibility of the desired behavior or decision by making the preferred choice options more accessible, e.g. by placing a healthy apple in a more prominent position than a rather unhealthy chocolate bar in order to promote a healthy diet. In the case of reducing household food waste, this for example could be achieved by a food delivery service that provides precisely the right amounts of food needed for a meal, without surplus of any of the food items. This way of encouraging a desired behavior and gently guiding consumers' behavior into a certain direction has become popular by the term *nudging*. This rather new approach has received much attention in the past ten years. It builds on the findings of Kahneman (2011) *Thinking fast and slow* (2011) which were incorporated by the economist Richard Thaler and the legal scholar Cass Sunstein. By altering the choice context 'good' behaviors are supported much more effectively than merely by means of providing general information. This is a much gentler approach than forbidding 'bad' behaviors or restrictions by strong economic actions (Thaler and Sunstein, 2008). As such, numerous successes in enhancing peoples' welfare and supporting sustainable consumption using this approach can be reported, for example in regard to monetary cost reduction via energy saving, reduced greenhouse gas emissions caused by public transport or healthier diets through reduced portions sizes (Lehner et al., 2016). However, there is still little experience with its application in the field of consumption politics (Reisch and Sandrini, 2015), let alone in the reduction of household food waste. Only a few studies exist on reducing consumer food waste via nudging, yet these focus mainly on eating-out occasions such as canteens or restaurants (see for example Filimonau et al., 2017; Kallbekken and Sælen, 2013; Papargyropoulou et al., 2016). Considering its high potential for contributing to a sustainable food system, it is becoming more and more obvious that there is a clear lack of research in the field of preventing household food waste via nudging.

The study at hand addresses this research gap and explores how nudging may reduce household food waste. For this, special attention is put on the consumers' opinion, as this is a vital factor of the successful implementation of nudging. Thus, the study investigates the research question of *What are consumers' perceptions of the suitability and applicability of the nudging approach to reduce food waste in private households?* Its unique contribution lies, firstly, in providing a first empirical exploration of the suitability of this approach and, secondly, in proposing first ideas on how elements of nudging may be used to tackle household food waste.

## 2. Theory

### 2.1. Food waste

In this study the term food waste is defined according to German jurisdiction as well as European regulations on food law (The European Parliament and the Council of the European Union: Directive 2008/98/EC; The European Parliament and the Council of the European Union: Regulation (EC) No 178/2002) and proposals for a framework to define food waste suggested by the EU-funded project *Food Use for Social Innovation by Optimising Waste Prevention Strategies* (Östergren et al., 2014; Stenmarck et al., 2016). Thus, the term food waste is defined as *all substances and products that were intended for human consumption but have been discarded viz. are not used for human consumption*. Although this definition is subject to many critiques, such as the exclusion of pre-harvest losses and male chicks that are not needed for egg production (e.g. Schneider, 2013), it is satisfactory for this study as it focuses on household food waste. With this definition, the focus of this study is clearly set on a proactive point of view (García-García et al., 2016). This means, the focus lies in the avoidance of arising food waste, rather than the efficient treatment of arisen food waste, thus following the European waste hierarchy (Directive 2008/98/EC). Consequently, food diverted to material uses or energy recovery as suggested by other studies will be regarded as waste, if it was previously intended for human consumption.

Not all food waste is avoidable; however, most of the food waste generated in private households is avoidable or at least partially avoidable (47% and 18%, respectively in Germany, Kranert et al., 2012). This study focuses on the avoidable and partially avoidable food waste.

Causes for household food waste are diverse and not always obvious (see Priefer et al., 2016; Parfitt et al., 2010). In an extensive study, Aschemann-Witzel et al. (2015) identified three factors for consumer-related food waste: (1) The motivation to avoid food waste, (2) consumers' food managing capabilities and (3) the handling of trade-offs between priorities. The motivation to avoid waste is rather high in Germany (European Commission, 2014) and therefore this may also be true for food waste, not least due to several information campaigns regarding the topic (Secondi et al., 2015). Factor three, other priorities, such as convenience orientation and safety concerns, depends on (1) the motivation and (2) the food managing capabilities (Aschemann-Witzel et al., 2015). For this reason, factor two, consumers' food managing capabilities is most relevant for household food waste prevention. Research shows that in many cases consumers lack the skills and the right solutions to reduce food waste (Parry et al., 2014). Of the different skills among consumers' food managing capabilities, the planning of food purchases is identified as the most important managing capability in this study. This is because food purchases occur at the beginning of the consumer food handling process and hence hold the most potential to reduce surplus food purchases and thus have an effect on food security and alleviating environmental pressure from surplus food production. The importance of purchase plans in combatting household food waste has been confirmed in several recent studies (e.g. Langen et al., 2015; Schmidt, 2016; Stefan et al., 2013; Stancu et al., 2016, see also Williams et al., 2012). Shopping planning in this context consists of the steps meal planning, supply check and usage of a shopping list (Stefan et al., 2013).

Food waste management strategies vary depending on the stage of the food supply chain, see García-García et al. (2016) for an overview. Many instruments to reduce household food waste have been discussed and applied. Besides the mentioned awareness campaigns, the instruments include early childhood education,

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