Towards Zero Waste: an Exploratory Study on Restaurant managers

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ABSTRACT

Approximately one third of global food production is wasted along the food supply chain causing economic, environmental and social impacts. At EU level, restaurants occupy the second highest position in the classification of bodies responsible for food waste generation and a significant share of restaurant costs "goes" to waste. However, few studies have been carried out on the factors and managerial implications associated to this type of waste.

By introducing the GME estimator, this paper focuses on data collected in 127 restaurants located in the regions of Lazio and Tuscany (Italy) with two specific aims. Firstly, to propose a theoretical framework for exploring factors that make restaurants waste food. Secondly, to comprehend whether food waste in restaurants is related to cooking and to clients.

The results show that the attitude of restaurant managers as well as types of menus served and restaurant size play significant roles.

1. Introduction

Worldwide 1,3 billion tons of food, equal to one third of the global food production is lost or wasted every year along the food supply chain (Gustavsson et al., 2011). The economic value of the food wasted globally is approximately 1000 billion dollars per year, this figure rises to 2600 billion considering the hidden environmental costs that result from the phenomenon (FAO, 2013). Since food waste represents a major public policy issue, it has recently been included in the United Nations Sustainable Development Goal 12, "Responsible Consumption and Production", which aims to halve "per capita global food waste at retail and consumer level and reduce food loss along production and supply chains by 2030" (UNDP, 2016).

According to literature, there is a specific classification for food loss and food waste (Griffin et al., 2009; Parfitt et al., 2010; Gustavsson et al., 2011). Food losses occur in the first stages of the food supply chain and are mainly due to poor technology and investments, which is why they specifically occur in developing countries. Food waste is related to the final consumption phase (retail, household and out of home consumption) and is a consequence of consumer's behaviour, therefore it is typical of the Western Countries (Mondéjar-Jiménez et al., 2016; Principato et al., 2015; Parfitt et al., 2010; Griffin et al., 2009; Gustavsson et al., 2011).

As much as 42% of all the food produced in Europe gets lost at consumption level, this corresponds to approximately 89 million tons of food wasted every year. This figure could rise to 126 million tons per year within 2020 if no action is taken (BIO Intelligence Service, 2010) thus causing significant economic, environmental, and social impacts (Barilla Center for Food and Nutrition, 2012; Graham-Rowe et al., 2014; Göbel et al., 2015). In Italy, the estimated costs of food waste occurring in the final phase of the food supply chain is approximately 12 billion Euros per year (Ministero dell'Ambiente Italiano, 2015).

In Europe, the second source of food waste generated at consumption level occurs in restaurants following households (Brautigam et al., 2014; Monier et al., 2010) and in Italy this tendency is continued with household food waste which amounts to as much as 54%, followed by restaurant waste amounting to 21% (Coldiretti, 2017). A similar situation can be seen in the US where families and restaurants waste approximately 39 million tons of food per year (Buzby et al., 2011).

Although much research has been carried out at household level, the same cannot be said for the food waste generated by the hospitality sector which includes food served in restaurant/bars, hotels, canteens and by catering services. To date in-depth studies have not been carried out on this phenomenon both at academic and practical level (Principato, 2018; Pirani and Arafat, 2016; Schneider, 2013). Indeed, most of the studies on food waste at restaurant level have focused on the amount instead of the underlying causes (Heikkilä et al., 2016).

Food waste represents a serious issue and economic cost for the restaurant industry (WRAP, 2013a). According to a recent study conducted in the UK, the amount of food wasted by the hospitality sector

amounts to more than £682 million GBP per year which includes food procurement, labour and service costs, utilities and waste management costs (WRAP, 2013a). Considering the economic losses, in addition to environmental and social damage, it is essential to identify the factors that contribute to the amount of food wasted in restaurants. In fact, the less food wasted, the fewer the related impacts which would lead to an improvement in the sustainability of the entire food service sector (Heikkilä et al., 2016).

According to WRAP (2013b), the main causes behind restaurant food waste generation occur in the preparation phase (45%) or are due to food deterioration (21%) and food scraps left by clients (34%).

In this study, we focus on avoidable food waste generated in the hospitality industry which includes restaurant, bars and cafeterias that provide table service; therefore canteens, catering services, hotels and fast food restaurants are excluded from the analysis. For avoidable food waste, we intend leftover edible food (e.g. slices of bread, apples, meat) which could have been consumed if it had been better portioned, managed, stored and/or prepared. 'Avoidable' food waste also includes some otherwise acceptable food items that are not eaten due to consumer preferences, such as bread crusts and jacket potato skins (WRAP, 2013b).

Restaurant food waste occurs at two levels: during preparation and service (or consumption) phase (Risku-Norja et al., 2010; Papargyropoulou et al., 2016). We should therefore consider the food wasted as avoidable food waste discarded during the preparation/processing of the meals as well as spoilage and expiration, as well as food left over by client (i.e. food scraps) (Marthinsen et al., 2012; Pirani and Arafat, 2016).

The main aim of this study is to determine the factors associated with restaurant food waste by distinguishing between food waste generated in the kitchen (hereafter Kitchen Food Waste, KFW) and that generated by clients (hereafter Client Food Waste, CFW). We used the logit model within a segmentation approach in order to achieve our aim. However, considering the small sample size which can characterize exploratory research as in our study, we suggest using the Generalized Maximum Entropy Estimation – introduced by Golan et al., 1996a – which does not require strong parametric assumption on the models, is suitable for small sample and for ill-posed or ill-conditioned situations in the matrix data.

Our study adds to existing literature by making two main contributions. Firstly, by exploring the main factors associated with restaurant food waste generated both in kitchens and in dining rooms, we can understand whether and to what extent food waste is generated by inefficient dish preparation and/or client leftovers. Secondly, the GME estimator represents a novelty in the field of exploratory research and can help researchers and analysts (marketer analysis, economists) to carry out proper analyses using flexible estimators which do not condition data to strong parametric assumptions and may not fit with the data collected.

The remainder of this paper is structured as follows. Section 2 presents the theoretical framework with which we carried out our exploratory research. Section 3 illustrates the data collection process and the method used for the analyses. A descriptive analysis and the GME logit estimation results are presented in Section 4. In Section 5 we discuss the implications of our study and some concluding remarks are drawn in Section 6.

2. Food waste in restaurants: the selected theoretical framework

Although to date little is known about food waste at restaurant level, based on the findings of the most relevant studies on this topic (Betz et al., 2015; Marthinsen et al., 2012; Pirani and Arafat, 2016; Heikkilä et al., 2016; Sustainable Restaurant Association, 2010), we defined a new conceptual framework (Fig. 1).

Based on previous studies (Risku-Norja et al., 2010; Papargyropoulou et al., 2016) we considered two types of food waste at restaurant level:

"kitchen food waste" (*KFW*) which is food wasted during the preparation stage due to "overproduction, peeling, cutting, expiration, spoilage, overcooking, etc." (p.4) and "client food waste" (*CFW*) which is "food wasted by customers after the food has been served to them" (p.4). Papargyropoulou et al. (2016) also considered "buffet leftover waste" which was not included in our analysis since we only consider table service.

Therefore, according to this overview, the main responsibilities related to the food waste phenomenon fall respectively on the chef and restaurant managers (for kitchen waste) and on the clients.

As regards these issues we firstly identified from existing literature the main factors and incorrect behaviours related to food waste generation both from the manager/chef and client perspectives.

Considering the manager/chef perspective, the behaviours that have resulted in the reduction of food waste are: careful ordering and menu planning (Sustainable Restaurant Association, 2010), avoiding spoilage waste by monitoring used-by-dates and storage conditions (WRAP, 2013b), re-using edible food items for making other recipes (Sustainable Restaurant Association, 2010), portion size, and composting food waste (WRAP, 2013b; Sustainable Restaurant Association, 2010).

From the client perspective, in order to reduce food waste, it is essential to avoid leaving leftovers on one's plate and large portions play an important role in food waste generation (WRAP, 2013b; Sustainable Restaurant Association, 2010). This is the main reason why managers should adapt portion sizes according to the clients' needs and preferences (WRAP, 2013b; Sustainable Restaurant Association, 2010). Indeed, a study conducted in the UK, which focused on CFW highlighted that 27% of respondents leave leftovers on their plates, especially in the case of large portions (WRAP, 2013a) and approximately 40% of the respondents suggested that a possible solution would be to reduce the cost of the meals according to the size of the portions.

Our conceptual framework not only considers the reduction of food waste, which is obviously the most important aspect for avoiding waste, but also the recycling of food when this phenomenon occurs. From the managers' perspective, it is preferable to donate surplus food in the case of KFW and/or give the client a bag of his/her leftovers – commonly called takeout bag or doggy bags (Sirieix et al., 2017) – to take home and consume at a later time in the case of CFW (WRAP, 2013b; Sustainable Restaurant Association, 2010). In Northern Countries (such as the UK and the USA) this is a commonly used practice accepted at any social level while in Mediterranean Countries (like Italy) this is still uncommon mainly due to cultural reasons. Indeed, according to a recent study carried out by Coldiretti (2017), approximately one out of three Italians (36%) have taken leftovers home at least once, while 22% consider this practice unsophisticated and are ashamed to ask for it (similar results were found by Sirieix et al., 2017). Similarly, although 90% of Italians believe that restaurants waste a large amount of food, as many as 41% are embarrassed to take home their leftovers (Last Minute Market, SWG, 2016).

3. Materials and methods

3.1. Data

The study was carried out between September 2015 and February 2016 and it was based on a sample of 127 restaurants located in Tuscany and Lazio regions. With the aim of increasing the range of competence and investigation of the phenomenon under study, the research design focused on restaurants located in tourist sites such as cultural, coastal and lakeside resorts and by distinguishing the type of business in restaurants and cafes with restaurant service. In the Lazio region, we considered restaurants located both in the metropolitan area of Rome and surrounding towns and lakeside resorts (Bracciano and Bolsena lakes) as well as other cultural sites located in the provinces of Viterbo, Latina and Rieti – while in Tuscany we focused on the provinces of Lucca and Massa-Carrara which include important coastal areas (i.e. Versilia coast).