# Restaurant food waste and the determinants of its effective management in Bulgaria: an exploratory case study of restaurants in Plovdiv

**Abstract**

Restaurant food waste represents a significant societal challenge in transitional economies where the frequency of dining out is rising. The problem of restaurant food waste in this context is however under-researched which hampers understanding of its causes and effects. This paper contributes to knowledge with a case study of food waste management in restaurants of Plovdiv in Bulgaria, a transitional economy in South-Eastern Europe. Through the lens of qualitative research, it establishes the causes of restaurant food waste and explores managerial approaches to mitigation. The study highlights the crucial role of targeted governmental support in more effective management of restaurant food waste. The government should train restaurateurs on how to quantify and characterise major food waste streams. It should further provide reliable services of waste collection to facilitate on-site food separation and recycling. Lastly, public awareness campaigns should be developed to better engage customers in restaurant food waste minimisation.

**Keywords**

Food waste; restaurant; environmental impact; environmental management; policy intervention; South-Eastern Europe

**Highlights**

- Explores the challenge of restaurant food waste in South-Eastern Europe
- Reports on a case study of a sample of restaurants in Plovdiv, Bulgaria
- Identifies major drivers of restaurant food waste and reveals managerial approaches to its mitigation
- Discloses the determinants of more effective management of restaurant food waste
- Elaborates upon required changes to policies and consumer mindsets

## 1. INTRODUCTION

Food waste is a major sustainability challenge (Wang *et al.* 2018). With an approximately one-third of the food produced for human consumption being wasted (Gustavsson *et al.* 2011), the associated detrimental effects are manifold (Stöckli *et al.* 2018). Food waste does not only lead to environmental degradation (Dou *et al.* 2018) but also inflates food prices and accelerates social inequality (Quested and Johnson 2009), thus threatening global food security and jeopardising local community resilience (Godfray *et al.* 2010).

In order to feed the growing global population, it is necessary to better utilise the food produced for human consumption (Foley *et al.* 2011). The hospitality sector and, in particular, its sub-sector of foodservice provision, is the third largest contributor to global food wastage, right behind households and the sector of agriculture with related food processing industries (Stenmarck *et al.* 2016). Food waste represents a substantial operational burden for restaurateurs (Giorgi 2013) as it diminishes their already 'thin' profit margin, thus emphasising the importance of its management (Pirani and Arafat 2014). Effective management requires understanding of the key drivers of restaurant food waste generation alongside managerial attitudes and approaches to its mitigation (Heikkilä *et al.* 2016; Papargyropoulou *et al.* 2016; Principato *et al.* 2018).

While the research agenda on restaurant food waste management is gradually evolving in developed countries, the issue remains under-studied in the context of developing and transitional economies (Filimonau and de Coteau 2019). This is a major shortcoming given the growth of the local middle class which drives the frequency of out-of-home food consumption with subsequent wastage (Pirani and Arafat 2016). For example, it is estimated that the foodservice sector in China generates up to a half of food wastage across the national food supply chain (Wen *et al.* 2015). The under-developed research agenda on restaurant food waste in emerging economies hinders understanding of how it can be managed more effectively (Papargyropoulou *et al.* 2016).

This paper contributes to knowledge with an exploratory case study of restaurant food waste and its

management in Plovdiv, Bulgaria, a transitional economy in South-Eastern Europe with a rapidly developing market of dining out (Todorov 2016). Restaurant food waste in Bulgaria has never been studied although its magnitude is estimated as significant and growing (Monier *et al.* 2010). Better understanding of the phenomenon of restaurant food waste can aid in the design of operational interventions for more effective management of this major societal challenge in Bulgaria, but also in other transitional economies of South-Eastern Europe where the patterns of out-of-home food consumption are similar, such as Romania, Serbia and Macedonia.

## 2. LITERATURE REVIEW

### *2.1. Environmental management in hospitality operations*

The hospitality sector consumes large quantities of natural resources and generates significant levels of environmental pollution (Chou *et al.* 2012). Due to excessive contribution to the global carbon footprint (Scott *et al.* 2010), water use (Warren and Becken 2017) and solid waste generation (Arbulu *et al.* 2016), it has been acknowledged as one of the least environmentally-benign sectors within the services industries (Bohdanowicz *et al.* 2011). To facilitate progress of the sector towards its sustainability goals, it has become ever-critical to reduce the environmental footprint of hospitality operations (Legrand *et al.* 2017).

The hospitality sector has begun to recognise the need to pro-actively manage its negative environmental effects (Namkung and Jang 2013). To this end, an increasingly large number of hospitality enterprises evaluates the feasibility of integrating the principles of 'green' (Wang *et al.* 2013) and/or 'environmental' (Zhu and Sarkis 2006) management into their operations. From the business perspective, environmental management represents an opportunity to improve organisational performance via cost minimisation (Tzschentke *et al.* 2008). Further, it enables managers to innovate (Martin-Rios *et al.* 2018), thus positively differentiating such hospitality enterprises from competition and, therefore, providing market advantages, as innovation theory suggests (Victorino *et al.* 2005). Environmental management is an integral element of the wider corporate social responsibility (CSR)

agenda which is gaining appeal within the hospitality sector (Martinez and del Bosque 2013). As theory of CSR posits (McWilliams and Siegel 2001), by tackling the major societal challenges, hospitality managers can enhance consumer engagement, improve corporate reputation and generate extra revenues.

The (small-to-medium) size of many hospitality businesses represents a prime barrier towards a broader integration of the principles of environmental management in hospitality operations (Filimonau and de Coteau 2019). Limited resources prevent hospitality managers from pro-actively engaging in environmental conservation (Filimonau *et al.* 2019). Further, the hospitality sector represents a highly competitive market with limited opportunities for managerial interaction (Gray *et al.* 2000). Professional networks of hospitality managers are often under-developed, thus constraining knowledge transfer (Shaw and Willaims 2009). This disadvantages hospitality enterprises in the services marketplace as they subsequently possess limited understanding of good business practices, such as those in environmental management (Legrand *et al.* 2017). This limited knowledge prevents managers from identifying areas in which operational interventions are necessary to mitigate the growing environmental footprint of hospitality enterprises (Filimonau *et al.* 2019). This further averts managers from prioritising and optimising the (re)distribution of scarce internal resources for more effective mitigation of environmental impacts (Tzschentke *et al.* 2008).

To aid hospitality businesses in embracing the principles of environmental management, non-governmental organisations and industry associations have established codes of conduct and/or developed guidelines for improved environmental performance (Hu *et al.* 2010). For example, the USA-based Green Restaurant Association-GRA (2018) designed standards for hospitality enterprises to save energy and water, engage in 'green' procurement and diminish environmental pollution. Within the latter category, GRA (2018) identified restaurant food waste reduction as a primary opportunity for managerial intervention. Likewise, food waste minimisation is recognised as a cornerstone of environmental management within the hospitality sector by the UK-based Sustainable Restaurant Association-SRA (2010). This is further acknowledged by scholarly research; for example, a

comprehensive review of the phenomenon of food waste in hospitality operations as an emerging study domain can be found in Filimonau and de Coteau (2019). The challenge of food waste management in restaurants is discussed next.

*2.2. Restaurant food waste and its management*

Although food waste represents a critical issue which triggers considerable economic and reputational losses for restaurants (Giorgi 2013), there is no consistency in its definition (Xue *et al.* 2017). In the context of this paper, food waste is understood as something driven by a human decision to dispose of food (Principato *et al.* 2015; Stenmarck *et al.* 2016; Mondéjar-Jiménez *et al.* 2016). This decision is normally deliberate, such as, for example, customers not finishing their meals and/or chefs refusing to plate aesthetically displeasing food. This is as opposed to the definition of food loss which is normally indeliberate, such as, for instance, the food spoilage occurring because of suddenly broken kitchen equipment (Parfitt *et al.* 2010). The key point is in that food waste can be avoided while food loss is largely unavoidable (Filimonau and de Coteau 2019).

Food waste occurs at different stages of restaurant operations and can be attributed to numerous, external and internal, factors (Heikkilä *et al.* 2016). If presented in linear form, these factors can relate to the pre-kitchen, kitchen-based and post-kitchen operational processes and procedures (Filimonau and de Coteau 2019). In simplistic terms, restaurant food waste is often categorised as arising from food preparation, on-site spoilage and customer plates (Kantor *et al.* 1997). It is estimated that food preparation accounts for the largest share of restaurant food waste (45-65%, depending on a source of estimates), followed by customer plate waste (30-34%), although these figures can vary significantly depending on such factors as restaurant's type, its location and business model, to mention a few (Baldwin *et al.* 2010).

Increased societal expectations of the restaurant product offer in terms of its quantity and quality is an example of an external factor which prompts restaurateurs to prioritise consumer satisfaction over food wastage (Makani 2016). Fierce market competition obliging restaurant managers to diversify their

menu offer, often at the cost of wasted food, exemplifies another external effect (Huang *et al.* 2018). Lastly, irresponsible consumer behaviour contributes significantly to food wastage in restaurants given that customers tend to prioritise personal satisfaction over environmental concerns when dining out (Sakaguchi *et al.* 2018).

Within the internal factors contributing to restaurant food waste, corporate policies, managerial attitudes, employee skills and operational defficiencies are important (Engstrom and Carlsson-Kanyama 2004). Rigid in-house rules regarding the time spent by food on buffets exemplify the role of corporate policies in food waste generation (Irani *et al.* 2018). Poor demand forecasting and inefficient food stock management represent examples of managerial and staff incompetencies leading to wastage (Pirani and Arafat 2016). The use of out-of-date cooking equipment, related technological failures and inadequately trained staff on food waste mitigation exemplify operational deficiencies (Papargyropoulou *et al.* 2016).

It is important to note that all factors contributing to restaurant food waste generation are inter-related. For example, the lack of staff training on how to prevent food wastage is often due to managerial disbelief in the importance of such training (Filimonau *et al.* 2019). In turn, poor demand forecasting can occur because of unwillingness of the company's senior management to invest into accurate forecasting models and prediction algorithms (Gu 2012). Lastly, irresponsible consumer behaviour can be prompted by corporate decisions, such as in the case of 'eat-as-much-as-you-like' and/or all-inclusive models of food service provision (Papargyropoulou *et al.* 2016).

The precise magnitude of restaurant food waste has never been established (Filimonau and de Coteau 2019). Although there are country-specific case studies of individual hospitality enterprises that quantified and characterised restaurant food waste (Silvennoinen *et al.* 2015; Gaiani *et al.* 2018; Sakaguchi *et al.* 2018), there are no accurate figures that would be representative of the entire national restaurant sectors. The available sectorial figures are dated and provide rather crude estimates that are likely to under-value the true magnitude of restaurant food waste. For example, the hospitality sector in EU-27 countries is thought to have produced over 12 million tonnes of food waste in 2006 (Oliveira *et*

*al.* 2016) with circa 3 million tonnes, or 25%, coming from the UK alone (WRAP 2011). Interestingly, the figure from the US (39 million tonnes in 2008) combines hospitality and household food waste (Gunders 2012). This is due to a high frequency of eating out in this particular geographical market, with a subsequent 'blurred' nature of food consumption within and outside households, which hinders accurate assessments of restaurant food waste.

It is recognised that up to 75% of restaurant food waste could have been avoided, subject to (more) effective management (Engström and Carlsson-Kanyama 2004). It is further acknowledged that, in the future, the challenge of restaurant food waste will accelerate as the frequency of dining out is growing while there is a lack of effective management in place (Papargyropoulou *et al.* 2016). The current lack of reliable sectorial figures on restaurant food waste may lead to an erroneous conclusion that the challenge is minor, hampering research on its drivers and approaches to mitigation. This may partially explain why extant studies have focused on household food waste (see, for example, Graham-Rowe *et al.* 2014; Parizeau *et al.* 2015; Grainger *et al.* 2018) while the restaurant sector remains under-examined (Principato *et al.* 2018).

It is argued that accurate, aggregate figures on restaurant food waste should be urgently established (Filimonau and de Coteau 2019). These figures can be obtained by analysing food waste in a sample of 'representative' restaurants within a particular hospitality market and then extrapolating these figures across the market in question. This underlines the need for academics to engage in a larger number of case studies on food waste at the level of individual, but sector-representative, restaurants. These case studies should focus on the different consumption markets as the quantity and the character of restaurant food waste has substantial geographical variations. These variations are due to such factors as the local political context (for example, immature national legislation on commercial food waste disposal in many developing countries), unique business models (for instance, the prevalence of 'all-inclusive' restaurants in costal cities of Turkey during the summer holiday season), and even national culture (for example, specific habits of consuming food outside home in China), to mention a few

(Filimonau and de Coteau 2019). This notwithstanding, the geographical focus of existing research on restaurant food waste has been limited to the USA and EU (Filimonau and de Coteau 2019). It is necessary to expand the study scope to other geographical markets, especially to those within emerging economies, as this is where food consumption outside home grows rapidly while the restaurant sector evolves promptly in response to this growth (Papargyropoulou *et al.* 2016).

Existing research on restaurant food waste has revealed a number of approaches to its management that are effectively summarised in Filimonau and de Coteau (2019), Papargyropoulou *et al.* (2016) and Pirani and Arafat (2016). The approaches range from preventative (pro-active) to disposal-focused (reactive) following the classical (food) waste management hierarchy (Papargyropoulou *et al.* 2014). The disposal-focused approaches are reactive because they take the form of simple binning food leftovers, surplus ingredients and/or any damaged foodstuffs by restaurant staff with the subsequent management of this food waste (via, for example, landfilling or energy recovery) undertaken by local authories and/or private waste collectors (Papargyropoulou *et al.* 2016). The preventative approaches that aim to pro-actively divert food waste from landfill should therefore be prioritised (Sakaguchi *et al.* 2018). To this end, restaurateurs should take advantage of technology (for example, by using accurate demand forecasting models, dynamic pricing techniques and novel distribution channels for selling surplus food), social capital (for instance, by redistributing unsold food to local communities and staff) and the tools of behavioural economics and consumer psychology (for example, by encouraging more responsible patterns of food consumption among customers) (Filimonau and de Coteau 2019). In order for the preventative approaches to be effective, it is critical to secure political support and genuine corporate willingness to mitigate the challenge of restaurant food waste (Filimonau *et al.* 2019; Heikkilä *et al.* 2016; Tatàno *et al.* 2017).

The success of managerial approaches to the mitigation of restaurant food waste will depend on the geography of their implementation as there are substantial differences across the national hospitality markets, as discussed above. This highlights the need to examine the extent to which managerial

approaches to restaurant food waste mitigation, whose feasibility has already been tested within and confirmed for certain hospitality markets, can be applied in the different consumption contexts. This study set to do this for a rapidly emerging market of Bulgaria which is introduced next.

### *2.3. Restaurant food waste in Bulgaria*

Bulgaria's hospitality sector is well established, but severely under-researched (Todorov 2016). There is a need to better understand the main trends affecting the sectorial development, especially given that the frequency of eating out within this country is on the rise (Petkova 2016). Restaurant food waste in Bulgaria is equally under-studied. The data from 2006 pinpoint the total volume of food wastage in the country as equal to 1.64 million tonnes (Bräutigam *et al.* 2014). Circa 65% of this volume was attributed to households, agriculture and related food processing industries (Monier *et al.* 2010), suggesting that the remaining 35%, or approximately 0.57 million tonnes, of food waste originated from the sectors of hospitality and retail. This equates to circa 5% of total restaurant food waste in the EU-27 in 2006 (Oliveira *et al.* 2016). To date, this figure has likely become an under-estimate as the Bulgarian economy and its foodservice sector have evolved considerably since 2006 (Petkova 2016).

The National Waste Prevention Programme has been established in Bulgaria to promote the (more) effective utilisation of natural resources (EEA 2016). The programme focuses on households, manufacturing, retail and public services. The foodservice sector is excluded from the scope of the programme suggesting that restaurant food waste in Bulgaria is not prioritised by national government and/or that little is known about its true magnitude. This is a significant shortcoming as, according to FUSIONS (2016), a EU-funded project which has been set to examine food wastage across the EU-28, the challenge is equally pronounced across all member states and within all sectors of their national economies.

Growing societal concern of restaurant food waste in Bulgaria is demonstrated by the rise in non-for-profit organisations, such as the Bulgarian Food Bank, that aim to collect surplus food from foodservice and grocery retail enterprises and then redistribute it to the people in need, thus reducing

wastage and minimising food poverty (BFB 2018). This emphasises the need for more research of restaurant food waste in Bulgaria, evaluating its magnitude, highlighting key drivers and discovering managerial approaches to mitigation.

## 3. RESEARCH DESIGN

Due to the following reasons, the study adopted the qualitative research paradigm for primary data collection and analysis. First, the project deals with the challenge of restaurant food waste in Bulgaria which is severely under-studied meaning that the political, organisational, managerial and/or societal contexts in which this challenge takes place are poorly understood. The qualitative research paradigm is suitable for such exploratory, rather than confirmatory, studies given its potential to shed light on under-examined phenomena (Hennink *et al.* 2011). Second, the project investigates the managerial approaches to restaurant food waste mitigation. Previous research held in other geographical contexts shows that the mitigation approaches correlate with the levels of managerial knowledge of restaurant food waste and managerial attitudes to its minimisation (Filimonau and de Coteau 2019). The qualitative research paradigm is well positioned to explore human attitudes and behaviour under complex, varied and difficult-to-predict circumstances, such as environmental management in hospitality operations (Tzschentke *et al.* 2008), in order to establish particular behavioural patterns of key stakeholders for their subsequent confirmation in quantitative studies (Adams *et al.* 2007). Third, the population of restaurant managers is limited (Poulston and Yiu 2010) and there are well-recognised recruitment issues for participation in academic research which is due to busy and unpredictable nature of restaurant jobs (Filimonau and Krivcova 2017). The qualitative research paradigm suits primary data collection and analysis in the context of populations that are small in size and have restricted accessibility (Silverman 2013) which further justifies its adoption in this project.

Within the portfolio of qualitative research tools, in-depth semi-structured interviews were selected given their recognised ability to gather rich data from the participants who are busy and difficult-to-access (Silverman 2013). Semi-structured interviews were further adopted due to their

analytical flexibility which enables a detailed investigation of specific topics and questions (Veal 2011). Lastly, semi-structured interviews were chosen because they are capable of revealing participants' true opinions and in-depth attitudes on sensitive topics of great societal and corporate importance (Ghauri and Gronhaug 2005), such as restaurant food waste and its mitigation opportunities.

An interview schedule was designed following the literature review (see Appendix A in Supplementary materials). A set of initial interview questions was derived to cover managerial awareness of the challenge of restaurant food waste in Bulgaria, including its drivers and determinants of minimisation (Betz *et al.* 2015; Silvennoinen *et al.* 2015; Eriksson *et al.* 2017), approaches to mitigation (Pirani and Arafat 2016; Heikkilä *et al.* 2016; Kibler *et al.* 2018) and the role of stakeholders in managing restaurant food wastage, such as senior management, customers, staff and suppliers (Eriksson *et al.* 2017; Gaiani *et al.* 2018; Filimonau *et al.* 2019). An interview schedule was piloted prior to deployment with two restaurant managers in Bulgaria and minor changes were made to the questions following post-pilot feedback for better understanding and clarity.

Participants were recruited from the population of restaurant managers in Plovdiv, the second largest city in Bulgaria characterised by rich and unique culinary heritage and an established, yet rapidly developing, foodservice sector (Europe's Best Destinations 2018). Plovdiv is one of the most popular tourist destinations in Bulgaria, especially in light of the status of the European Capital of Culture it was granted for 2019 (Staikos 2018). In 2017, Plovdiv was visited by circa 0.3 million tourists with larger tourist figures reported in the country only by the capital (Sofia) and the coastal cities in the Black Sea region (Ministry of Tourism 2019). Plovdiv attracts tourists not only by its historical heritage, but also by its cuisine: according to the Ministry of Tourism, there are over 200 full-scale restaurants and cafes in Plovdiv while tourist expenditure on food and beverages consumed in the sector of foodservice provision in Plovdiv has grown almost two-fold since 2015 (Ministry of Tourism 2019). The rapid growth in tourism and out-of-home food consumption among the local middle class makes Plovdiv a suitable case study to explore the challenge of food waste management in restaurants. Although the

results of a case study can be difficult to generalise, case studies represent a popular research approach in many business subjects (Halinen and Tornroos 2011). This is because case studies can provide an initial, critical insight into an under-researched topic (for example, restaurant food waste in Bulgaria), outlining prospective study avenues and encouraging future, more detailed examination.

Convenience sampling was used for recruitment which, despite being subjective, is considered appropriate when dealing with the populations that are limited in number and characterised by poor access (Adams *et al.* 2007), such as those of restaurant managers. Although the qualitative research paradigm has a well-known drawback of its samples being non-representative, an effort was made to ensure the project embraced opinions of managers from a range of restaurants in Plovdiv that were broadly characteristic of the Bulgarian restaurant sector. To this end, three major categories of restaurants in Bulgaria were established in pilot interviews, i.e. casual dining, family dining (which includes fast food restaurants) and fine dining. Although no statistical data exist to establish an accurate market share of these major categories of restaurants, pilot interviews confirmed that casual dining and family dining restaurants occupy circa 50% of the market each, with fine dining restaurants holding a minor share. According to the participants in pilot interviews, the share of fine dining restaurants in Bulgaria is however gradually growing given a steady rise in income among local residents. Hence, the resultant sample had the representations of all major restaurant categories in relative proportions appropriate to the estimated market shares they occupied (Table 1).

[Insert Table 1 here]

Sample size (n=14) was determined by the saturation effect (Morse 1995 cited by Guest *et al.* 2006). Thomson (2010 cited by Marshall *et al.* 2013) posits that saturation is normally observed within 10–30 interviews which this study's sample fits into. Interviews were administered in June 2018 and lasted, on average, between 30 and 60 minutes. They were conducted in Bulgarian with a subsequent English translation performed by a professional language translator. The interviews were audio recorded for subsequent transcribing. No incentives were offered to the participants.

Thematic analysis was applied to the data collected following Braun and Clarke (2006). Thematic analysis provides a flexible, yet systematic, approach to qualitative data exploration by enabling an in-depth elaboration upon particular themes, codes and sub-codes, thus better exposing different features of the studied phenomena (Saunders *et al.* 2016). Three major themes emerged from analysis: the magnitude of food wastage in restaurants alongside its key drivers; approaches to mitigation; and the main obstacles to (more) effective food waste management. Figure 1 presents the coding structure of thematic analysis. When writing up its results, verbatim quotations were employed to support the main points made.

[Insert Figure 1 here]

## 4. FINDINGS AND DISCUSSION

### *4.1. The magnitude of restaurant food waste and its key drivers*

When asked to quantify and characterise food wastage in their restaurants, none of the participants were able to produce exact figures, offering rather rough estimates of the amount and the character of wasted food and assigning only basic qualitative descriptors to the food waste challenge in their restaurants, such as ‘significant’, ‘large, yet manageable’ and ‘insignificant’ (Figure 1). The inability to produce accurate figures was explained by the laborious process of taking measurements, but also by the need to prioritise other operational procedures, such as revenue management and customer satisfaction, in pursuit of corporate goals and personal performance bonuses. This is in line with Cobanuglu *et al.* (2003), Filimonau *et al.* (2019) and Martin-Rios *et al.* (2018) but contradicts Sakaguchi *et al.* (2018). The latter study found that most restaurateurs in California measure the amounts of wasted food regularly. This was attributed to the support of local authorities and, in particular, to the external training opportunities available to restaurant managers on how to quantify the major food waste streams in their enterprises. Given the crucial role of external support in measuring the magnitude of restaurant food waste in the USA, it is suggested that the EU initiatives designed to facilitate more accurate assessments of food waste, such as the FUSIONS (2016) project, should be implemented more actively, in various

economic sectors and across geographical borders.

When probing for the main drivers of restaurant food waste, the absolute majority pointed at customers (Figure 1). According to participants, Bulgarians do not think about the detrimental environmental and societal implications of food wastage when they dine out, which is in line with previous research on this topic conducted in other consumption markets (Ge *et al.* 2018; Kallbekken and Saelen 2013; Kanjanakom and Lee 2017). Concurrently, existing figures suggest that customer plates account for less than half of restaurant food waste (SRA 2010), implying that restaurant managers in Bulgaria may simply shift responsibility for wastage towards the consumer. Further, it is recognised that restaurants can influence consumption and make it more 'responsible' by employing the principles of behavioural economics and consumer choice architecture (Filimonau *et al.* 2017; Guthrie *et al.* 2015; Kallbekken and Saelen 2013). When probed, however, the majority rejected the possibility of architecting consumer behaviour to reduce food wastage in fear of customer dissatisfaction and subsequent loyalty loss. Similar findings were reported in Filimonau *et al.* (2019) in the UK context which suggests that the strategic prioritisation of short-term economic gains over long-term environmental savings is typical for restaurant managers across Europe.

Managerial knowledge and attitudes can determine the speed of adoption of 'green' practices in restaurants (Chou *et al.* 2012; Martin-Rios *et al.* 2018; Tzschentke *et al.* 2008). Based on how much they know about particular environmental challenges and the need for their mitigation, managers define the level of their business engagement with environmental conservation (Aragón-Correa *et al.* 2004). Managers can further affect the success of environmental conservation through a more pro-active execution of their mitigation decisions and preferences on the ground (López-Gamero *et al.* 2010). Hence, a probe was made to understand the extent to which managerial knowledge of the issue of restaurant food waste and managerial attitudes to its mitigation may have affected the inability of participants to produce accurate assessments of wasted food within their restaurants. The majority demonstrated good knowledge of the food waste challenge in restaurants and beyond, raising concerns

about the growing magnitude of the issue in Bulgaria, as well as globally, and indicated positive attitudes to the need for its mitigation:

> *'In my opinion, the problem of [restaurant] food waste has reached critical levels and continues to grow… I know that, in the West, they discard tremendous amounts of food every year. I think this is a shame, really, as this wasted food could certainly be used in a much more responsible way, such as it could be recycled, it could be donated to the people in need or used to feed animals'* (Daniel)

Like Daniel, many participants expressed concerns over restaurant food waste generation in the USA and 'western' EU countries. They however viewed the challenge as being less pronounced for Bulgaria due to its smaller population size and yet emerging foodservice market. This mindset has to be changed and managerial awareness of the growing scale of the challenge of restaurant food waste in Bulgaria should be raised as restaurants in developing and transitional economies waste as much food as restaurants in developed countries, if not more (Gustavsson *et al.* 2011).

*4.2. Mitigation approaches*

Interviews exposed a number of managerial approaches to the mitigation of restaurant food waste in Bulgaria (Figure 1). (Accurate) demand forecasting was dominant and participants claimed to make every effort to anticipate the number of customers and then order the necessary amount of food. Forecasting is integrally linked to the ratio between the actual number of customers and the number of customers that are expected to come to a restaurant (Muriana 2017), and the (in)accuracy in predicting this proportion determines the magnitude of food wastage (Gu 2012). Forecasting represents an example of pro-active, preventative approaches to the management of restaurant food waste that should be prioritised (Filimonau and de Coteau 2019; Papargyropoulou *et al.* 2014; 2016). However, this finding

contradicts Filimonau *et al.* (2019) who establsihed that UK restaurant managers tend to rely upon the reactive, disposal, rather than prevention, focussed approaches to food waste minimisation which is due to the challenges in generating precise demand forecasts. The latter point is further supported by Gruber *et al.* (2016) and Pirani and Arafat (2016) who posit that most foodservice enterprises refuse to take the risk of undervaluing the amount of food required to satisfy customer demand and tend to order more food than necessary. The difference in findings is likely to be because Bulgarian cuisine, whenever possible, strives to use local ingredients, implying short(er) food supply chains that are more responsive to last minute changes in food orders (Parfitt *et al.* 2010). Despite the adoption of preventative vision, many participants however admitted that, at times, the forecasts would not work, thus generating wastage.

Among other preventative approaches to the mitigation of restaurant food waste were portion control and regular stock inventories and rotation (Figure 1). These were however significantly less popular than forecasting which is in line with the literature. For example, Filimonau *et al.* (2019) found that these approaches were adopted by only a third of the sample of coffee shop managers in the UK while Charlebois *et al.* (2015) reported multiple challenges in taking this approach on board when managing food wastage in the context of fine dining catering in Canada. Low popularity of portion control as an approach to food waste mitigation is potentially due to the lack of consistency in defining an 'optimal' food serving size and poor consumer understanding of nutritional standards (Kallbekken and Sælen 2013; Castrica *et al.* 2018). This is further related to the size and shape of plates as they often determine subjective norms of the quantity of food that a person would like to consume (van Ittersum and Wansink 2012; Sobal and Wansink 2007; Wansink and van Ittersum 2013). To avoid customer dissatisfaction, instead of reducing portion size, restaurant managers in Bulgaria tend to ensure the meal becomes more interesting to consumers by making it more visually appealing and adding novel ingredients. Although this approach may encourage restaurant guests to consume an entire meal, it does not warrant less wastage as the literature pinpoints the reduction of portion size as a prime factor in the mitigation of restaurant food waste (van Ittersum and Wansink 2012). The challenge of implementing

portion control in Bulgarian restaurants is effectively summarised by Gloria:

> *'We have portion size control; however, it's relative because sometimes customers cannot even decide how much they'd like to consume and they just order the meal without thinking about the size of the portion… Instead, what has shown to be quite effective is to offer portions of the same weight, but with a bigger variety of different components and new ingredients. We noticed that, in this case, the customer eats at least 80% of the dish which reduces wastage'*

Inaccurate demand forecasting results in surplus food that restaurateurs should aim at re-purposing or re-distributing (Filimonau and de Coteau 2019). Smartphone technology can serve this purpose. For example, the 'Too Good To Go' smartphone app which is growing in popularity in Europe (TGTG 2019) enables restaurateurs to sell surplus meals at heavily discounted prices, subject to customers collecting these meals at the end of a business day, rather than serving them on restaurant's premises. This technological solution can, thus, aid restaurateurs in diverting food waste from landfill, but also generating extra profits and building consumer loyalty. Although none of the participants employed the smartphone technology to redistribute surplus food, they all acknowledged its significant potential to reduce food wastage and enhance business profitability. In particular, some participants commented on the potential of smartphone apps that redistribute surplus food to appeal to the growing market of the 'millennial' consumers. This is possibly because the Millennials tend to patronise those foodservice enterprises that aim to closely integrate the principles of environmental sustainability into their day-to-day business operations (Jang *et al* 2011).

In absence of suitable technological solutions, Bulgarian restaurateurs re-distribute surplus food by offering take-away boxes (so-called 'doggy bags') to customers. These are designed to restore the original value of plate leftovers, so restaurant guests can perceive them as food and not as waste

(Bozzola *et al.* 2017). However, the practice of using doggy bags in restaurants is sometimes seen inappropriate (Shimmura and Takenaka 2010) and consumers often choose not to ask for leftovers while restaurateurs do not offer them pro-actively in fear of customer dissastifaction (Sirieix *et al.* 2017). Interestingly, in the Bulgarian context, the practice of offering doggy bags is viewed by many managers as rather conventional (Figure 1). This is attributed to the fact that, for the Bulgarians, paying money for a restaurant meal means that the meal can be taken home if uneaten. There may also be a slight national culture effect as, according to participants, many Bulgarians were raised respecting the amount of work which food production required. Restaurant doggy bags are gaining appeal in other consumption contexts (Papargyropoulou *et al.* 2016; Sakaguchi *et al.* 2018) and this approach to managing food waste is likely to succeed in Bulgaria. To facilitate its broader application, it is important to provide uneaten food to consumers in plain packaging to avoid embarrassment (Zuraikat *et al.* 2018). Further, offering doggy bags in Bulgarian restaurants holds significant potential when catering for functions and events as here, similar to the Chinese context (Wang *et al.* 2017), consumers tend to order more food than required during these celebratory occasions which is in order to demonstrate exceptional hospitability to their guests. This is in line with Mirosa *et al.* (2018) and confirmed by Travis below:

> *'Yes, we do have such policy [on doggy bags], and we always ask customers if they'd like a doggy bag in order to take their leftovers home. Also, when we have major events, such as weddings, we have adopted a practice whereby the food that has remained is put in boxes, packed neatly and given to the organiser of the event. This is because they [clients] always order more food than necessary'* (Travis)

Donating food to the people in need and/or giving it to own staff can aid in re-distributing surplus restaurant food (Filimonau and de Coteau 2019). Aside from reducing wastage, food donations help combat social inequality, thus providing reputational benefits (Schneider 2013). However, restaurants

are often discouraged from donating food due to potential liability in terms of health and safety (Sakaguchi *et al.* 2018). In the case of Bulgaria, when probed, although all participants viewed food donation as a great method to mitigate wastage, only a half highlighted their active engagement in such initiatives (Figure 1). The major offputting factors were the above liability concerns, but also the manifold administrative requirements and conditions that would need to be met for surplus food to be donated alongside the lack of incentivisation for donation. This is in line with Chalak *et al.* (2018) who posit that these challenges are truly universal and persist across all markets of out-of-home food consumption. Lastly, weak civil society in Bulgaria was seen as an obstacle to food donation in a way that there were very few charities and/or non-governmental organisations that would be willing to take the burden of collecting unsold food from restaurants and giving it to the people in need. This is effectively summarised by Kris below:

> *'Our restaurant has previously participated in food donation initiatives but we won't participate in the future because there're huge requirements that must be met by the restaurant in terms of what food can be given and how it should look like. In absence of business alleviations or incentives to encourage donations, I see little point in engaging. Don't get me wrong though, I think that food donation initiatives are quite useful. However, there's a need for an external organisation, which could take the lead and monitor the process and which could act as an effective mediator between the people who'd need the food and the people who'd like to donate the food, such as us'*

Interviews showed that although restaurant managers in Bulgaria have adopted a number of approaches to food waste management, they engage in these approaches on an ad-hoc, rather than consistent, basis. The main obstacles to broader engagement are discussed next.

*4.3. The main obstacles to more effective management of restaurant food waste*

The determinants of effective management of restaurant food waste can be categorised as external and internal (Filimonau and de Coteau 2019; Martin-Rios *et al.* 2018; Papargyropoulou *et al.* 2016). While participants claimed to be prepared to mitigate food wastage and willing to allocate appropriate resources to this task (internal factor), they highlighted limited governmental support in mitigation (external factor) as a main constraint (Figure 1). Governmental support is instrumental in reducing barriers to food waste minimisation in hospitality businesses and promoting industry engagement (Bohdanowicz 2007; Canali *et al.* 2016; Girotto *et al.* 2015) and governmental (dis)incentives are necessary to stimulate more ambitious pro-environmental initiatives in restaurants (Clemens and Douglas 2006). However, in Bulgaria, participants blamed the passiveness of national government in the three key areas of relevance, namely: 1) raising public awareness of restaurant food waste, thus promoting customer collaboration with restaurateurs in its mitigation; 2) incentivising the industry with tax reductions; and 3) improving the efficiency of commercial food waste separation, collection and recycling. Desired governmental support is effectively summarised by Monika:

> *'To be honest, I cannot sense the role of the government in managing food waste at all. This's very sad because there're a big number of restaurants that are absolutely irresponsible in every aspect concerning [food] waste. People are not interested that the environment gets polluted and that, in fact, food waste can be recycled or even reused. The government has to intervene in order for people to learn what is right. But we, as a restaurant, do not see this intervention at this stage. For example, tax alleviations are important for those restaurants that are already managing their food waste. Stimulating the separation of food waste and taking care of the food waste collection logistics is another thing which the government should deal with. Indeed, if there was an established state or municipal firm, which would take responsibility for this, then we, as managers,*

*would be quite encouraged to take part and adopt more rigorous food waste management practices…'*

The role of national government in raising consumer awareness of the challenge of restaurant food waste is well recognised. For example, Kasim and Ismail (2012), Priefer *et al.* (2016) and Revell and Blackburn (2007) identified pro-active governmental support as a key element in building public awareness of restaurant food waste and engaging consumers in mitigation. Likewise, Gössling *et al.* (2016) considered policy-making essential for enhancing the social understanding of how particular (food) consumption choices can damage the environment. The issue of public awareness is of special importance for Bulgaria as most managers identified irresponsible consumer behaviour as another important external obstacle to effective mitigation of restaurant food waste (Figure 1). This is in line with the literature which emphasises the role of consumers in food waste generation in restaurants (Ge *et al.* 2018), hotels (Radwan *et al.* 2010) and coffee shops (Filimonau *et al.* 2019). Although some evidence exists to suggest that the modern consumer is getting increasingly concerned about the detrimental effects of restaurant food waste (Schubert *et al.* 2010), according to this study, this does not apply to the Bulgarians whose environmental awareness was claimed to be low. The managers blamed the Bulgarian government in taking no action on raising public awareness, thus providing no support to restaurants that are willing to engage consumers in the mitigation of food waste:

*'The customers are definitely not informed about the issue of food waste in restaurants and they do not care about it as a result. Consumer behaviour is absolutely irresponsible and, what is interesting, there're no interventions on behalf of the Bulgarian government to change this! I do not blame the customers if they know nothing about how big the problem is, but I do blame the government for doing nothing though …'* (Simon)

Targeted governmental support was repeatedly requested by participants to encourage Bulgarian restaurateurs to dispose of food waste in a more responsible manner. Food waste separation and subsequent recycling represent integral elements of food waste management in restaurants once prevention and re-distribution are no longer feasible (Filimonau and de Coteau 2019). However, they can only succeed in presence of reliable food waste collection services (Papargyropoulou *et al.* 2014). These are often administered by national government or, to be more exact, by local authorities on its behalf (Tai *et al.* 2011) but not always effective, even in developed countries, because of costly logistics (ReFED 2016). This held true for Bulgaria where on-site food separation and recycling was seen by most managers as meaningless given that commercial food waste was often disposed of together with other waste fractions. The national government was blamed for the poor design and execution of commercial food waste collection services. A national system of financial (dis)incentives (i.e. compliance tax reductions and non-compliance fines) which could facilitate on-site food waste separation and recycling in restaurants (Giuseppe *et al.* 2014) was further criticised for being inefficient and/or not working properly:

> *'Look, in Bulgaria, the problem is that there's no practice that requires restaurants to dispose of food separately. We've tried to separate food waste a few times, but we then saw how, when this waste was collected in order to be transported for disposal, everything went to one place, this made all our efforts pointless. Whatever we try to do [to minimise food waste] is extremely inefficient due to the lack of execution of [food waste collection] by the government'* (Mark)

Next, supportive and responsible suppliers are instrumental in carrying out environmental interventions in restaurants (Hua and Templeton 2010). Restaurateurs avoid changing suppliers because they are unwilling to risk working with a new supplier, whose responsibility is questionable and cannot

be predicted (Alonso and Northcote 2013). Suppliers can contribute to restaurant food waste generation due to poor logistics standards (Gustavsson *et al.* 2011). This was considered an important obstacle to the mitigation of restaurant food waste in Bulgaria by some restaurateurs (Figure 1). According to them, foodservice suppliers in Bulgaria do not pro-actively engage in food waste minimisation which is partially because they do not recognise the significance of the issue, but also due to their disinterest in its management, which is in line with Eriksson *et al.* (2012). The Bulgarian government should enhance recognition of the food waste challenge and the need for its mitigation among suppliers.

Lastly, within the internal factors, a lack of employee engagement in mitigation was seen as an obstacle (Figure 1), which is in line with Charlebois *et al.* (2015). Staff involvement in mitigation interventions brings multiple benefits to restaurants (Latif and Aziz 2018). However, for better staff engagement, it is crucial for restaurateurs to explain the benefits of mitigation and provide adequate training (Sourvinou and Filimonau 2018), implying extra financial commitments that can be offputting for many managers (Sobaih 2011).

## 5. CONCLUSIONS

The study contributed to knowledge by exploring the challenge of restaurant food waste and its management in the context of Bulgaria. For the first time, the study provided a qualitative indication of the approximate magnitude of restaurant food waste in this emerging market of out-of-home food consumption, identified its key drivers and shed light on major mitigation approaches adopted by foodservice managers on the ground. The main obstacles to effective mitigation of restaurant food waste in Bulgaria were revealed and the propositions were made on how these obstacles should be overcome.

The study demonstrated the need for restaurant businesses in Bulgaria to invest in (more) accurate demand forecasting and stock inventories as a prime means of food waste mitigation. A number of commercial models have been developed to aid restaurateurs in this endeavour (see, for example, https://www.noyanum.de/en/home) and it is argued that such models should be procured by restaurant business owners and integrated into day-to-day operations of their enterprises. Further, Bulgarian

restaurateurs should take advantage of growing academic expertise on food nutrition and design their menus accordingly. By controlling the size of portions, restaurants do not only reduce food wastage, but also contribute to healthy lifestyles of their customers. For instance, restaurateurs can offer smaller portions at discounted prices while giving their consumers an opportunity to order more food by paying extra, if and when necessary. This is in line with the principles of consumer choice architecture whose application in the sector of foodservice provision in Europe has been gradually growing, also as a means to encourage more sustainable food choices.

The study highlighted a crucial role of national government in mitigating restaurant food waste in Bulgaria. Given the low levels of public knowledge of the restaurant food waste challenge, Bulgarian government should design and administer public awareness campaigns to facilitate consumer collaboration with the industry towards the common goal of mitigation. Further, the government should assist restaurant managers to more accurately measure the main food waste streams in their enterprises by offering dedicated training opportunities, such as professional development workshops. Among other goals, these trainings may serve the purpose of sharing good business practices in restaurant food waste mitigation, thus playing the role of knowledge multiplying events. Next, the government should develop an effective system of financial (dis)incentives to encourage restaurateurs to engage more actively in food waste management. For example, commercial food waste collections can be organised in such a way in Bulgaria that local restaurateurs are charged per volume of food waste generated, rather than a flat fee, thus encouraging reduction in the quantity of wasted food. Likewise, interest-free or low-interest loans can be offered to those restaurant businesses in Bulgaria that are prepared to recycle food waste on site and recover energy. These loans can be spent on the procurement and instalment of anaerobic digestors in restaurants, for example. The regulations on commercial food waste separation, collection and recycling should be reinforced and their effective implementation should be incentivised with regular progress monitoring. Lastly, because civil society in Bulgaria remains under-developed, the government should facilitate engagement of non-governmental organisations in the mitigation of restaurant food waste, mainly with the purpose of streamlining the procedure of re-distributing surplus

food to the people in need.

The study had a number of limitations. Qualitative research is not generalisable, meaning the study's findings should be seen as exploratory, provisional and not confirmatory. Further, while every effort was made to detect social desirability bias in interviews and eliminate its occurence, it may have nevertheless affected participants' responses as it represents a long-standing shortfall of managerial interviews. Lastly, the study was constrained to a single country, implying its findings cannot be considered representative of the broader region of South-Eastern Europe.

The study highlighted a number of research opportunities. First, its provisional findings should be tested on a more robust sample of restaurant managers in Bulgaria targeting, in particular, a larger number of the representatives of the main sub-sectors (casual dining, fine dining, family dining), but also the industry professionals from the different regions within the country, such as the capital (Sofia) and the cities along the Black Sea coast, where international tourism supplies an essential proportion of restaurant customers. Food wastage in restaurants that cater for tourists can be different from those that cater for domestic residents. Second, future research can target non-governmental organisations in Bulgaria to seek their views on the scope of potential work on food waste mitigation, especially from the standpoint of engaging in the re-distribution of surplus food donated by restaurants. Third, governmental opinions on the need for support of restaurant food waste mitigation in Bulgaria as highlighted in this study should be obtained to evaluate how/if the claims made by the industry professionals about the passive role of national government are justified. Lastly, future research should examine restaurant food waste in other consumption markets that are characterised by the growing patterns of dining out and increasing international tourism while where little is known about the drivers of this major societal challenge alongside the scope for its mitigation, such as other countries in South-Eastern and East-Central Europe (for example, Croatia, Poland or Czech Republic), South-East Asia and South America.

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Figure 1. Coding structure with themes and codes. The figures inside the brackets represent the number and proportion of text passages representative of each code.

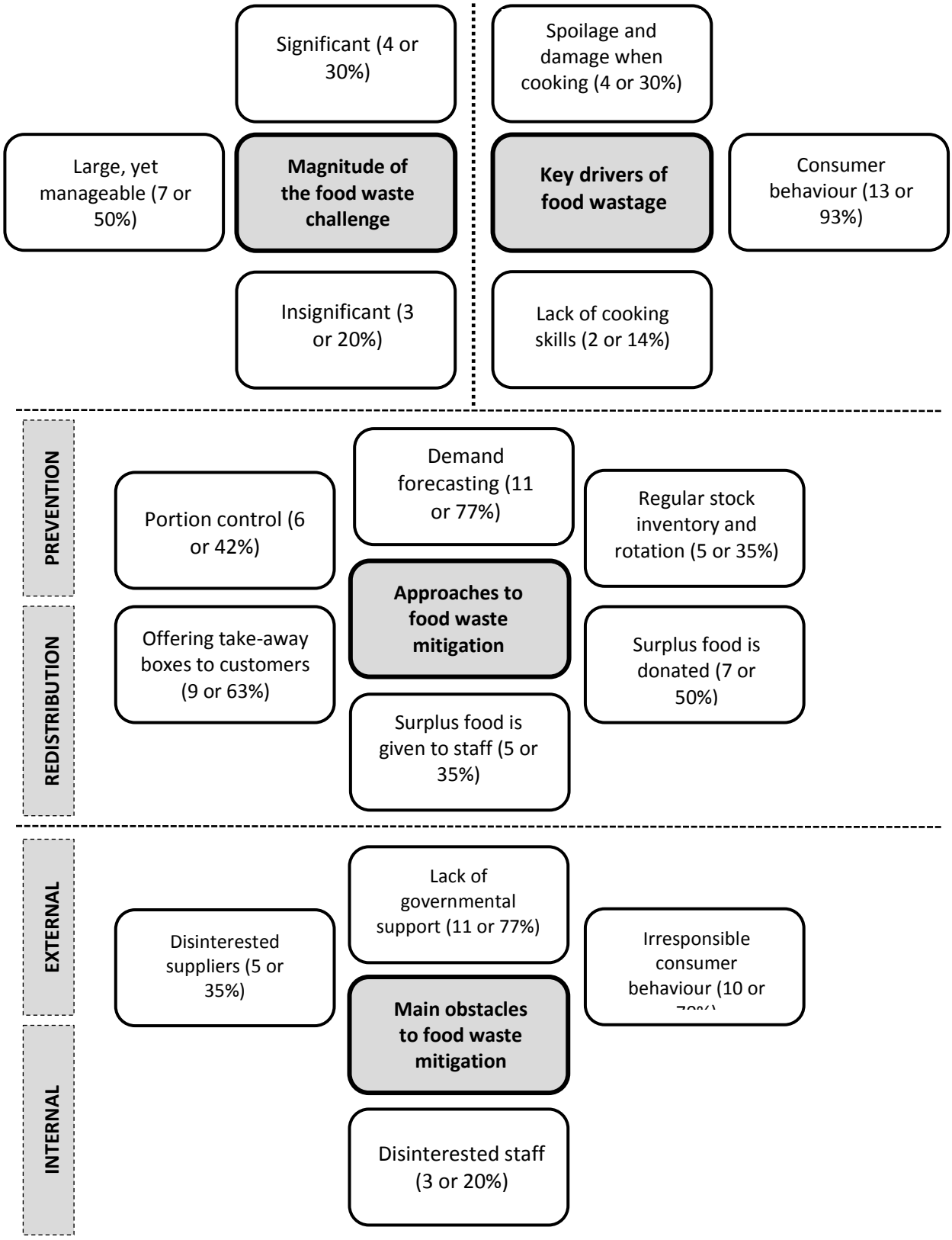

Table 1. Interview participants (n=14)

| Pseudonym | Gender | Age | Restaurant category | Educated to a University degree? | Work experience in a managerial role<br>+ Limited (1-2 years)<br>++ Intermediate (3-5 years)<br>+++ Extensive (5+ years) |
|---|---|---|---|---|---|
| Sam | Female | In their 30s | Casual dining | No | ++ |
| Kris | Male | In their 30s | Casual dining | Yes | + |
| Monika | Female | In their 40s | Fine dining | Yes | +++ |
| Daniel | Male | In their 30s | Fine dining | Yes | +++ |
| Mark | Male | In their 30s | Family style | Yes | + |
| Beth | Female | In their 20s | Family style | No | + |
| Veronica | Female | In their 50s | Casual dining | Yes | ++ |
| John | Male | In their 40s | Casual dining | No | +++ |
| Kelly | Female | In their 40s | Family style | Yes | ++ |
| Simon | Male | In their 40s | Family style | Yes | +++ |
| Tina | Female | In their 40s | Family style | Yes | ++ |
| Mila | Female | In their 30s | Casual dining | Yes | +++ |
| Travis | Male | In their 40s | Casual dining | No | + |
| Gloria | Female | In their 30s | Family style | Yes | ++ |