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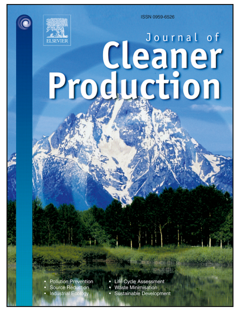

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An exploratory study of food waste management practices in the UK grocery retail sector

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Abstract

The grocery retail sector produces substantial amounts of food waste. Despite the growing public recognition of its negative socio-economic and environmental implications, the issue has been under-researched. In addition to a small number of studies, the focus has been on the quantification and characterisation of food waste streams in grocery retail. Little attention has been drawn to the managerial attitudes and approaches to food waste mitigation. Managerial research is critical to aid in understanding how the issue of food waste is tackled on the ground. This paper plugs this knowledge gap by investigating how managers of major UK grocery retailers address the problem of food waste in their day-to-day operations. It adopts content analysis of corporate materials and a qualitative method of primary data collection and analysis to explore managerial attitudes and approaches to food waste mitigation in supermarkets of the South East Dorset conurbation (UK). The study demonstrates that, although the problem of food waste is recognised by UK grocery retailers, it is not seen as being of critical importance. In mitigation terms, while food waste recycling and price reductions are mainstream, food donations are ad-hoc and largely occur at managerial discretion. Poor consumer awareness, imperfect regulation, inflexible corporate polices and limited control over suppliers hamper more active involvement in food waste mitigation. Based on findings, policy-making and managerial recommendations on how to optimise food waste management practices in the UK grocery retail sector are revealed.

Keywords: Food waste; Grocery retail; Managerial practices; Supermarket; UK; Dorset.

Highlights

- Corporate policies of major UK supermarkets emphasize importance of food waste mitigation
- Managerial approaches to food waste mitigation adopted on the ground are however basic
- Effective mitigation is hampered by low consumer awareness, imperfect regulation and relations with suppliers
- Inflexibility of corporate policies also prevent effective food waste management on the ground

1. Introduction

Food waste is a major global problem (Gustavsson *et al.* 2011). Although there are geographical variations in food waste generation, the issue is critical for both developed and developing economies (Kosseva and Webb 2013). Food waste indicates an unsustainable system of food production and consumption which is closely linked to other global challenges (Cuellar and Webber 2010; Godfray *et al.* 2010; Grizzetti *et al.* 2013; Kummu *et al.* 2012; Segrè *et al.* 2014). This underlines the urgency of food waste mitigation as a means of addressing a range of global socio-economic and environmental concerns (Waste & Resources Action Programme-WRAP 2013).

Due to data availability and ambiguity of definitions, it is difficult to accurately assess the volume of food waste generated globally (Garrone *et al.* 2014) although existing estimates suggest it is significant. The United Nations' Food and Agriculture Organisation (FAO) claims that circa one third (or 1.6 billion tonnes) of the food produced for human consumption annually is wasted or lost (FAO 2013). The UK's Institution of Mechanical Engineers (IME) argues this number to be as high as 2 billion tonnes a year which equals to half of the worldwide food production (IME 2013). In terms of the geographical distribution, developed countries waste more food overall and on a per capita basis; however, emerging economies are producing increasingly larger amounts of food waste as a result of the population growth and associated rise in consumption (FAO 2013). In developed countries, the European Union (EU) alone generates approximately 88 million tonnes of food waste per year which corresponds to circa 5% of the global volume (FUSIONS 2016) where the UK with its 10 million tonnes (or roughly 11% of the EU total) is a major offender (WRAP 2017). Although some progress has recently been made to reduce food waste in Europe and internationally, the magnitude of the issue remains critical (Garrone *et al.* 2014). Importantly, up to 80% of European food waste could have been avoided which underlines significant optimisation potential and outlines an important area for urgent policy-making and management intervention (Priefer *et al.* 2016; Vanham *et al.* 2015).

Cross-sectoral analysis indicates that the largest amount of food waste in Europe is produced by households (53-71% of the total, depending on estimate source) followed by food manufacturing and processing enterprises (17-30%), food service providers (9-12%) and retail outlets (2-9%) (FUSIONS 2016; Goldenberg 2016; WRAP 2017). It is therefore not surprising that food waste generated at the stage of manufacturing and in household consumption has become the main object of research scrutiny to-date while, due to its smaller share, food waste in the sectors of food service provision and retail has attracted less attention (Cicatiello *et al.* 2016; Papargyropoulou *et al.* 2016; Pirani and Arafat 2015). This calls for a change given that sustainability has become a relevant issue for the above two sectors in the result of reinforced policies, enhanced stakeholder commitments and increased consumer pressures (Claro *et al.* 2013). As for the grocery retail sector, the need for more in-depth research is further justified by the evidence that households waste food not only because of consumer reckless behaviour, but also due to the marketing tools adopted by supermarkets (Koivupuro *et al.* 2012). In the UK, for example, the multi-buy supermarket deals are seen as key facilitators of food waste generation in households (Smithers 2013; Swinburne 2014; Wheatstone 2016).

Gustavsson *et al.* (2011) argue that, next to low public awareness of the scale and environmental implications of food waste generation with associated irresponsible consumer behaviour, managerial attitudes often represent a significant barrier towards the adoption of more effective food waste management practices in many food manufacturing, catering and grocery retail ventures. It is therefore paramount to research how managers tackle the issue of food waste on the ground and in various operational contexts, including the grocery retail sector. Better understanding of managerial approaches to food waste minimisation should enable collation of ‘good business’ practices with a subsequent analysis of the feasibility of their wider adoption.

Despite the importance of better understanding the managerial attitudes and approaches to food waste minimisation in the grocery retail sector, there is paucity of studies on this topic. With a few notable exceptions (Gonzales-Torre and Coque 2016; Syroegina 2016; Tjärnemo and Södahl 2015), existing research has focussed on the issue of food waste quantification and characterisation in supermarkets (see, for example, Eriksson *et al.* 2012; Lanfranchi *et al.* 2014; Scholz *et al.* 2015). The busy nature of grocery retail employment imposes substantial challenges on finding and recruiting willing participants to study the managerial attitudes. This problem persists not only in grocery retail, but also in related contexts, such as tourism and hospitality (Poulston and Yiu 2010). This study aims to plug this knowledge gap by exploring the managerial attitudes and approaches to food waste minimisation in the UK sector of grocery retail.

The rest of the article is structured as follows. Section 2 sets the scene by reviewing the literature on food waste generation and its management, generally and specifically in the UK grocery retail context. It identifies the knowledge gap which is subsequently tackled with the help of the method introduced in Section 3. Section 4 presents the outcome of primary data collection and analysis and Section 5 elaborates on the main findings of this study alongside its implications for policy-making, grocery retail management and future research.

2. Literature review

2.1. Food waste characterisation and quantification

Despite the growing global recognition of the food waste problem, there is no consensus among key stakeholders and in the literature on how food waste should be characterised (Garrone *et al.* 2014). While some stakeholders (see, for instance, European Parliament 2011;

FAO 2014) explicitly differentiate between the notions of 'food waste' and 'food loss', there are some actors (see, for example, United Nations Environment Programme-UNEP 2013) that do not separate the two assuming that if any food designed for human consumption leaves the food system, it should be considered wasted (Girotto *et al.* 2015). There is further ambiguity in what should be defined as 'food waste'. While Papargyropoulou *et al.* (2014) and WRAP (2015) suggest that food waste can be classed as avoidable (for example, any food or part of food which can be eaten), unavoidable (for instance, fruit peelings or seafood shells) and potentially avoidable (for example, bread crumbs or potato skin), they also pinpoint of the problem of defining the term 'edible' as it varies across cultures. According to Gustavsson *et al.* (2011), it is therefore more logical to categorise food waste as 'planned' and 'unplanned' where the former stands for unavoidable food waste which should be disposed of regardless, while the latter represents avoidable and potentially avoidable food waste which occurs due to poor managerial practices and irresponsible consumer behaviour. Lastly, the literature traditionally refers to food waste as 'post-harvested food losses' that appear throughout the food supply chain, i.e. from food production to consumption (Grizzetti *et al.* 2013). In contrast, Parfitt *et al.* (2010) suggest that 'food waste' is more frequently used to mark the amounts of disposed food in the consumption phase, thus relating to consumer behaviour, while the term 'food loss' is more appropriate when describing all pre-household stages of the food system. The heterogeneity of definitions of food waste calls for their harmonisation to ensure the key notions are comprehended by all stakeholders.

In terms of the volume of food waste generation, there are numerous reasons for food waste occurrence at the different stages of the food supply chain (FAO 2013; WRAP 2015). The wastage magnitude depends on the overall efficiency of national economies alongside climatic conditions, quality and maintenance levels of food production, distribution and transportation infrastructure, target market demands and consumption patterns (Parfitt *et al.*

2010). Overall, the literature agrees that, in order to minimise food waste generation, cross-stakeholder engagement, consumer choice architecture and awareness-building campaigns represent the primary intervention areas for developed countries while emerging economies, in addition to the above action points, require urgent investments in food related infrastructure to make it more efficient (Gustavsson *et al.* 2011; Kummu *et al.* 2012; Quested *et al.* 2013). To identify areas with the largest mitigation potential, both developed and developing countries should strive to generate more precise estimates of their food waste streams as this information is fragmented, if not absent (Garrone *et al.* 2014). The estimates of food waste in developed countries are more accurate and up-to-date than in developing nations. For example, Parfitt *et al.* (2010) and FUSIONS (2016) have quantified food waste which occurs at the different stages of the food supply chain in EU and WRAP (2017) regularly collects and analyses data on food waste generation across various sectors of the UK economy. The estimates suggest that, in Europe, the largest amounts of food waste occur in the phases of food production and consumption while the food distribution stage (represented by catering ventures and grocery retail outlets) holds a smaller share of circa 25% (FUSIONS (2016; Parfitt *et al.* 2010).

2.2. Food waste in grocery retail

Food waste estimates in grocery retail are difficult to produce. Parfitt *et al.* (2010) suggest that this is due to a substantial number of different variables involved, such as national and regional legislation, accounting methodologies, corporate policies and managerial practices. These might determine data availability and their accessibility thus, ultimately, affecting the precision of food waste estimates. For example, there are 53 different legislative acts on food waste in EU which demonstrates the bureaucratic complexity of the issue (Vittuari *et al.* 2015). It is estimated that in EU, where food waste estimates are more advanced, grocery retail had generated circa 4.4 million tonnes of food waste in 2010 which represents approximately 5% of the total food wastage across the EU food supply chain (European Commission 2011). In the UK alone, the seven major supermarkets that cover 85% of the British food retail market produce circa 0.2 million tonnes of food waste which equals to approximately 2% of the total food waste generated annually within the national food supply chain (British Retail Consortium-BRC 2015; WRAP 2017). Similar shares of 3% and 4% have been reported for Germany and Sweden, respectively (Eriksson *et al.* 2014). However, these numbers are likely to be conservative estimates as other sources, such as Goldenberg (2016), suggest that the grocery retail sector can contribute with as much as 9% to the total amount of food waste produced in the UK annually.

Thus, in relative terms, the grocery retail sector holds a smaller share of food waste generation within the national food supply chains, globally and in EU/UK (Cicatiello *et al.* 2016). However, it is imperative to ensure that this status quo does not mislead stakeholders and there are several reasons for why studying the issue of grocery retail's food waste with its subsequent mitigation is important. First, supermarkets hold a large number of perishable food products in a relatively small environment. Hence, they represent the best case studies to investigate food waste management approaches (Eriksson 2015). Second, grocery retail outlets are strategically positioned in the centre of gravity of the national food supply chains as they connect suppliers and consumers (Eriksson *et al.* 2012). This implies that, potentially, they have the power to affect the amounts of food waste generated on both, supply and demand, sides. This can be achieved by managing suppliers, raising customer awareness or architecting consumer choice, among others (Hobbs 2013). Lastly, in response to various external and internal drivers, the sector of grocery retail in developed countries is getting increasingly committed to enhance its environmental credentials where food waste reduction represents a cornerstone of sustainability actions (Eriksson *et al.* 2014; Mena *et al.* 2011).

The reasons for food waste generation in grocery retail are manifold. According to Norden (2011), the main cause is the difficulties in selling food which is about to become unsalable. Unsalable food comprises products where the 'best before' date has expired; unlabelled fresh fruits or vegetables; and products with minor packaging or aesthetic damage (Norden 2011; Papargyropoulou *et al.* 2014). In the UK, for instance, bananas are the most wasted fruit in grocery retail (20% of the total fruit wastage) because consumers often mistakenly think that imperfectly shaped or overripe banana represents a health hazard (Riley 2014). Alexander and Smaje (2008) claim that bigger and chain-affiliated grocery retailers tend to waste more food compared to smaller supermarkets as they have to deal with larger volumes and face customer pressure who demand the top class, fresh products. Conversely, Parfitt *et al.* (2010) argue that most of the food waste is generated by small grocery retailers as they have technical difficulties in managing food provisions to account for demand fluctuations and the bargaining power of suppliers. Furthermore, Norden (2011) states that imperfect demand forecasting represents a key challenge for grocery retail outlets which can bring about substantial food wastage. Developing and adopting new, more advanced, demand forecasting techniques is crucial for supermarkets of any size as customers vary their choice depending on many factors, such as weather, season, fashion trends, celebrity endorsements, competitor offers and personal mood (Mena *et al.* 2010).

Food waste in grocery retail can be grouped into four major categories: pre-store waste; recorded in-store waste; unrecorded in-store waste; and missing quantities (FUSIONS 2014). Pre-store waste and recorded in-store waste hold the largest share in grocery retail's food waste (Eriksson *et al.* 2012). Pre-store waste occurs when a grocery retail outlet does not accept the foodstuffs delivered from suppliers because they are damaged or do not pass internal quality control. Although, technically, this food waste occurs outside grocery outlets, it is usually assigned to the supermarket operations (Eriksson 2015). Recorded in-store waste is generated when grocery retailers sort out and discard food which has low chances to be sold; this is due to poor aesthetics, structural damage or surpass of the 'best before' or 'use by' dates (Eriksson *et al.* 2012). According to Mena *et al.* (2010), bakery; dairy products; chilled meat and seafood; and fruits and vegetables represent the major categories of in-store waste in UK grocery retail outlets. This category of food waste arguably holds the largest mitigation potential from the managerial perspective as it rests within the remits of primary managerial responsibility. The relative contribution of other food waste categories is less significant and it is more difficult to control.

2.3. Food waste management in the UK grocery retail sector

Food waste reduction in grocery retail is not legally reinforced in the UK and supermarkets tackle the issue via voluntary public awareness building campaigns and voluntary mitigation commitments instead. The major market players are signatories to the so-called 'Courtauld Commitment' which was launched by the UK government in 2005 in an attempt to reduce the amount of food waste generated in the grocery retail sector and by households (Jamasb and Nepal 2010). Content analysis of corporate websites and annual reports of major UK supermarkets was conducted to better understand the importance attributed by the UK grocery retail sector to food waste management. Content analysis took the form of a careful review by two independent researchers of the above corporate materials to deduce the sections and passages that dealt specifically with the issue of food waste and its mitigation. Comparative analysis of this review is presented in Figure 1; its outcome was further utilised to develop initial themes for primary data collection as described in section 3. The analysis shows that food waste is considered an issue of critical importance for major UK supermarkets which is reflected in its integration into their corporate social responsibility strategies.

It is important to mention that content analysis has attempted to embrace smaller grocery retail chains in the UK, such as SPAR, Iceland, Budgens and Heron's Foods. However, these do not provide free-to-access information on how they tackle food waste in their operations. In addition, traditional discount supermarkets LIDL and ALDI, which currently hold a UK market share of 6.0% and 4.4%, respectively (Kantar Worldpanel 2017), despite being signatories to the 'Courtauld Commitment', provide very limited information on food waste management in their corporate materials. These supermarkets were therefore excluded from a comparative analysis.

[Insert Figure 1 here]

In terms of food waste mitigation approaches, Figure 1 shows that all major UK supermarkets consider donating food as a corporate priority. This is a result of the growing public pressure imposed on UK grocery retailers after the France and Italy governments' pioneer decision to discourage larger supermarkets from generating avoidable food waste which ought to be donated to charities and food banks instead (Chrisafis 2016; Gonzales-Torre and Coque 2016; Kirschgaessner 2016). This has accelerated food donations within najor British grocery retailers who aim to actively donate food through making strategic partnerships with surplus food distribution platforms, such as the FareShare, or with stand-alone civil society organisations, such as the local charities (Alexander and Smaje 2008). The FareShare is the UK's leading umbrella institution whose goal is to divert food from waste by redistributing it to associated charities which then provide it in meals to disadvantaged people (FareShare 2017). Given the on-going advancements in technology, Tesco are piloting a smartphone app named the 'Food Cloud' which enables store managers to report on the surplus food or the food close to a 'sell-by' date in real-time. Registered charities can then collect the food directly from the store. The role of technological solutions in connecting grocery retailers and civil sector organisations to facilitate food donation is likely to increase in the future (Butler 2015b).

Importantly, there are currently no EU-wide policies regulating food donation in grocery retail as a means of improving the regional food supply efficiency, mitigating food waste and fighting societal inequality (Deloitte 2014). Although certain EU member states (for instance, France, Italy, Hungary and Finland) have voluntarily reinforced their national legislation with food donation related acts, there is no unified EU policy in place which calls for a change given the criticality of the issue under review (Deloitte 2014; Gaiani 2015). In the UK, WRAP has established guidelines for food manufacturers, grocery retail outlets and charities to aid in food surplus distribution (Deloitte 2014). According to UK legislation, there are currently insufficient incentives for grocery retailers to donate food which negatively affects the uptake of food donations by UK supermarkets. Although the 'zero VAT' policy applies to all food donations, which is referred to as 'good practice' by O'Connor and Gheldous (2014), British food donors cannot deduct the value of food donation from corporate tax (Deloitte 2014). Furthermore, the stringent food donation liabilities imply that UK food donors may face severe financial and corporate image repercussions if the health and safety issues are reported by donated food recipients (GOV UK 2004). Lastly, financial support mechanisms are available to grocery retailers to dispose of food waste via anaerobic digestion while food donations are not financially incentivised (Deloitte 2014). This is inconsistent with the food waste mitigation hierarchy which suggests that disposal should only be considered if other approaches to food waste minimisation prove to be unfeasible (Radwan *et al.* 2012).

Regular, throughout the day, price reductions for the foodstuffs approaching their expiry date and for the foodstuffs that do not meet corporate aesthetical standards (also known as the 'wonky' products) represent another popular approach to food waste minimisation in UK grocery retail (Smithers 2013). Tesco have recently launched their 'Perfectly Imperfect' product range where the ‘wonky’ fruits and vegetables are sold at a discounted price (Butler 2016). Similar product lines have been introduced by other UK supermarkets (Bowden 2016).

Lastly, voluntary engagement in consumer awareness raising campaigns is reported by all major players (Figure 1) with the “Love Food Hate Waste” scheme introduced by WRAP in 2007 (Love Food Hate Waste 2016) being the most popular. Investment in packaging and storage research to improve food quality and enhance its shelf life alongside the careful use of labelling has also been highlighted. For example, ASDA and Morrison’s have refused from printing the ‘best before’ dates on the packaging of selected own brand food products so that customers are not driven to dispose of these prematurely (ASDA 2016; Morrison’s 2016; National Health System-NHS 2016).

2.4. Research gap

Literature review and content analysis applied to major UK’s grocery retail corporate materials has established that food waste is seen as a critical issue affecting the efficiency of business operations. A number of approaches have been adopted by British supermarkets to reduce the magnitude of food waste generation. Most of these approaches require substantial managerial commitment to ensure success. However, no research has attempted to investigate how UK grocery retail managers deal with the issue of food waste on the ground and if the corporate vision on food waste mitigation as presented in corporate materials is mirrored by the alike managerial actions. This study contributes to knowledge by exploring the managerial attitudes and first-hand approaches to food waste minimisation, highlighting the opportunities and challenges of tackling the problem of UK grocery retail’s food waste on the ground.

3. Material and methods

Given the exploratory nature of this study, the qualitative research paradigm was selected for primary data collection and analysis. Qualitative research is best applied to investigate the social phenomena characterised by insufficient and patchy knowledge (Silverman 2000). Furthermore, it provides an opportunity to not only describe these social phenomena, thus revealing public attitudes and current actions (i.e. ‘how do you feel towards this issue?’ or ‘what are you doing to have this issue addressed?’), but also to critically evaluate it, including the analysis of intentions and future behavioural patterns (i.e. ‘what else can be done?’) (Veal 2006). The main shortcoming of the qualitative research paradigm is in the restricted generalisability and limited representativeness of its outcome; however, it enables conceptualisation of the understudied topics and represents an appropriate research strategy when the key study informants or data providers are difficult to reach (Silverman 2000). Due to their busy work schedules and limited population, grocery retail managers are cumbersome to recruit which partially explains their limited engagement in previous research on the adoption of sustainability initiatives (Wagner *et al.* 2005). Given this study’s aim, the qualitative research paradigm was deemed most cost-effective to reach such an exclusive category of informants to collect in-depth data.

Within the portfolio of qualitative research methods, in-depth semi-structured interviews with grocery retail managers were chosen to collect primary data on the ground. Focus groups were also considered but abandoned due to the inability to identify a mutually suitable date and location to meet all invited participants’ work commitments. Semi-structured interviews enable participants to reveal their true attitudes (Ghauri and Gronhaug 2005); they generate rich datasets, thus facilitating in-depth analysis of the subject matter in question (Veal 2006); hence, their suitability for this study. Importantly, interviewing involves an element of subjectivity which represents one of the main shortcomings of this method. In the context of this study, the negative effect of subjectivity was reduced by the fact that interviews were conducted by experienced researchers purposefully trained in qualitative data collection and analysis.

The interview schedule was developed based on findings from the literature review, content analysis of corporate materials (Figure 1) and the outcome of pilot interviews conducted with two willing grocery retail managers. Interview questions were designed to cover three major subject areas: general knowledge on the magnitude of food waste generation in the UK grocery retail sector; current and future approaches to food waste management in a specific supermarket; and the role of corporate policies, suppliers, staff and consumers.

Recruitment for interviews took place online and offline and was essentially convenience based. Convenience sampling is justified when the study informants are difficult to access or their population is limited (Veal 2006); grocery retail managers fit this description. When selecting willing participants, the following criteria were applied: managerial position within a major UK grocery retail outlet; at least one year of managerial experience in the current store; familiarity with sustainability issues affecting the store; location of the store within the South East Dorset conurbation. The latter criterion was applied due to the financial restrictions of the project which prevented long-distance travel. To account for the diversity of opinions and food waste management approaches, recruitment considered the supermarket size and the UK market share of grocery retail outlets (Figure 1) and no more than two managers representing the same grocery retail brand were interviewed. Initially, a list of supermarkets located in Bournemouth, the key urban center within the conurbation, was made. These were emailed with a request to partake in the project alongside its description. The email was followed on with an on-site visit to secure an interview.

Recruitment of willing participants was laborious which confirms substantial difficulties in relying on managers as key informants in research projects as reported elsewhere (see, for example, Filimonau and Grant 2017; Filimonau and Krivcova 2017; Poulston and Yiu 2010). Work commitments prevented many from participation. Furthermore, managers from discount grocery retailers refused to contribute to the project by referring to corporate information non-disclosure policies. The first round of recruitment took place in July 2016. Due to a low response rate, the second recruitment round was necessary. It took place in September-October 2016 and extended the search for willing participants to Poole and Christchurch, the two other main urban centers within the South East Dorset conurbation.

In total, 12 managerial interviews were conducted (Table 1) with a response rate of circa 44% (in total, 27 grocery retailers were approached). The exact number of interviews was determined by the 'saturation effect' and interviewing was rolled up after no new information was emerging from the data collected. Data analysis was on-going and interim findings were regularly fed back to the interview schedule to inform subsequent interviews. On average, interviews lasted between 30 and 50 minutes; they were digitally recorded and transcribed. No financial incentives were offered for participation.

[Insert Table 1 here]

Thematic analysis was applied to the data collected given this is an established method in qualitative research (Jankowicz 2005). Codes were first identified and then grouped into major themes. Figure 2 presents the coding structure developed where the figures in circles and the circle size signify the importance assigned by managers to a specific theme/code tested in interviews. The concepts emerged from thematic analysis were supported with the most representative verbatim quotations.

[Insert Figure 2 here]

4. Results and discussion

The outcome of thematic analysis will be presented as per the major themes identified in the literature review and through content analysis of corporate materials and subsequently supplemented with any additional themes emerged during interviews. These include: managerial attitudes to food waste; existing mitigation practices; opportunities and challenges of mitigation; and the role of stakeholders alongside corporate policies.

4.1. Managerial attitudes to the problem of food waste and how these are aligned with corporate policies

According to Parfitt *et al.* (2010), it is difficult to quantify the exact amount of food wasted in grocery retail as multiple variables affect the estimates. Eriksson (2015) adds that there is always a significant amount of unrecorded food waste in supermarkets which is laborious or even impossible to track. However, being on the ground and focusing on the day-to-day operations of their business ventures (Wagner *et al.* 2005), managers should normally be able to keep record of the largest food waste streams.

There was a split in managerial opinions on the criticality of the problem of food waste in terms of its effect on the operational logistics and financial sustainability of their grocery retail outlets (Figure 2). While a quarter claimed the problem to be substantial, the majority did not consider food waste as a major issue as long as there are corporate mitigation plans in place and these are closely adhered to by managers and staff. Importantly, availability of the food waste disposal budget and waste collection services was highlighted as feasible mitigation options which indicates that some managers are not familiar with the (food) waste reduction hierarchy which dictates that waste prevention should be prioritised over disposal (Radwan *et al.* 2012). There was just one manager who did not see food waste as an issue claiming the supermarket had robust systems of demand forecasting and pricing in place that enabled them to waste limited amounts of food:

'For us, it's huge. As a single store, the value of food waste is hundreds pounds a week. For Tesco as a company it is a multi-million pounds loss' (T1)

'For us, is not a big problem. But it can be at times... you know, as long as you follow the processes of the store, usually food waste is not a big problem. Because we have automatic ordering, we can change the orders when we need to, and we also have a budget for waste disposal. Basically, there is the amount that we can throw away that we can afford' (C1)

'Not really a big problem. We have to follow some standard processes, therefore we throw away just a limited amount' (M1)

The findings indicate that, although food waste is recognised as a major issue in corporate policies of UK grocery retailers, the attitudes of store managers on the ground may not necessarily reflect the corporate vision. The findings also show that some managers remain unaware of the priorities assigned to food waste minimisation, especially in regard to its prevention, which calls for intervention. In general, while food waste minimisation procedures outlined in corporate policies can undoubtedly be effective in terms of diverting food from waste, the issue seems to represent just a single aspect of the corporate social responsibility strategies, rather than a problem affecting business at a store level.

The products approaching their ‘sell by’ or ‘use before’ dates were referred to by all as the main contributors to in-store food waste generation. Among these, fruits and vegetables alongside bakery products were mentioned repeatedly. This is in line with literature which identifies fresh produce as holding the foremost potential to become a waste in grocery retail (Eriksson *et al.* 2012; Eriksson 2015). For example, FAO (2011 cited in Eriksson 2015) point that fresh fruits and vegetables contribute with up to 10% to the overall European retail food wastage. Likewise, bakery and dairy products, fresh meat and seafood, and convenience products represent significant food waste categories (Katajajuuri *et al.* 2014). Parfitt *et al.* (2010) emphasise the complexity of food waste streams in grocery retail claiming that, in addition to holding substantial amounts of short-life products within a confined environment, supermarkets also generate food waste because of poor handling, improperly functioning freezing and cooling equipment, lack of adequate storage facilities and erroneous purchasing decisions which is effectively summarized by Mo1 below:

> *‘For us, as a company, the biggest problem is fresh fruits and vegetables, bread, bakery overall and any other short-lived products. Getting the forecast right is difficult, you know. It depends on a lot of things, weather, people, what we currently have. There are lots of factors that contribute to potential [food] waste’*

Lastly, all managers agreed that, regardless of its magnitude, the problem of food waste in grocery retail requires mitigation. Financial savings were referred to as a primary driver for adopting the food waste mitigation practices in-house alongside the reputational gains. This is in line with findings from the related contexts, such as hospitality, where the economic and corporate image factors were found to drive managerial engagement in sustainability initiatives (Graci and Dodds 2008).

4.2. Food waste mitigation practices

4.2.1. Food recycling

The diversion of surplus food from landfill represents an issue of particular concern for grocery retailers in EU. This is a result of the EU Landfill Directive which came into force in 2009 (Alexander and Smaje 2008). According to the Directive, grocery retailers are strongly encouraged to evaluate the feasibility of different food waste minimisation solutions with a view to reduce the amount of disposed food. Raised public awareness on the magnitude of food waste generation represents another driver for adopting more effective food waste minimisation practices in UK grocery retail (Alexander and Smaje 2008).

All participants stated that almost no food that has surpassed its 'best before' date goes to landfill but undergoes recycling. However, recycling does not take place on site, but in larger depot facilities or external plants that store managers have no control of:

> *'We have got separate things for different areas, so, for example, wasted raw meat, this has to be separated from other food waste due to its nature and it is all recycled in pet food. All our waste meat is actually recycled; we have nothing going to landfill from waste meat. They can be either destroyed or used for energy recovery, but that doesn't depend on us. We also have bakery that we recycle and it is converted to animal feed. Cooking oil and fat is treated and blended and used as biodiesel for our lorries'* (T2)

The UK's Department for Environment, Food and Rural Affairs-DEFRA (2014) considers raw meat, seafood, eggs and milk to be high risk products that are banned from landfilling in the UK. They can neither be converted into anything intended for human and farm animal consumption. Recycling of these foodstuffs is only permitted by authorised pet food plants, composting or biogas plants and zoos (Brent Council 2003). Converting food to animal feed and energy demonstrates an effective engagement of UK grocery retailers in the last stages of the waste management hierarchy (Radwan *et al.* 2012). However, the hierarchy holds, as the most preferred action, prevention of food from being wasted and feeding people in need. Thus, the topic of food donation which has been given significant attention in the corporate materials analysed (Figure 1) was explored next.

4.2.2. Food donation

Although food donations are not adequately regulated in the UK (Deloitte 2014), they are an integral element of the 'Courtauld Commitment' and various voluntary agreements signed by grocery retailers. There are circa 8.4 million of UK residents who struggle to regularly access healthy, nutritionally-balanced meals (FAO 2016 cited by FareShare 2017) and donations to charities with the subsequent redistribution of food to the disadvantaged population groups hold potential to partially address this challenge.

Contrary to the outcome of content analysis which suggests that food donation practices sit high on the corporate food waste mitigation agenda of major UK grocery retailers (Figure 1), the findings revealed that food donations do not seem to prevail in food waste minimisation practices adopted by the studied supermarkets. With an exception of Tesco which utilise technology to record the categories and amounts of surplus food and then feed this information to local charities, food is donated irregularly and largely on an ad-hoc basis. This may be attributed to the lack of policy and legal reinforcement of food donation in UK grocery retail which is opposed to France and Italy:

‘Well, actually we don’t have any agreements with charities at the moment, it might happen sometimes in the future on a voluntary basis, but we tend to recycle rather than donate’ (S2)

‘We do donate food sometimes but not on regular basis. It really depends on where the store is and what is near. It’s not regular, we don’t have any corporate policies about that, not that I am aware of. It’s just on a voluntary basis’ (C2)

‘We do donate to charities sometimes. But only certain products, bread, cakes and stuff like that. We do not donate any chilled products’ (W2)

‘At store level we now have the “food cloud”. Any edible food which is due to go outdate on that day is now donated to local charities to feed homeless or goes to food banks. Food cloud is a phone app, charities register with us and it then processes when it comes at the end of the day of the expiration date, the manager of the store uploads to the app what we have available and charities can come and collect’ (T1)

The interviews disclosed a number of barriers towards more active engagement in food donation by UK supermarkets. The pressure to maximise revenues deters managers from donating chilled food (such as sandwiches and salads) as this is convenience food which has high chances to be sold on short notice. Donating chilled food may also impose unwanted liability on store managers; it may further result in the reputational damage for the brand they represent if health issues are reported by consumers of donated food. Lastly, the donation process can be lengthy which represents a serious obstacle given that perishable products constitute the primary category of donated foodstuffs (Alexander and Smaje 2008).

Technology has potential to enhance food donation practices in UK grocery retail as it accelerates the ‘donor-recipient’ communication process, thus decreasing managerial liability and ensuring safe donation. Tesco is the first retailer in the UK to trial a new donation scheme 'Community Food Connection” as part of the Food Cloud project promoted by FareShare (FareShare 2017). The trial results indicate substantial enhancements in the volumes of donated food, thus alleviating poverty and mitigating climate change (Food Cloud 2016). M&S tested a similar scheme in 2008 which, however, never became functional due to complexities of establishing agreements with the local charities (Butler 2015a). The scheme has recently been revamped via a new smartphone app operated in partnership with Neighbourly, a UK-wide social media platform which helps businesses to distribute surplus food to charities (Neighbourly 2016). The Neighbourly’s app resembles the Tesco’s Food Cloud but there are subscription fees for food donors (Butler 2015a). Although the examples of using food sharing apps in the UK grocery retail sector are limited to Tesco and M&S, there is substantial potential for them to become more popular. This is driven by the growing international evidence demonstrating the positive impact of technology on establishing connections between grocery retailers, private and public catering organisations and local food banks and charities (see, for example, Foodsharing 2016).

Given the recent political reinforcement of food donations in the grocery retail sectors of France and Italy (Chrisafis 2016; Tatum 2016), a probe was made into managerial knowledge of and attitudes towards this policy intervention. The majority were familiar and all claimed that, if introduced in the UK, it would not negatively affect their business operations. In fact, such reinforcement was called for by some managers to ensure the food donation practices that are currently opportunistic and ad-hoc become more standardised and mainstream:

'Yes, I have heard something about it. We're already going in that way anyway I think. We're already taking a step before the legislation is coming in place. I don't think it would be a problem [for us to adopt]' (W1)

4.2.3. Other approaches

Regular price reductions represent a traditional and, concurrently, one the most popular ways to maximise revenues while tackling the issue of food waste generation in store which was confirmed by all managers:

'We do have food waste policies, I mean set structures of reduction for certain food products, at certain hours and certain times of the day. People come at night and might find something for just 10p and buy it!' (A1)

At a managerial discretion, surplus food can also be given to staff; however, some supermarkets' corporate policies prescribe managers against this approach to food waste mitigation. Giving food to staff can discourage them from selling food in the hope it could be taken home. This is also due to staff health and safety considerations.

4.3. Barriers to food waste mitigation

4.3.1. Consumer awareness and purchasing behaviour

Most managers agreed that customers lack awareness on the scale of the food waste problem and its environmental implications when shopping. They tend to buy more food when needed which results in wastage. While this is partially true, the corporate marketing policies adopted by selected supermarkets indirectly encourage over-consumption due to the ‘buy-one-get-one-free’ (BOGOF) or ‘buy-one-get-two-free’ (BOGTF) offers (Morley 2016). According to Blythman (2016), by blaming consumers in low environmental awareness, some grocery retailers may just play the game of shifting responsibility. It is important that supermarkets acknowledge their mediating role in food waste generation at the household level and adjust their marketing strategies accordingly (Aschemann-Witzel *et al.* 2017).

It is important to recognise that the modern consumer has the right to demand ‘best quality’ food produce which applies to both its taste and aesthetic appearance. The lines of ‘wonky foodstuffs’ recently introduced by major grocery retailers in an attempt to minimise food wastage may therefore not succeed despite the significant discounts offered on imperfect food items (The Guardian 2013). Aside from poor aesthetics, this is because consumer purchasing habits are strongly influenced by the ‘use by’ and ‘best before’ labels on packaging (Witzel *et al.* 2015). These are often misunderstood as many customers perceive the ‘best before’ label as a safety indicator. Hence, the willingness to pay for imperfect food and food approaching its expiry date is low (Witzel *et al.* 2015):

> *‘Customers shopping definitely [is a barrier]. When customers do not buy a product if it’s not that satisfactory quality or lookwise. Yes, lack of awareness is certainly one of the main problems I think. For example, if bananas are not perfectly ripe and yellow, if they have some brown spots customers, don’t buy them even if they’re safe to eat’* (A2)

'Customers just care about the price and how long what they're buying is going to stay fresh for. I know it's sad but this is actually what we see here every day' (Mo1)

The campaign 'Love Food Hate Waste' operated by WRAP aims to raise consumer awareness on the benefits of reducing food waste by paying more attention to product labelling (WRAP 2016). However, the effect of this educational intervention remains largely unknown. It is argued that grocery retailers should play a more active role in raising consumer awareness on the food waste issue. Sitting on the interface of supply and demand, supermarkets can architect or 'nudge' consumer choice as to make it more responsible (Kalnikaitė *et al.* 2013; Filimonau *et al.* 2017). For instance, ASDA hosts educational events in-store on food waste prevention (Edie 2016b) and this practice can be adopted by the others.

4.3.2. Corporate policies

Corporate policies were identified as another obstacle for applying sound food waste management practices at a store level. Bulk purchasing, inability to impact on the size and the frequency of deliveries by suppliers, the necessity to strictly adhere to the internal health and safety and quality control standards were mentioned. While acknowledging the need to follow corporate policies, managers demanded more flexibility on the ground. This flexibility could enable supermarkets to make more rationalised decisions to reduce food waste while concurrently contributing to the well-being of employees and local communities:

'As we're a big business, we have to follow certain rules. We have to follow a corporate policy and we don't have much power at store level. I'm not saying we are not doing anything in terms of food waste, but certain things have to be managed at local level due to better knowledge' (S1)

'Well, there is a company [environmental] policy that we have to follow, but we do a bit of judgement on the ground on when something is coming close to date, how much we can sell it for, and the time for doing it' (C1)

4.3.3. Suppliers

Irresponsible suppliers and their disinterest in pro-actively engaging in environmental initiatives were acknowledged as inhibitors of food waste mitigation in UK grocery retail. According to WRAP (2017), UK food manufacturers generate circa 17% of the total food waste within the national food supply chain which makes them the 2nd largest contributor after households. Gustavsson *et al.* (2011) suggest that wastage here occurs due to spillage, degradation, poor handling and storage as well as during transportation to the distribution point. According to James and James (2010), one of the key aspects of food logistics is the right utilisation of the so-called 'cold or chilled chain' in order to maximise the product's shelf-life for perishable foodstuffs. Some managers claimed that, while cold chain is easy to control and maintain once the food had arrived in store, there is no control over its processes at the supply stage. Furthermore, given that supermarkets purchase food in bulk, it often has to wait in depots for long before going into the distribution. Therefore, when foodstuffs are purchased, they arrive with not much life left in them (Edie 2016a):

'For us, personally, it's all about freshness and quality. We have chilled chain which ensures that none of our chilled products are out of chilled environment for more than 20 minutes at time. Maintaining that and have the integrity required from suppliers to store helps us giving that quality. However, at store level there's nothing we can really do with suppliers in terms of control' (T1)

'I don't really know what their [suppliers] policies [on food waste] are to be honest, but they all waste a lot. I think that as they have to manage lots of food every day it's easier for them to dispose of it or recycle it, rather than donate it' (W2)

4.3.4. Employees

Employees are often considered an 'under-utilized resource in a company's development and implementation of sustainability programs and strategies' (Larsen 2015). The importance of employee engagement in the delivery of environmental management initiatives is further highlighted by Bohdanowicz *et al.* (2011) who states that this engagement extends beyond employee satisfaction. Indeed, according to Serafeim *et al.* (2012), employee participation in sustainability projects saves money, improves customer loyalty and builds productivity. A small number of managers complained about irresponsible staff attitudes and their disinterest in minimising food wastage. However, the majority agreed that this would not represent a major obstacle to implementing food waste mitigation practices, subject to proper training on corporate environmental commitment, food rotations and handling provided:

'They [staff] are all trained about it. We apply discounts at certain times during the day and use rotations to move later sell-by dates to the back of the shelves, that's what we do' (S1)

4.3.5. Supermarket size

Lastly, some managers agreed that supermarket size plays an important role in food waste generation. Larger grocery retailers handle more foodstuff varieties and manage their bigger quantities. This enhances the probability of food waste generation which is in line with Alexander and Smaje (2008).

5. Conclusion

Food waste represents a critical problem for national economies and their specific sectors. This applies to the UK sector of grocery retail whose relative share in the total amount of food waste generation within the nation is small but holds significant environmental and socio-economic repercussions. To advance the sector towards sustainability goals, urgent measures are necessary to reduce the magnitude of food waste in UK supermarkets.

Store managers possess first-hand knowledge on food waste as they face the issue on the ground. Despite the importance of utilizing store managers as study informants, managerial research within the UK grocery retail sector is scarce. This paper contributed to knowledge by exploring the managerial attitudes and approaches to food waste mitigation in UK grocery retail outlets within the South East Dorset conurbation.

The study found that food waste represents a major problem for a handful of supermarkets. The majority do not assign the due significance to food waste because of the recycling and food waste disposal practices adopted in house. The preventative and alternative approaches to food waste mitigation, such as food donation, are in operation but largely on an ad-hoc basis. Poor consumer awareness, limited control over suppliers, imperfect regulation and stringent corporate policies hamper the adoption of more effective food waste minimisation approaches by supermarket managers. Interventions are necessary to educate consumers about the environmental repercussions of their food choice, incentivise food donations at the store level via more active engagement with local charities and better use of technology, and offer more flexibility and bargaining power to supermarket managers on the ground. This should be supported with relevant national policies aiming to facilitate the process of food waste mitigation at the level of specific grocery retail outlets. In particular, this concerns legal reinforcement of unsold food donations by supermarkets and simplification of the health and safety regulations in the UK.

The study has a number of limitations that concurrently represent promising research avenues. First, its outcome is limited to a small convenience sample of grocery retail managers from Dorset. To enhance the representativeness and generalisability of the project's findings, it is paramount to explore the managerial opinions on food waste in other UK geographies. Second, future research could look at how the issue of food waste is addressed by the different players within the UK grocery retail market. Given there is disagreement in the literature on how the store size impacts on the magnitude of food waste and the effectiveness of its mitigation, a detailed investigation into larger grocery retail outlets (i.e. hypermarkets and supermarkets) should be supplemented with a study of smaller stores (i.e. convenience and off-license). Third, future research should strive to conduct a comparative analysis of the UK situation against France and Italy where food donation in the national grocery retail sectors has been politically reinforced. This is paramount to evaluate the value of this intervention with a view to adopt the 'best practice' examples and case studies in the

UK context. Lastly, the value of food donation from the perspective of the consumers of donated food calls for more research. There is anecdotal evidence that people are more likely to offer help, than to accept it, hence the importance of future study on how this social phenomenon can affect the future of food donation in the UK.

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Table 1. Interview participants (n=12).

Grocery retail outlet	**Size**	**Code**
Tesco	Small (Express)	T1
Tesco	Large (Hypermarket)	T2
Coop	Medium	C1
Coop	Medium	C2
ASDA	Large (Hypermarket)	A1
ASDA	Large (Hypermarket)	A2
Sainsbury’s	Medium	S1
Sainsbury’s	Small (Local)	S2
Waitrose	Medium	W1
Waitrose	Medium	W2
Morrison’s	Medium	Mo1
Marks & Spencer (M&S)	Medium	M1

GROCERY RETAIL CHAIN	FOOD DONATION	PRICE REDUCTION	CUSTOMER AWARENESS CAMPAIGNS	LABELLING & PACKAGING	OTHER	ZERO WASTE TO LANDFILL	UK MARKET SHARE (2016)
ASDA	Surplus + supplier send-overs donated to FareShare and Kind Direct	Regular price reductions for close to the “use by” date food + Promotion of “wonky veggies” bags at a discounted price	Voluntary agreement with “Love Food Hate Waste” campaign	Not printing “best before” date but just packaging date	Reducing food purchase time in the food supply chain + organising food waste conferences for suppliers	YES	15.5%
TESCO	Surplus food donated to FareShare + ad-hoc online platform “Food Cloud” available for local charities	Regular price reductions for close to the “use by” date food + “Perfectly Imperfect” food bags at a discounted price			Bakery wastage sent for animal feeding and cooking oils diverted for bio-fuel production	YES	28.2%
SAINSBURY’S	Surplus food donated to FareShare – store managers make agreements with local charities on food donations		“Waste Less, Save More” campaign, regular awareness building campaigns and online platform with consumer tips to avoid waste	Advanced food freezing instructions + voluntary commitment to develop new, more sustainable packaging for their own-brand food products	Store in Cannock (Staffordshire) has become the first in the UK to be powered by energy produced from food waste	YES	16.7%
THE COOPERATIVE FOOD	Encouraging donations to FareShare – decisions are made by store managers	“Still Fresh” policy for maximum price reductions applied to food which is close to the ‘use by’ date	“Working On Waste” voluntary campaign	Scientific approach for new packaging design to enhance shelf-life of foodstuffs		YES	6.0%
MARKS & SPENCER	Donations of up to 45% of unsold food – partnerships with FareShare, CompanyShop, FoodCycle and Neighbourly	Three levels of price reductions for food close to the ‘use by’ date	Voluntary agreement with “Love Food Hate Waste” campaign + “Festive Freeze” + “Cookery classes”	Investing in new packaging development i.e plantic bioplastic skin packs + clearer labelling and freezing instructions for own-branded food products	Investments in developing new demand forecasting techniques	YES	No data available
WAITROSE	Encourage charities to register for food donations	Regular price reductions for food close to the ‘use by’ date + “Little Less Than Perfect” fruits and vegetables sold with a discount in 40 stores	Voluntary agreement with “Love Food Hate Waste” campaign	Clearer guidance for food cooking, portioning, storage and freezing		YES	5.3%

MORRISONS	Surplus donations to FareShare, HisChurch and local charities where possible	Regular price reductions for close to the "use by" date food	Voluntary agreement with "Love Food Hate Waste" campaign	Not printing "best before" date on fruits and vegetables + storage advice to consumers printed on products, provided online and magazines	Surplus for staff canteen + food preparation in store + partnership with Company Shop which sells imperfectly packaged products at lower prices	Unknown	10.9%
TOTAL							82.6%

Figure 1. Content analysis of major UK grocery retail's corporate websites and annual reports. Analysis conducted in September-October 2016. Market share data are from Kantar Worldpanel (2017).

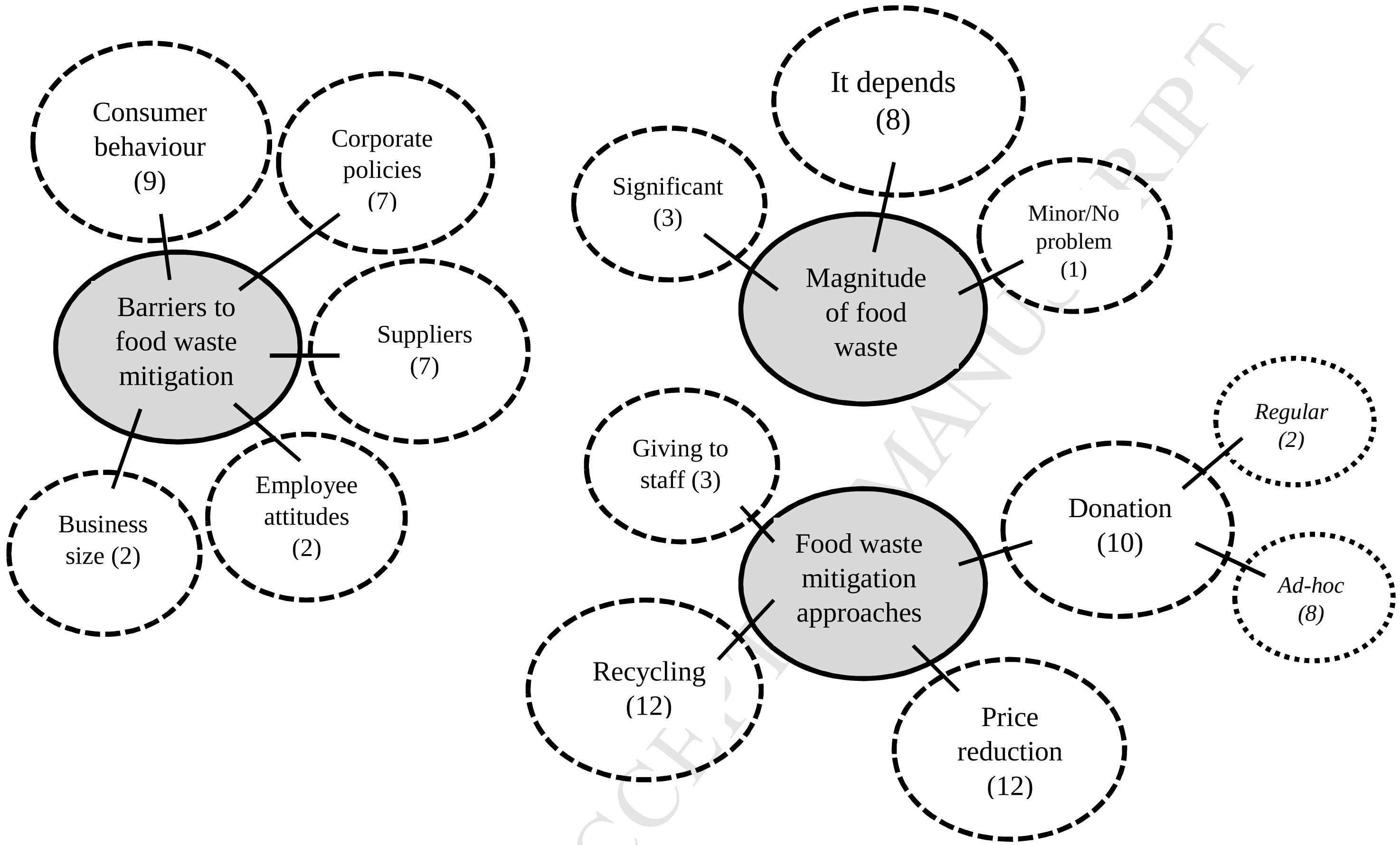

Figure 2. The coding structure developed from interviews. The figures in brackets inside the circles correspond to the number of text passages identified in interview transcripts for each code.