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Identifying the barriers and opportunities for food waste prevention in Universities using social media as a tool for behaviour change

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**Identifying the barriers and opportunities for
food waste prevention in Universities:
Using social media as a tool for behaviour
change**

By

Jordon Lazell

May

2014



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***A thesis submitted in partial fulfilment of the University's
requirements for the Degree of Master of Research***

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Abstract

The UK Higher Education Sector is required to reduce its carbon emissions by 83% by 2050, with food and green waste representing 18% of total disposal. This is significant as the equivalent of 3.8 tonnes of carbon dioxide is produced for every tonne of food wasted. Universities are a key setting to reduce this figure and have a responsibility to sustainably manage their waste on two fronts, firstly as sites of food waste creation, management and disposal and secondly as actors of pedagogy in educating students and staff. Despite this there is a lack of understanding of how we interact with food waste as a routine 'cultural performance' underpinned by our own embodied attitudes, behaviours and values.

Within this context, this project aims to firstly identify the barriers and opportunities for preventing food waste by understanding the behaviour behind why food is wasted, and secondly exploring the possibility of using social media to influence waste practices. Using a case study of Coventry University, a mixed method approach engaged with academics, operation staff and students on different levels. A 'Coventry University Food Network' Twitter application was developed and tested to enable sharing of unwanted eatable food between members of the university community. Dealing with food waste was found to be a hidden practice engrained in daily routines which counteracted possible prevention. The negative connotations attached to 'leftovers' and 'wasted food' heightened people's accepted standards of foods' appearance, smell and touch with trust found to be an important factor in overcoming such concerns. The study found organisational barriers in the lack of accountability in auditing and disposing of food waste with health and safety procedures preventing the sharing of food. A number of recommendations are made within this setting in order to inform future behaviour change and food waste prevention projects.

Keywords: Food Waste; Behaviour Change; Social Media; Embodied Practice; Higher Education Sector

Declaration

I hereby declare that this project is entirely my own work and where I used the work of others it has been appropriately acknowledged. I also confirm that the project has been conducted in compliance with the university ethics policy and that ethics related information submitted with the original proposal corresponds with the work actually conducted.

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Chapter 1: Introduction

1.1 Rationale

Food waste is an unavoidable consequence evident in all food systems throughout the developed and developing world. Globally it has been estimated that up to 50% of all food is wasted amounting to 2 billion tonnes of all food produced however such figures are only an approximation with great difficulty in recording wastage accurately (Institute of Mechanical Engineers, 2013; BBC,2013). The global impact of such wastage is vast. Environmentally, millions of tonnes of carbon dioxide are needlessly created transporting food that ultimately ends up being binned, only to be further transported to landfill where further methane is created through anaerobic breakdown. Socially, there are almost one billion malnourished people in the world and it would take only the food wasted in America, 40 million tonnes annually, to feed them all (Stuart, 2009). Economically, consumers waste millions of pounds annually, often with little penalty to retailers for throwing away unused stock or incentive for consumers to throw away less. Figure 1.1 shows that within developed nations the majority of waste arises at the consumption stage and also such nations waste a higher percentage of their total available food, with North America wasting 42% (Lipinski *et al.*, 2013).

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Figure 1.1 Percentage of food wasted during each stage of the food chain globally by area (Lipinski et al. 2013:9).

Overall food waste is growing along with modern consumption habits attributable to the complex and elongated nature of industrial food chains and consumers' behaviour, attitudes and actions. Such consumption habits in the global north are embedded within a paradoxical situation which allows retailers to advertise and promote cheap processed foods but blames the consumer for purchasing too much and ultimately wasting it. Within this Neoliberal system the promotion of more sustainable consumption patterns through 'choice' can be questioned with behaviours in fact dependant on wider reaching factors (Kneafsey *et al.* 2013). The UK's highly developed food and manufacturing sector retailing high volume low cost food causes increasing perishable food waste at consumer and farm level as products must match perfection appearance standards (Parfitt *et al.*, 2010). Despite having the 2nd largest population in the EU, the UK contributes the most by country to the 89 million tonnes a year wasted by this continent (European Commission, 2010). Figure 1.2 shows an overview of where the 15 million tonnes wasted each year arises from in the UK.

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Figure 1.2 Overview of sources of Food Waste in the UK (Bray, 2013)

Of this food waste, 60% is deemed avoidable (Bray, 2013), which is defined as food which could have been consumed or used within the food chain at some point before its disposal. This represents 17 million tonnes of carbon dioxide emitted each year, with every tonne of food waste generating 3.8 tonnes equivalent of carbon dioxide (Bray 2013). At least 40% of the 7.2 million tonnes of household waste is disposed at landfill sites further emitting methane which has a four times greater effect environmentally than carbon dioxide (Bray, 2013). Economically, households waste £12 billion, £480 per household, with £5 billion wasted annually within supply chains in the UK (DEFRA 2011:58).

Overall the level of food wasted not just in the UK but globally can be seen as a symptom that the current food system is unsustainable and must change in order to secure food security for the forecasted 9 billion population in 2050. The Environmental Commissioner for the European Commission sums up such concerns stating “this is morally and economically unacceptable and is all the more horrific when you consider the true scale of the resources required to produce those 89 million tonnesThere’s something wrong with the food system” (CIWM 2013a).

1.2 Strategies to Mitigate Food Waste

In developed nations, efforts to reduce food waste concentrate on actions during the retailing and consumption stages where most waste arises, although strategies do exist across the rest of the food chain. Within the EU, a ‘Waste Framework Directive’ enforces strategies to mitigate waste across the food chain, targeting a 50% reduction in food waste by 2020. This is implemented under a waste hierarchy, shown in figure 1.3, which defines the most preferred actions to the least preferred. Prevention of

food becoming waste is the most idealistic action which is achieved through changing consumption habits such as purchasing less, eating the right sized portions, re-heating leftovers, as well as making the most of surpluses in manufacturing and retailing by donating food to charity. One example of a campaign implemented in the UK is 'Love Food Hate Waste' which provides consumers with information on how to reduce their food wastage by storing food correctly and making meals with leftovers.

In order to reduce waste arising from the food industry, the 'Courtauld' commitment was established which is a voluntary agreement, where businesses work together with WRAP (Waste and Resources Action Programme) set up by the government to reduce the environmental impact of the food industry, saving 3.3 tonnes of carbon dioxide across the supply chain in its first four year phase (WRAP, 2013). Now in its 3rd stage, the commitment has been criticized for not setting high enough targets in order to meet the EU's 50% targeted reduction, aiming to reduce household waste by 5% just in 2013 (CIWM 2013b).

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Figure 1.3 The Food Waste Hierarchy Pyramid (Bray, 2013)

In order to meet such a target it is important efforts are focused on the prevention stage, however despite its definition and amalgamation into legislation, this strategy has a “lack of progress in reality” (Salhofer *et al.* 2007:246). This is due to difficulties in measuring prevention and also the long term nature of its goals which are contradictory. In relation to food waste, preventing consumers from throwing food away requires changing behaviours, meaning making better use of food that is wasted or purchasing less food in the first place. This contrasts with the food industry’s need to profit from mass producing cheap and accessible food, questioning the usefulness of voluntary commitments such as Courtauld. For example between 2010 and 2012 the UK food industry only reduced product and packaging waste by 0.4% falling short of the 5% target (Smithers, 2012).

In order to change behaviours, an understanding is required of current actions involved in wasting food. Salhofer *et al.* (2007:254) have shown that those living in urban areas are more likely to waste food in comparison with those living in rural agricultural areas. This relates to our knowledge of food production with residents of rural areas more likely to hold this information. The consequence of industrialised food systems has been an unintended ‘disconnectedness’ as a result of global mass producing food economy (Duffy *et al.* 2005:18). This shows that the behaviour of wasting food is related to embedded knowledge of how we think about and understand food within the context of everyday lives. So far such an engagement with conceptualising food waste in this manner is undeveloped but could be critical to changing consumption behaviours to prevent food waste.

1.3 The Higher Education Sector in the UK

The Higher Education Sector in the UK represents more than 150 Universities and colleges which are sites of waste creation, teaching and implementation of sustainability, providing food services to 2.5 million students and 378,000 staff (HESA, 2013). The UK Government’s Waste Review from 2011 admitted that “we do not yet have a detailed understanding of the quantities of food waste arising across much of

the public sector” showing that there is a lack of research in Higher Education Institutions (DEFRA 2011:59). The Higher Education Statistical Agency collects an annual overall waste statistic for each higher Education Institution (HEI) with 454,588 tonnes generated in the 2011/12 academic year (HESA, 2012), however there is no such data for food waste.

This sector is a key environment in preventing food waste for two reasons. Firstly, its influence on the economy through its yearly expenditure (£23 million in 2007/8) holding purchasing power through procurement contracts (Zhang 2011:22)(HESA, 2009). Furthermore, this sector has a commitment to contribute towards emissions reduction and sustainable development plans foreseen by the government, targeting an 80% reduction of emissions by 2050 in relation to a 1990 baseline. Secondly, is the importance of this sector to disseminate and implement research which promotes a sustainable society; HEIs lead in new ideas which can benefit humanity. Researching food waste within this setting fills a gap in terms of both an understanding of the amount generated and from which sources, but also the opportunity to develop a more critical approach to understanding and changing food waste behaviours.

The notion of ‘changing’ behaviours to encourage environmentally friendly actions, such as preventing food waste in HEIs, is an under researched topic, with common strategies involving increased awareness of the issue by auditing consumers’ waste or using poster campaigns to influence attitudes. In moving towards an understanding of behaviours positional to wider societal factors, communication and interaction with others is important, not just in changing behaviours but also maintaining them. The increased popularity of social media, now used daily by millions of people to communicate, and increasing smart phone ownership, makes it a perfect virtual space to facilitate such interaction. Social media has developed into a powerful tool not only used as a source of knowledge but also having the ability to bring people together with the recent “occupy” protests a great example of uniting towards a common goal using technology to facilitate the practice of protesting (Juris, 2012).

1.4 Aims and Objectives

This research project investigates food waste prevention in the context of HEIs in the UK by using social media as a tool for behaviour change. The purpose of this is to identify the barriers and opportunities for food waste prevention within this setting, as well as the extent to which behaviour change can be achieved using social media. The following objectives were developed to accomplish this:

1. To conduct a review of existing research and practice related to food waste prevention in universities with a particular focus on the use of social media in relation to food waste prevention.
2. To carry out an audit of food waste at Coventry University to record what food is wasted, how much, where on campus, and at what times of the day.
3. To develop a Facebook 'app'lication to record food waste and connect unused food with recipients locally.
4. To evaluate the broader utility of the application in promoting attitude and behaviour change relating to food waste, and assess the implications of the research for the UK university sector.
5. To contribute to the development of the university's sustainable food policy and communicate the results of the research through a short film documentary

1.5 Background information

Coventry University is based in the West Midlands employing more than 3,000 staff and offering a range of courses to more than 30,000 students (HESA, 2013). The university is located in the centre of Coventry with its campus buildings covering the easterly area of the city centre. The university hosts three centres of excellence in teaching and learning at a national level with strengths in Automotive and Business areas. Universities in the UK are run as autonomous institutions undertaking teaching and research under the guidelines of the Higher Education Funding Council for England

with Coventry University generating £200 million in income in the 2011/12 academic year (HESA, 2012).

This institution's overall mission is "to be a dynamic, global, enterprising university ... work in partnership with external organisations through our research and engage our students as partners in a community of learning" (Coventry University, 2013a). The People and the Planet Green league, a ranking of universities by environmental credentials, lists Coventry as 43rd of 143 institutions surveyed, falling down in areas of ethical investment, sustainable food, and carbon reduction, noting a 6.52% increase in emissions since 2005 (People and Planet, 2013). The catering is privately contracted at the institution, overseen by the estates department responsible for managing the University's environmental impact. The University is targeting a 35% reduction of its carbon emissions by 2015 as well as an 80% recycling and reuse rate (Coventry University, 2013b), with a reduction of food waste an integral part of meeting these targets.

1.6 Structure

This thesis will be structured as follows;

- First a review of literature relevant to this study exploring food waste and behaviour change initiatives in relation to HEIs. The conceptualisation of food waste is further discussed, examining food waste from the perspective of 'embodiment' and as a 'practical problem'.
- Second a discussion of methods used currently to explore behaviour change and food waste, an explanation of the methods used in this study and any considerations, and ethical implications experienced by the researcher.
- Thirdly the findings are evaluated detailing how food waste is managed within Coventry University, behaviours and attitudes of members of the University's

community as well as a critical analysis under an embodied framework of the attempts to prevent food waste using social media. The implications for the wider university sector are then discussed.

- Finally the thesis concludes by summarising the main points and findings as well as drafting targets to be included within the University's Sustainable Food policy to tackle food waste.

2) Conceptualising Food Waste in Higher Education Institutions

Research into food waste is an emerging area, providing a "prism to explore the interlinkages between different stages of the food chain" (Sonnino and McWilliam 2011:829). Critically this chapter will provide an in-depth narrative of current research to achieve three outcomes: firstly to place this research within the context of current debates; secondly to show that a gap exists within which this research can contribute to existing knowledge and thirdly to establish a conceptual framework in researching food waste within this context. The review attempts bring together research from different disciplines namely the geographies of food, waste management, environmental sociology and computer science under an interdisciplinary approach.

Two conceptualisations of food waste will be discussed followed by literature on social networks which will be organised in the following manner; 1) Implementing sustainability in Higher Education Institutions: A conceptualisation of food waste as a 'practical problem'; 2) A Conceptualisation based on 'embodiment': Exploring food waste and the field of behaviour change; 3) Linking Social Media and Food Waste: A tool for behaviour change

2.1 Implementing sustainability in Higher Education Institutions: A Conceptualisation of food waste as a 'practical problem'

Within academic literature two conceptualisations of waste as well as food waste are evident, on the one side a very practical view, predominantly used by practitioners in the waste industries, treating waste as a "a practical problem that needs to be managed" (Evans *et al.* 2013:6). On the other side critical perspectives examine waste in relation to our practices and experiences seeing its formation as socially constructed. The following section will consider the conceptualisation of food waste based on a 'practical problem' by analysing first how HEI's implement sustainability

into institutions, as well as research from various disciplines on food waste and waste strategies. The purpose of considering a more 'practical' conceptual framework is that institutions have a responsibility on two fronts, firstly as sites of food waste creation, management and disposal, and secondly as actors of pedagogy in educating students and staff to find solutions to societies grand challenges.

HEI's are under pressure to act in a sustainable way due to leagues such as the People and the Planets Green League, evaluating HEI's in the UK according to their environmental credentials. The amount of influence such 'green' leagues have is questionable however with efforts focused on improving University league table positions which are influential in student choice and allocation of research funding. Also due to pressure from the Waste Industry where awarding bodies, such as the Chartered Institute of Waste Management in the UK, set universal standards working with DEFRA and WRAP to enact sustainable disposal and recovery. This has led the way for academics and practitioners to research around the subjects of sustainability and waste within this context. The following will focus more on practice based literature by discussing firstly the incorporation of sustainability into University policy, second the different strategies which have been implemented to mitigate Waste and food waste at HEI's, and finally a summary of the barriers and opportunities in undertaking such strategies.

2.1.1 Implementing Sustainability in HEI's

Universities are spaces not only for teaching and researching sustainability but also implementing it, having an obligation to act morally and ethically towards the environment (Armijo de Vega 2008:22). Wastage forms part of any HEI's impact upon the environment therefore any strategies of research around the subject are underpinned by a need to lessen the impact of the institution and ultimately make it more sustainable. A number of policies and declarations were critical to incorporating environmental concern into HEIs' policies and practice; these can be seen in Figure 2.1. Each HEI is subject to social, economic and mostly importantly environmental

pressures on a local, national and global scale which it must work towards in order to contribute towards sustainable development. As well as the benchmarks mentioned in figure 2.1, a multitude of national laws and directives exist to hold HEIs to account against environmental targets. This requirement has led to the development of internal sustainability targets which are undertaken using a range of different techniques, often incorporating food or food waste. However due to the complex nature of the term 'sustainability' even when universities agree to such commitments often little immediate action is taken (Bekessy *et al.* 2007).

- The Magna Carta of European Universities (1988)
- Talloires Declaration (1990)
- The Halifax document 'Creating a Common Future: an Action Plan for Universities' (1991)
- The 'Urgent Appeal from CRE' to the Preparatory Committee of UNCED (1991)
- Stockholm conference on Human Environment (1992)
- Swansea Declaration (1993)
- The Copernicus Charter (1993)
- The 'Universities Charter for Sustainable Development' (1994)
- Students for a Sustainable Future (1995)
- Kyoto Declaration (2000)

*Figure 2.1 Milestones in bringing environmental concerns to HEI policy and practice
(Armijo de Vega et al. 2003:228)(IISD, 1996)*

In the UK the Climate Change Act of 2008 proposed an 80% reduction of emissions to 1990 levels by the year 2050 with an interim target of a 34% reduction by 2020 (HEFCE, 2012). The Higher Education Funding Council for England (HEFCE) has set its own targets for the higher education sector to reach aiming for a 43% reduction by 2020 and an 83% reduction of emissions by 2050 (HEFCE, 2012). The introduction of municipal waste legislation and its presence in higher education benchmarking tools has meant increased pressure to manage waste in a sustainable way in the UK. The EU Waste Framework Directive underpins UK municipal waste legislation which enforces waste prevention and reduction. The following discusses research on how sustainability can be implemented in HEIs.

Within HEIs, three spheres exist which must interact with each other in order to successfully implement sustainability; Curriculum, Campus Operations and Research

(see figure 2.2). McMillin and Dyball (2009:57) describe universities' role as 'agents of change' within this 'whole-of-university' approach as a means of amalgamating resources to implementing sustainable development on campus, or more specifically manage an environmental problem such as food waste.

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Figure 2.2 A Whole-of-University Approach (McMillin and Dyball 2009:57)

Sustainability within the sphere of campus operations is questioned in Sharp's (2009) own experience of undertaking a career in campus 'greening'. The article describes two phases of 'greening' in American Campuses since the 1990s. The first phase was significant in implementing a variety of different strategies but having little impact. For example Sharp (2009:2) notes that universities focus funds on recycling schemes in public places whilst elsewhere waste increases with "no comprehensive waste-reduction plan". The failure to make realistic changes was due to the perception that such projects were too expensive compared to the savings which could be made. The second phase was the introduction of university environmental committees, where staff and students undertook equal roles which increased recycling rates of 500 Universities to 78% (Sharp 2009:3). It is questionable that the current management of campus operations places enough importance in sustainability measures, as Sharp (2002:3) notes that the movement towards more sustainable campuses has not yet shown the impact needed to facilitate wide scale change. The article advocates the allocation of more professional roles to campus operation staff with the ability to transcend departments and disciplines to make of the most of resources.

Dahle and Neumayer (2001:139) note that environmental education must “become an integral part of higher educational institutions” and also to take control and reduce the impacts of their own infrastructure. For example, in order to implement sustainable practices, those affected need to understand why actions are needed as well as how to carry them out either by incorporating environmental awareness into the curriculum or using visually stimulating material such as poster campaigns (Dahle and Neumayer 2001:151). Promoting sustainability through the curriculum is a ‘bottom up’ approach where students criticise campus actions and decisions holding an important role as ‘customers’ in Universities (Dahle and Neumayer 2001:152). All of a HEI’s community from lecturers to students and University operations staff’s agency and ability to understand and undertake a project are crucial for its success. It is important that sustainability is not just taught as an abstract set of ideas but something that can be engaged with on campus.

The final sphere to this approach, research, can take the form of various different pathways from the most efficient means of composting to the organisational structure of HEIs. In reviewing research in this area Velazquez *et al.* (2005) draw conclusions through a literature review of American campus ‘greening’ programmes showing that there is a lack of literature on bad practices with literature solely focused on good practices meaning” (Velazquez *et al.* 2005:383). Critically from discussing each of these three spheres the notion of a ‘whole-of-university’ approach can be seen as idealistic as in practice institutions are more complex. Sharp (2009:3) notes that literature pays “no attention ... toward the more complex, irrational, and unconscious life of the institution”, as universities operate in denial over their efficient organisation structures rather than addressing the problems they create.

In the UK an organisation which aims to aid the implementation of sustainability and social responsibility in Universities is LIFE (Learning in Future Environments). Their support is based around four areas, similar to the ‘whole-of-university’ approach, which can be seen in figure 2.3. As of yet, no literature exists accounting for the on the ground actions involved in such programmes however there is a degree of

‘outsourcing’ with the 21 institutions involved (LIFE, 2013). The concept differs in the addition of ‘social responsibility’, meaning its underlying purpose is to disseminate progress on sustainable activities as well as implement them to increase a HEI’s profile.

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Figure 2.3 The Flexible ‘LIFE’ (Learning in Future Environments) Framework (LIFE, 2012)

As previously noted, the imperative of sustainability and environmental concern underpins such waste reduction projects. Table 2.1 summarizes the previous literature by showing a direct comparison of the successful approaches against the barriers which prevent the implementation of sustainability in order to meet objective 3.

Table 2.1 Comparison of the Opportunities and Barriers to Implementing Sustainability in HEI’s (Adapted from Velazquez et al. 2005:385-389; Sharp 2002:131-132)

Successful approaches to Implementing Sustainability	Barriers Against Implementing Sustainability
Management support – secure a commitment that can be gradually substantiated with action.	Lack of awareness, interest, and involvement - Between all actors in the University community Decentralised, over complex compartmentalised, organizational structure
Effective coordination – dedicated, respectfully persistent, skilled communicator.	Lack of data access – Lack of data recording, data procedures and inaccuracy of data Lack of training – Lack of sustainability taught across all disciplines Lack of opportune communication, and information – Information Dispersed between departments
Maximize face to face communication – dialogue is the most effective means of progressing with the change process, learn the language of other	Lack of time – Falls outside normal day to day activities. Reliance on volunteers or students who have other commitments

people, active listening skills are essential.	
Build both informal and formal support – ensure there is informal support and general understanding before formalizing systems.	Lack of support from university administrators – Without agreement from those at the top, disagreement can occur at lower levels. As reduced effective leadership
Partnerships – seek a range of partnerships to support projects internally and externally	Lack of funding – Reduction of internal spending due to budget cuts, inadequate funding to undertake a study to deliver quality results.
Trial, review, expand – remove risk and generate organizational support by running pilot projects.	Resistance to change – The inability to see sustainability beyond an abstract set of ideas. May mean changing of consumption habits, negative or guilty connotations.
Integrated planning and integrated design – utilize systems to understand interrelationships and to perceive beneficial design solutions. Development of a learning organization – where the educational potential of experience and process is optimized.	Lack of interdisciplinary research – Lack of communication between departments and the inability to work together. Prevented by the organisational structure of a HEI.
Management framework – the coordinator of environment programs must have freedom to engage all levels of the university community, access to generate and strategically draw upon the highest levels of management.	Lack of more rigorous regulations – Initiatives to implement sustainability are normally based upon voluntary targets with no penalty for failure to achieve reductions. Lack of performance indicators – The ability to put savings in the real world terms.
Student partnerships – tapping into talented, committed students and involving them and mentoring them through paid positions and/or research projects, ensuring that their work is relevant and integrated into university systems.	Lack of policies to promote sustainability on campus – Lack on ‘on the ground’ evidence of sustainability targets. University community unable to engage with policies.
Continuity – allow two to three years to establish foundation of trust, relationships, organizational familiarity and skill base to be effective in medium to long term projects.	Profits mentality – Universities run like a business, reduction of short term loses and lack of commitment to projects which guarantee a return or saving.
Forums – for broad community involvement, discussion and consideration.	Lack of standard definitions of concepts – Lack of understanding across the Universities community. Inability to compare project findings
Profile – share the learning experience with everyone who has any interest; maintain a profile within and beyond the university for the efforts being undertaken.	Sexism – The Development of power relations of men over women due to the lack of women in managerial positions.
Information systems – a means of capturing and presenting information in digestible formats for all levels of management.	Lack of designated workplace – Lack of working space for staff working on sustainability Technical problems – Lack of university equipment, adequate measuring equipment or data analysis tools.

The summary of factors in table 2.1 shows a contrast in research themes between the idealistic and abstract nature of sustainability on one side and on the other the ‘in the

field' reality. To a certain extent absolute sustainability according to the Bruntland Convention definition (United Nations, 1987), can be seen as unreachable, relating to one such point in table 2.1, due to the lack of standardised definitions. In relation to food waste as a 'practical problem', an institution's understanding of sustainability affects how a management strategy is developed which addresses such an environmental issue. This exists within the context of waste policies, environmental legislation and the underpinning of attitudes from those involved in the university community which is also influenced by these barriers and opportunities.

This section now moves to discuss more specific examples where projects have been implemented on campuses to reduce food waste with the conceptual framework of food waste as a 'practical problem'.

2.1.2 Waste Management Strategies

The most common means for HEI's to manage and account for their waste is to introduce a Waste Management Strategy (WMS), also described as a Solid waste Management Strategy. In America, 80% of HEIs have waste management programmes, predominantly in the form of waste characterisation studies within which organic and food waste are measured (Armijo de Vega *et al.* 2008:552). A WMS involves "plans and programs (taxes and financial incentives) and persuasive strategies (information campaigns, public relationships and environmental management systems) [which] must be implemented to minimize waste" (Armijo de Vega *et al.* 2008:21).

Waste management strategies have the advantage of putting into context the amount of food waste an institution produces, amalgamating the 'research', 'campus operation' and 'curriculum' spheres of the 'whole-of-university' approach, with numerous studies showing how these three spheres work together. Dahle and Neumayer (2001) note the curriculum and the students' voice are important in implementing sustainability from the 'bottom-up'. Numerous studies note the need to mobilise the HEI community at different levels to increase awareness of good practice

in relation to (SWM) solid waste management (Armijo de Vega *et al.* 2008:25). Mason *et al.*'s. (2003) example of a 'zero waste programme' at Massey University, New Zealand is one case study which evaluated the students' role in the development of their programme which can be seen in figure 2.4.

This strategy was introduced through forwarding environmental concerns by students at the environmental forum, a space within which students could communicate with academic staff from different disciplines to explore possible research projects (Mason *et al.* 2003:267). The study emphasises that without permanent staff involvement the programme would not have been a success. Mason *et al.* (2003) conclude by recommending efficient communication between all parties, paid staff to work with volunteer students and a breakdown of university structural management which can prevent communication barriers between departments. Such management often consists of internal policy and standards of practice which is critical to address when reducing food waste in this administrative setting (Clugston and Calder 2007:213).

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Figure 2.4 Flow diagram of the development of the implementation of a zero waste programme at Massey University, New Zealand (Mason et al. 2003:266)

Students lack an understanding of the organisational structure of HEIs and therefore lack knowledge of how they can effectively apply themselves leading to short term rather than long term targets (Sharp 2002:138). In light of this, Figure 2.4 can be criticised for not involving students a further stages rather than solely at the beginnings of the project.

Few studies exist which detail waste management strategies at HEIs in the developing world. Mbuligwe's (2002) article discusses the management of waste at three Universities in Tanzania, noting that the majority of waste was organic with the potential for it to be used as animal feed or in anaerobic digestion. Currently the waste is disposed of by being dumped in a pit and then burnt causing air pollution as well as littering. Critically this institution lacks external waste management support in comparison with HEIs in western nations due to a lack of funds to provide technology in order for safer disposal.

Due to waste legislation, in the UK all HEIs are required to have some form of waste management plan. A requirement is to regularly report the amount of waste through an auditing process, information which is collected privately, rather than by the local authority, due to the nature of waste management contracts. Figure 2.5 shows the advantages described by HEFCE of using auditing as an accountability tool. A clear disadvantage is the unaccountable nature of private auditing and whether HEIs are under enough pressure to improve the sustainability of their waste streams.

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*Figure 2.5 Advantages of using waste audits as a means of accountability in the UK
(HEFCE 2012:22)*

Each waste contract can have its own auditing system depending upon the needs of the HEI, often a breakdown of the types and amounts of waste is desirable to calculate

the potential recycling rate available. Within the HEFCE document on Water and Waste in the HEI sector, a case study of the University of Leicester describes how they went about finding a new contractor to implement their Waste Management Strategy (HEFCE 2012:22). First a tender was produced, splitting the University's waste stream into eight possible contracts informed by internal audits of waste composition. An annual audit was carried out with the help of students and academics as part of an environmental team of volunteers, ultimately leading to a better understanding of the waste the University created.

In relation to similar countries the UK's system can seem overly stringent. For example The Environmental Association for Universities and College (EAUC) website states that under the 'Food Waste and Animal-by-products Legislation' only certain types of food waste can be composted and can only be given to farmers to be used as animal feed if it has not come in contact with materials of animal origin (EAUC, 2013; Gloucestershire Council, 2012). Further EU laws state that catering waste cannot be used in anaerobic digestion if of international origin (outside the EU) or used in the production of pet food (Gloucestershire Council, 2012).

The most in depth analysis of WMSs in HEI's in the UK is an article by Zhang *et al.* (2011) using a case study of the University of Southampton. The article details the development of their WMS over more than a ten year period beginning with recycling schemes through to organisation changes, auditing and the introduction of a separate food waste collection service. The study notes that one sphere of the HEI community was not more involved more than the others, also commenting on the introduction of national laws such as the 1999 landfill directive (Zhang *et al.* 2011:1610). Overall the study showed a reduction in the amount of waste produced and its processing cost with 75% less going to landfill and saving of £40,000 a year (Zhang *et al.* 2011:1613).

Typically WMS consist of several components one of which is a waste characterisation study or to put simply an audit of waste. Smyth *et al.* (2010) argue waste characterisations studies are an effective means of identifying waste sources and planning their reduction. Using a case study of the University of Northern British

Columbia, composition of waste was established and then investigated to evaluate how feasible schemes were to reduce key sources. Critically this study was comprehensive in its auditing process giving extensive statistical breakdown of waste, showing that 184 kilograms of food waste was generated across campus from two 5 day audits.

Armijo de Vega *et al.* (2008) extends waste characterisation research in an updated study, breaking down waste into eight defined categories, one of which is organic, and providing detailed figures of not just the amount of waste but also its rate of generation and percentage which can be recycled. Such studies are beneficial in showing the amount of recovery potential as well as giving an overview of an institution's wastage. However one challenge is that staff must be trained in how to effectively separate and undertake auditing in order to provide consistent data and accurate resource separation in cases of waste recovery (Mason *et al.*, 2004).

Critically this review has found discrepancy between studies which contain such an auditing process. For example studies using the terminology 'waste characterisation', such as Armijo de Vega *et al.*'s. (2003:2008) Mexican based study and Smyth *et al.*'s (2010) regional Ontario, Canada based methodology, use a specific characterisation of waste in relation to other local studies. This had led to the amount of organic waste varying dramatically between each university, with Armijo de Vega *et al.* (2008) quoting an example of Itcha college where 5 tonnes of food waste is processed each week representing 13-15% of their total waste stream. To the other end of the spectrum in which Felder *et al.* (2001) notes 'organic' waste represented 70% of the total waste stream at the University of British Columbia, Canada.

Researchers have attempted to introduce innovative means to adapt the waste stream at a HEI to this auditing process. Felder *et al.* (2001) used a separate collection for seasonal waste as well as a means of tracking waste from individual groups within the University's community. Despite this, there was a lack of universal categorisation such as a breakdown of organic waste into avoidable and unavoidable. Smyth *et al.* (2010:1012) is one study which does separate organic waste into 'compostable' and

'other compostable' categories estimating saving of 21% but fails to give further detail. Such auditing processes are not yet adapted to aid the prevention of waste, breaking down organic waste for example into avoidable and unavoidable would be beneficial where avoidability is based on whether the food could have been either consumed or used in some way before disposal.

2.1.3 Food Service Waste Reduction

Cafeteria, dining halls and canteens are a source of food waste of specific concern to food service sector practitioners with specific strategies aimed at reducing waste within this environment. Thiagarajah and Getty (2012) note that the buffet nature of food service areas leads to food waste through consumers over filling plates and also in having a tray meaning more food is taken and then not eaten as consumers are overcome by 'choice'. Removing trays from the canteen resulted in a reduction of 171 kilograms of food waste over one week (Thiagarajah and Getty 2012:143). This could have been due to consumers eating less as more trips to the buffet were needed in the tray-less canteen. This raises the question of how researchers can attribute data towards a unique individual or group in such a situation as well as the reliability of such data. This is important in relation to how research is able to measure and influence food waste within a food service environment.

Research by Al-Domi *et al.* (2011) has attempted to attribute cafeteria food waste to males and females using a case study of the University of Jordan. On average 13% of food was wasted by students with a higher number of females wasting meat than males (Al-Domi *et al.* 2011:873). The study gives greater details than other academic literature of the percentages of food waste by food type giving accurate information of where and by whom the food wastage was originating. For example Babich and Smith's (2010) methodology of recording pulped food waste over solely two days lacks depth to account for seasonal variations in students numbers and information about their food choices.

A more accountable method used by Whitehair *et al.* (2012) is tray tracking to individually monitor the amount of waste a student throws away in each serving over a period of 6 weeks. A key challenge in implementing this was making organisational changes due to the food service manager's lack of experience in implementing waste strategies. Two of the canteens monitored achieved a 30% reduction in waste through a poster campaign and an energy saving. Sarjahani *et al.* (2009) also shows that trayless dining reduces waste by comparing statistics of a tray and trayless weeks' worth of generated food waste. However there are noted limitations in the study: only data on Tuesdays and Thursday were analysed and also no data was collected on liquids and beverages. Despite this, the articles does show that trayless dining reduces food waste, as well as that such measure must have the support of students to be successful (Sarjahani et al. 2009:99). Further examples from the University of Maine also show similar reductions (Aramark 2008:4).

Such trayless initiatives fail to act upon the amount of food waste created by kitchens, for example food leftover on the counter not served to customers. A study by Northern Michigan University found that 266 grams per person of food was wasted on average each day under an American style 'buffet' service system (Van Hendel, 2004), suggesting that through portion control less food is wasted. Overall there is a lack of research into reducing food waste within such canteen environments, particularly in North American 'all you can eat' food services. Furthermore an understanding of how food cultures impact the amount of food wasted is absent. For example in Al-Domi *et al.*'s. (2011) study on Jordanian students wasted considerably less food than elsewhere with only.

2.1.4 Composting and Anaerobic Digestion

Composting the organic waste stream is a common strategy to reduce the amount of waste disposed by HEIs, instead of being handled and disposed by a third party, often going straight to land fill. The amount of organic waste which can be composted varies greatly in North America. For example in Canada a 'Green dining standard' has been

established in order to tackle all HEI cafeteria's 'large ecological footprint' by diverting food waste to a composting system (Ouseley *et al.*, 2011). Here an industrial composter was installed with the ability to compost 95% of all food waste at Queen's University (Ouseley 2011:8). Whereas Smyth *et al.*'s (2010) case study at the University of Northern British Columbia notes only 60% can be decomposed in this manner. As stated at the beginning of this chapter, this field is multidisciplinary, and there is a lack of space to account for the different means of effectively composting using a variety of equipment. There various different methods for example Rasmussen and Bergstorm's (2011) article explaining a 'food dehydration' machine which can reduce the volume of composting food waste.

A subject of debate in relation to its efficacy is the amount of economic and human capital needed to start and maintain such methods. On the one hand Smyth *et al.* (2010:1014) note that student led initiatives struggle to reach their full potential due to a lack of financial resources and a limited number of volunteers. On the other hand articles in *Biocycle* magazine have shown that student run composting projects have been successful. Sullivan (2010) describes a project in Goucher College, Baltimore which not only reduces waste but also sells composts and pays students an hourly wage for their involvement. Others examples are Ohio University in Athens (US) (McClure, 2009), Appalachian State University (Sustain Appalachian, 2013) and American University in Washington (American University, 2013).

Critically, research surrounding the overall savings of such a method in comparison with preventing the production of food waste is lacking. Although this strategy is important and easily applicable to any HEI, strategies which aim to reduce the amount of food waste before it is thrown away are arguably more sustainable, with less energy wasted in the creation of food which is not eaten. Similarly anaerobic digestion can be placed within a similar role. Little research exists detailing the implementation of such a method in HEIs which works by using micro-organisms to decompose organic matter with the ability to capture exerted methane gas. Barylak's (2008) unpublished thesis uses a case study of Ohio State University to show a decrease in greenhouse cases

using such a method. The university subcontracted this role to a plant that was able to process 35,000 tonnes of organic waste in six days, from which 500kWh of electricity was produced (Barylak 2008:26). The method was implemented using 'Ecoflow', a means of statistically accounting for different paths of waste produced by the institution, shown in figure 2.6. Using colours to show stages, a number of inputs can be directly followed through processing, allocation and conversion to outputs of

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fertilizer, methane and carbon dioxide.

Figure 2.6 An 'Ecoflow' organic waste recovery system (Barylak 2008:49).

2.1.5 Barriers and opportunities of strategies to mitigate food waste

The purpose of this section is to summarize findings from this review of strategies to mitigate food waste to show their barriers and opportunities in order to meet objective three of this research. Table 2.2 was amalgamated from sources discussed so far in this chapter and is unique to this literature review.

Table 2.2 Barriers and Opportunities of strategies to mitigate food waste in HEI's

Method	Opportunities	Barriers	Prevention, Reduction or Diversion?
Waste Management Strategy	Detailed data on the different waste streams which exist through characterisation studies. Opportunity for the wider university community to engage and understand why the issue of waste is important	Lack of a consistent audit methodology. Lack of equal involvement across the university community. Cost of training and managing the process.	Prevention, reduction and diversion
Food Service Intervention	Ability to change people's consumption practices to directly influence the amount of food they waste.	Change restricted by the demand to maintain a profit margin through sales. Lack of a penalty to food service operators against large food wastage.	Prevention and diversion
Composting	Diversion of food waste away from landfill lowering emissions and creation of a useful agricultural product	Technical knowledge required in how to achieve the best results and what can be composted. Does not prevent food being wasted originally.	Reduction and diversion
Anaerobic Digestion	Diversion of food waste away from landfill lowering emissions. Creation of electricity from methane gas as well as fertilizer.	Specialised expertise and technical costs of implementing this method or having to pay for waste to be disposed in this way. Again a reduction rather than prevention method.	Reduction and diversion
Animal Feed	Diversion of food waste away from landfill. Energy in production and cooking re-inputted into the food cycle.	Against the law in the EU to use scraps of food that have come from or been in contact with an animals as feed.	Diversion

2.1.6 Conclusion

In evaluating strategies to reduce food waste in HEI's and how they implement waste management strategies, a conceptual framework of treating food waste as a practical problem can be seen. A reoccurring theme is the complex organisational structure

present within HEI's which acts as a barrier to preventing and reducing food waste and implementing waste management strategies and idealistic concepts such as the 'whole-of-university' approach. Critically there is adequate research in this field from a variety of different corners of the academic world of different possible methods but there is a failure to move beyond descriptions of savings gained and organisational structures towards more holistic approaches considering not only the wider aspects of HEI's but also social factors in implementing food waste prevention. In relation to each strategy, there is a lack of a universal approach to auditing meaning that the largely quantitative evidence base is only to a certain extent useful being specific rather than representative. Furthermore some of the literature is more than ten years old, therefore being out of date with the recent changes both in the HEI sector as well as environmental and sustainability debates.

2.2 A Conceptualisation based on 'embodiment': Exploring food waste and the field of behaviour change

In taking a more post-structuralist stance, the review now moves to give an insight into waste as a "dynamic category that needs to be understood in relation to the context through which it is embedded" (Evans 2011:708). The following will discuss a conceptualisation based upon embodiment by drawing upon the field of behavioural change in order to set out a framework. First, food waste will be discussed as an embodied practice, then how behaviour change initiatives aim at changing consumption practices to reduce waste are discussed and finally its relation to changing food waste behaviours in HEI's.

2.2.1 Food Waste as an Embodied Practice

A plethora of research exists exploring our social interaction with food in its consumption and purchasing however little has been written in relation to its wastage. The consumption of food can be seen as an embodied practice as there are "few things

more essentially transgressive and boundary-crossing than food” our interaction constructed from “spaces and places, nature and culture, society and technology, bodies and environments, the personal and the political, ethics and morality” (Goodman and Sage 2013:6). For example research by Southerton (2001:180) suggests that the kitchen as a space that reproduces social, cultural and economic factors through the storing and cooking of food, ultimately showing that consuming is the fundamental means of social classification.

The act of eating food forms intimate relationships of a variety of feelings and ‘affects’ from pleasure and disgust, to authenticity, place, production and power (Goodman 2013). How we feel through food and its interaction with those around us are ‘visceral’ aspects, showing a relationship from personal interactions to macro level food politics. Essentially in uncovering our relationship with food, a consumer can be placed within a complex sphere of relationships and interactions, “a visceral reminder of how we variously inhabit the axes of economics, gender, sexuality, history, ethnicity and class” (Probyn 2000:9).

In relation to waste, literature has attempted to explore relationships in a similar means to our socially constructed interaction with food. The *Ethics of Waste* by Hawkins (2005) attempts to account for our interactions with waste arguing that they originate from a disregard for the environment and nature which prevent the changing of waste habits. Technological developments are able to process and dispose of waste preventing the further thought of wastage habits in everyday life (O’Brien, 2007). Dealing with waste can be seen as a ‘cultural performance’ which when analysed can show a complex social context in how things become classified as waste and how they are dealt and disposed of (Hawkins, 2005).

In relation to the act of wasting food, literature is yet to fully explore the disposal of food in this manner. One notable exception is Evans’ (2012) analysis of household food waste using ethnographic methods. The study shows that the process of food turning into waste is subjective due to everyday routines and visceral interactions such as the weekly food shop and the guilty feeling of wasting uneaten food. Within this same

research space, the household, research has also shown how the practice of eating leftovers interrupts the linear consumption path by redefining food as eatable instead of being wasted (Cappellini, 2009). The study shows that despite being labelled as 'leftovers' a visceral connection is still possible. This label then reconnects consumers with wasted food through economic factors, in saving money, and also environmental factors in relation to wasting less food.

Within this field of research, there are several unexplored avenues. It is clear that research about our interaction with food waste provides an in-depth insight into why we waste food and also how we go about reducing or preventing its wastage. This forms the basis for an 'embodied' conceptualisation, evaluating our practices and interactions with waste which are entangled in personal factors from 'visceral' aspects to factors of space and place. There are a multitude of possible spaces, places, cultures, economic and environmental contexts which such research could be placed into, with one such pathway being students, campus operations and academic staff within a HEI community. Note that such an 'embodied conceptualisation' includes the 'embedded' factors discussed under a single terminology.

2.2.2 Behaviour Change Initiatives: Changing Consumption Practices

As the process of wasting food can be described as a practice, research within the field of behaviour change to implement more sustainable consumption practices is a relevant avenue to explore. Such research is successful in influencing individual's behaviour to reduce environmental impact (Evans *et al.* 2012:114). This field has sought to explain mechanisms that drives such behaviour with Stern (2000) noting that there are four main factors behind this in figure 2.7. However due to the complex relationship that exists between 'attitudes', 'values' and 'behaviours' (Warde and Southerton 2012:5), two lines of thought have emerged in this field underpinning sustainable consumption behaviour change. On the one hand research has sought to be 'methodologically individualistic', relating individual's behaviour to their consumption behaviour. On the other hand research has placed more emphasis on

routine and everyday day practices. The following will discuss their relevance to reducing food waste.

- **Attitudinal factors:** including general environmentalist predisposition, behaviour-specific norms and beliefs, and non-environmental attitudes such as the perceived costs and benefits of any particular environmentally responsible behaviour.
- **Contextual factors:** factors such as the material costs and rewards associated with particular environmentally responsible behaviours, what the regulatory framework supports or prohibits, what kinds of technologies and/or organisational mechanisms are in place, what kinds of social norms are activated in particular communities, and so forth.
- **Personal capabilities:** including knowledge/ information and demographic and social factors.
- **Habit and routine:** high-frequency behaviours undertaken more or less automatically, or without considered reason for doing them.

Figure 2.7 Four Main factors for encouraging Environmental Behaviour (Stern 2000:416) (Summarised in Nye and Burgess 2008:23)

The traditional means of implementing sustainable consumption initiatives involves encouraging sustainable behaviours by using a number of different methods on an individual level. These are attitudinal and contextual factors (see figure 2.7) for example incentives or penalties are used to either reward or fine positive or negative environmental activities, promote alternative behaviours and inform consumers using information campaigns (Southerton *et al.* 2011:8). Here behaviour change is framed in relation to the 'sovereign consumer' who acts according to factors which influence their choices (Evans *et al.* 2012:114). Such approaches have been criticised as they have yet to demonstrate the scale of impact needed to lead to a noticeable social change (Evans *et al.* 2012:115), limited in providing short term rather than long term behaviour changes. This is due to a 'value – action' gap, as they rely on peoples concern for the environment to change their behaviour however there is a discrepancy between holding green values and taking actions upon them (Vermeir and Verbeke, 2006).

In light of this, academics have sought an alternative approach which argues that consumption takes place through practices, most of which are repeated routinely

every day and are dynamic in relation to our embodied relationship to everyday objects (Warde, 2005). The key difference is explained by Evans *et al.* (2012:116) in noting that “ecologically damaging forms of consumption are not seen as a problem of individual consumer behaviour; rather they are understood as embedded within the prevailing organisation of practices”. Research in this area focuses on how practices can be modified to encourage more sustainable activities. This is critical in relation to routines as Warde and Southerton (2012:6) note that the majority of negative environmental behaviour is ‘unremarkable and unrecordable’ being so mundane it is invisible.

Hargreaves’ (2011) study of implementing a scheme named ‘Environmental Champions’ by the charity Global Action Plan UK, shows an example of how this approach can be used effectively to analyse consumption behaviour. The project begins by asking staff of an organisation to undertake an audit of routine practices, such as looking into their rubbish, which led to awkwardness as they challenged every day, ‘unthinkable’ practices (Hargreaves 2011:86). The resulting audit created a space to think about existing practices that allowed further environmental development (2011:87). Following this a number of initiatives were proposed, one of which was ‘No bin day’ in order to “de-routinize existing waste habits and re-routinize new ones” (2011:90). This attempt to change routine was met with opposition by the Facilities Manager as the usage of bins relates to several legal obligations such as data protection, cleanliness and hygiene. The act of taking away a bin being described as an invasion of privacy (2011:91), with the eventual outcome resulting in a compromise as employees were offered the choice of removing their office desk bins for a day, to which no-one agreed.

Critically this can be related to the complex nature of implementing sustainability in HEI’s as clearly such routine everyday practices are engrained into their organisational context which until now has remained unnoticed, or at least un-conceptualised in this manner. The case study described by Hargreaves (2011) shows that practitioners are

‘carriers’ of practice’ holding influence over implementing and sustaining practices in order to adhere to workplace legislation (Evans *et al.* 2012:117).

There is little literature which covers behaviour change in relation to food wastage. As a starting point, WRAP’s research using quantitative methods gives an overview of the seven factors they claim are causing consumers to waste food (See figure 2.8).

- Buying too much food in general, particularly driven by special offers (e.g. Buy one get one free).
- Buying more perishable products (e.g. fruit and vegetables) as part of healthier eating patterns and food experimentation.
- Not eating the foods that need to be eaten first, as consumers opt for what they fancy eating on the day over what they already have at home (itself driven by frequent top up shops and ‘spontaneous purchasing’).
- Undertaking an ad hoc ‘spring clean’ of cupboards, fridges and freezers to dispose of old, forgotten or unwanted food products.
- High sensitivity to food hygiene and the guidance dates on food labelling.
- Making too much food in general.
- Dissatisfaction with the taste of the food – especially food left by children.

Figure 2.8 Behaviours that Drive Consumer Food Waste (WRAP 2006:2)

The research notes that change is only possible if consumers connect with the issue of food waste stating that “there is a wide-spread belief that food waste has no environmental impact whatsoever because it is biodegradable” (WRAP 2006:3). The research is not critical enough in exploring how such attitudes could be changed by looking beyond consumers’ environmental ethics and instead considering the routine waste habits instead of their buying habits shown in figure 2.8.

Despite this, WRAP has launched a campaign under the name *Love Food Hate Waste* which aims to provide advice on storing food, controlling portion sizes and recipes to make the most of consumer’s pantries. Such a campaign does aim at changing or introducing routine habits such as storing and reheating leftovers or setting up a compost bin as well as influencing and informing existing habits, for example through giving detailed information on the storage of products. Figure 2.9 shows how this campaign is able to engage with consumer’s practices as an initiative to change behaviour, backed up by information on possible financial savings on an individual and

national level, the carbon footprint of avoidable wasted food and further information on the cost of food waste in the UK (Love Food Hate Waste, 2013a). The environmental imperative can be seen as secondary as it is almost hidden within the pages of the website with the factors of saving time and money standing out and taking pride of place. For consumers taking part, this campaign is not a process of knowledge attribution that their habits are environmentally damaging, but instead takes the form of consumers seeking personal gain which is accomplished through such savings of time and money. In focusing on the 'practice' element this example shows that behaviour change does not necessarily revolve around consumer's awareness of the environmental impacts of their own behaviour.

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Figure 2.9 Love Food Hate Wastes diagram showing how to reduce food waste (Love Food Hate Waste, 2013:b)

Finally this section will consider research which looks into established environmental behaviours in relation to waste and food waste. Bekin *et al's.* (2006:34) study of 'new consumption communities' explores how consumers engage with pro-environmental behaviour through empowerment and resistance against oppressive market consumerism. The study concentrates on how such communities have undertaken 'alternative' waste management practices in order to find out whether an

'embodiment' is present in resistance behaviour. On the one hand, the pro-environmental communities described have a re-connection with nature through controlling their own production and disposal therefore encouraging such behaviours. On the other hand it is questionable whether the re-connection takes place as within such communities this behaviour would not be considered 'alternative' but part of everyone's routines. This idea is furthered in Foden's (2012) study exploring the extent to which routine practices in reuse groups such as 'freecycle' can be seen as activism against the 'formal economy'. The study showed that although those involved were aware that their behaviour was ethically positive, participants were disinclined to link this to wider issues and were unwilling to describe this as a 'political act'. Critically this shows that the social context of behaviour is important to consider as in these examples normative waste management behaviour was already established.

2.2.3 Behaviour Change Research in Higher Education Institutions.

Few studies have analysed such environmental behaviours in HEI's, particularly considering the social contexts and interaction with waste as previously explored. Hansen *et al.*'s. (2008) study aims to understand recycling behaviour, values and attitudes of faculty, staff and students at Michigan State University in order to aid decisions on recycling infrastructure. Interestingly the study finds a conflict in interests between conducting rigorous academic work and the need to provide a 'quick turnaround' for operational staff actions. Staff acknowledged that environmental behaviour should be encouraged but admitted that students lack the knowledge and resources required to be good environmental citizens (Hansen *et al.* 2008:177). The lack of a convenient means to recycle and organisational barriers were quoted as reasons for this, for example staff lacked funding and the labour to provide and collect recycling across the whole campus.

A difference also exists in relation to student's behaviours to recycling and waste minimisation, with an environmental concern having less of an influence on recycling (Robertson and Walkington, 2009). Through a study of students' recycling behaviour in

Oxford, UK, overall waste minimisation was influenced by more social factors such as the likeliness of friends and family to reduce waste. Again lack of access was quoted as a barrier against recycling behaviour, in this case providing facilities at student's halls. This can be related to establishing normative values, especially the ability to provide this in a convenient manner to the University community.

Further evidence also shows that students' underlying environmental beliefs do not correlate with their environmental actions. In a study which used poster campaigns as a 'message intervention' to reduce food waste in a university dining facility, Whitehair *et al.* (2012) notes an outcomes of a 15% reduction in food waste. The messages gave data such as 61 grams of food was wasted per student per meal but only had a minor effect on environmental attitudes noting that rather than continuing to inform their attitudes, instead messages needed to simply remind students to act upon them (Whitehair *et al.* 2012:68). Literature on student's behaviour to food waste has failed here to move beyond individualistic explanations underpinned by environmental ethics. Robertson and Walkington (2009) provide the most in-depth analysis in relation to explanations of behaviour noting that social context has some effect upon recycling rates. Other than students, a sole study which reviews food service administrators perceptions on food waste is Kwon *et al's.* (2010:19) study on the National Association of College and University Food Service in America. Educating customers to reduce waste was considered most efficient in reducing food waste showing individual attitudes are seen as the principle cause of wastage. Nevertheless further research is needed to accurately account for students' and staffs' routines and habits across the spaces they interact within HEI's, from accommodation blocks to university canteens and buildings.

2.3 Linking Social Networks and Food Waste: A tool for behaviour change

Society is growing ever more connected and complex with an 'interconnectedness' linking actors and objects in a diversity of ways. For example our social interactions and ties we hold with others have become further reaching as technology has

developed. Exploring such interactions can reveal critical knowledge behind why such behaviours or practices take place. Here the focus is to relate this ‘interconnectedness’ to the wastage of food, first by exploring how social media has been used as a tool for behaviour change and secondly to look into current usages in relation to food and food waste. This will bring together the different fields showing how these areas can contribute towards preventing food waste in HEIs (see figure 2.10).

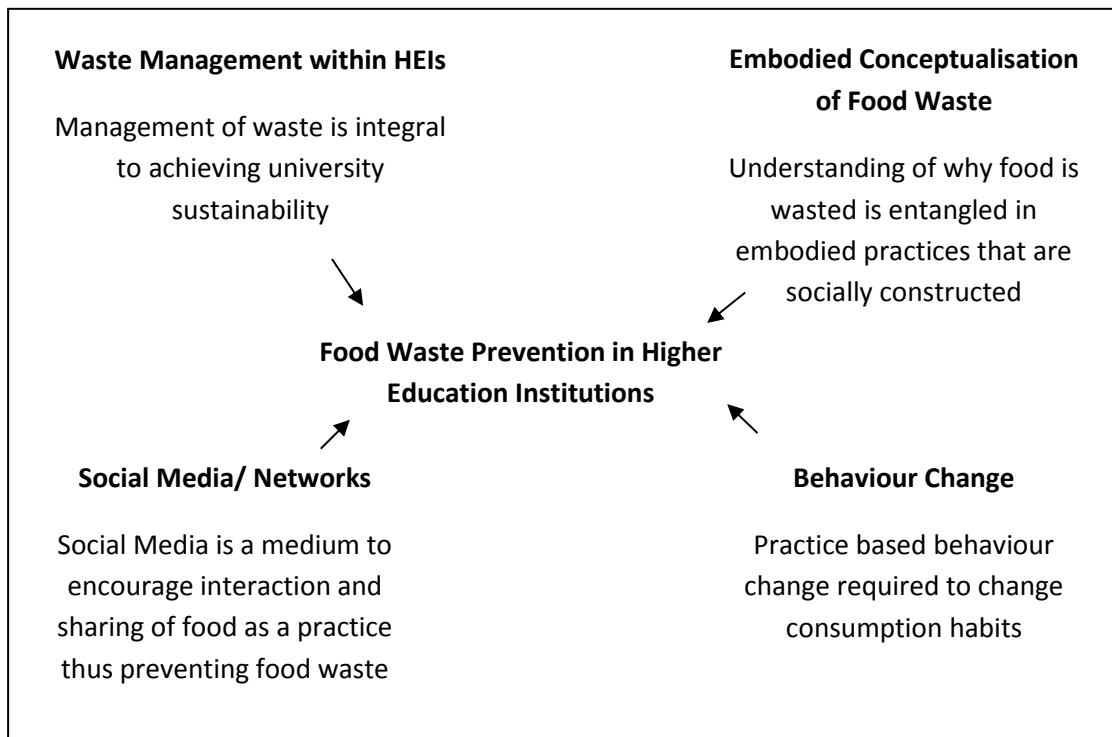


Figure 2.10 Conceptual diagram to show how different areas of the literature review contribute toward food waste prevention in HEIs

2.3.1 Social Network Theory

Theories which attempt to understand and give meaning to the networked nature within which society is organised span a broad range of disciplines from technical, quantitative based mathematics and computer sciences to social science approaches. Due to the scope of this research, the following will give a brief overview in defining

Social Network Theory and furthermore evaluate literature which is relevant to the purpose of this study.

Social Network Theory allows the analysis of both social actors and social relationships. Critically it holds relevance to understanding practice based consumption as instead of analysing individual behaviour it focuses on “social entities or actors in interaction with one another and on how these interactions constitute a framework or structure” (Galaskiewicz and Wasserman 1994:xii). Four key assumptions underpin the ‘social network perspective’, shown in figure 2.11, which is embedded within an institutional context, bridging micro and macro level aspects. The purpose of using such an analytical method is to understand the complex sets of relationships which exist within ‘social order’, ultimately providing a graphical representation of actors and relationships.

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*Figure 2.11 Four key assumptions which underpin the Social Network Perspective
(Galaskiewicz and Wasserman 1994:xiii)*

Their assumptions underpin a multitude of different approaches which exist under the term ‘Social Network theory’ which covers academic fields across scientific disciplines, each with their own techniques and perspective (Carpenter *et al.*, 2012). A number of these involve complex mathematical calculation which would not be a relevant path to follow in this review considering the embedded, qualitative nature of this research. Literature on networks can also vary in their level of study from individual actors to a group of organisations which are explored as single nodes, ties between nodes or whole networks (Carpenter *et al.* 2012: 1330). These variables depend upon the unique circumstances of each research subject and objectives. Carpenter *et al.* (2012)

narrow down social network research within organisations into four categories which are shown in table 2.3.

In relation to this study, cell 3 is the most relevant because such an approach links directly to the fourth point in figure 2.11 in assessing the evolution of member's behaviours and attitudes in relation to food waste. Network development research looks into how individuals have been affected by analysing effects across the whole network. This could be in two forms either, the network structure, a visible representation of how actors are linked together, or the 'connectedness' of each actors consequences as a result of their individual behaviour (Easley and Kleinberg 2010:4). Underlying these two structures is the network setting which can be described as the 'social context' of the 'cause-effect relationship, meaning the micro to macro level consequences of disseminating information (Easley and Kleinberg 2010:5). This can then be monitored and traced to understand a change in behaviour across a network, how it is spreading and the barriers and opportunities for further impact.

Table 2.3 Classification of Network Research in Organisation Research (Carpenter et al. 2012:1331)

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2.3.2 Social Media as a tool for behaviour change

A 'network' can have a number of different meanings and forms depending upon its context. Currently, the most common types of networks aid communication and interaction by using information technology as a platform, for example an email system forms the basis for employee communication within an organisation. The recent surge in popularity of social media, for example Facebook and Twitter having 1 billion and 500 million users respectively, constitutes of an increasing amount of many people's everyday interactions. Such social media platforms offer a tool for behaviour change through their ability to have a wide reaching influence (Foster and Lawson, 2013).

Froehlich *et al.* (2010:1999) describe such technology that influences behaviour as 'eco-feedback' which increases awareness of the impact of people's everyday behaviours. The most prominent feature is the ability to present information (or feedback) which not only shows the benefits of pro-environmental behaviour but is in an engaging and effective format, relevant to those receiving it. Social media offers the ability of viewing this information in 'real -time' within a space that allows social comparison and accountability but yet is "one of the most unexplored aspects of motivating behaviour change" (Froehlich 2010:2000).

Foster and Lawson (2013) give three examples of behaviour change initiatives using social media, within which three different types of intervention are noted. The first is descriptive which makes the user aware of their own actions such as showing how much energy they use at home. The second is injunctive in explaining whether this is good or bad and the third uses feedback to supplement this, for example a negative consequence of a message being posted to others about their energy usage. In accepting that social norms are a central aspect of online social networks, Foster and Lawson (2013:2) show that in introducing a social context of actions through social media acts as an incentive for change through competition and increased awareness. Table 2.4 gives more details of how these three examples of behaviour change operated.

*Table 2.4 Social media initiatives encouraging environmentally positive behaviour
(Foster and Lawson, 2013; Foster and Lineham, 2013).*

Name	Platform	Purpose
Wattsup	Facebook	Provided users with a live energy feed and a comparison with other users in order to increase awareness and bring about reduction. Resulted in 7 out of 8 households reducing their energy usage
Power Ballad	Facebook	Provided users with a live energy feed and comparison with other users but also set a specific level of energy which when reached posted a popular UK music song onto the users facebook page in order to embarrass them and make others aware of their high energy usage. Findings showed that negative stimuli did not lead to disengagement but it is unclear whether this led to a decrease in energy usage.
StepMatron	Facebook	Provided users with information on the number of steps taken each day. Nurses were used as the study group of which 9 out of 10 increased in activity facilitated by competition and social engagement via the application.

In relation to food, academics in the field of HCI (Human Computer Interface) have understood the importance of focusing on daily food practices in order to design and implement technology aimed towards sustainable consumption. Similar to an ‘embodied conceptualisation’ Comber *et al.* (2012:2768) note a complexity of situational factors and choices underpin food related behaviours. HCI technology, is noted as having the potential to further understand and support sustainable food practices, two key papers are drawn upon as examples.

The first is Ganglbauer *et al.*'s (2013) research which uses a ‘FridgeCam’ in order to uncover the domestic practices surrounding food waste in 14 households. The paper is

of particular relevance as it focuses on food waste through the temporal and spatial variants within of everyday practices, drawing upon similar behaviour change literature as this study (Ganglbauer *et al.* 2013:112). The FridgeCam experiment was designed to uncover these practices by capturing an image every time each participant opened their fridge. These images were then available via a webpage to view and used by participants as an aid to deciding what to buy when shopping. The study was critical in identifying that practices which resulted in food waste occurred before the act of putting food into the bin citing example such as buying larger packs to save money, buying food that was not needed or not being organised in meal planning. Here technology facilitated careful food shopping which ultimately towards the prevention of food wastage (Ganglbauer *et al.* 2013:1120).

The second example is a study which links social media and food wastage study is Comber and Thieme's (2012) research which challenges the routine behaviour of wastage using Facebook. The study created a means of uploading images of participants' bin contents on the social media site Facebook through a 'Bin league'. This led to an increased awareness of routine habits of wastage, as well as feelings of guilt through the realisation that participant attitudes were not reflected in their behaviours. The study showed how behaviour change can take place through social media by 'sharing' waste performances across established networks of friends on the internet.

Other than the examples above, literature encouraging a change in food waste behaviour using social media is very limited however there are a number of food waste based activities which use social media in a number of ways. Such initiatives take a variety of forms which can be seen in Table 2.5.

Table 2.5 Use of Social Networking by Organisations relating to Food Waste Activities

Name	Platforms	Popularity	Purpose	Use of Social Media
Food Cycle http://www.foodcycle.org.uk/	Facebook	4,916 likes	Volunteer run charity which diverts manufacturing surplus food to feed those in poverty in the UK. 16 projects across the UK.	Facebook and Twitter used to highlight the scale of food waste and food poverty as well as recruit volunteers for activities such as raising money.
	Twitter	7,371 followers		
	Vimeo	5 followers		
	Flickr	20 members		
	Youtube	9 subscribers		
	Google Plus Website Groupspace	28 members		
Food Recovery Network http://www.foodrecoverynetwork.org/	Twitter	959 followers	Student run organisation across America which diverts surplus food from dining halls to those in food poverty. Food donors cleared of liability through the Bill Emerson Good Samaritan act, also allowing companies to write off donations as tax deductible gifts.	Facebook, Twitter and Google Plus used to promote the topic of food waste and give news of what is happening across campuses. Also to recruit new members.
	Facebook	8,150 likes		
	Google Plus	47 members		
	Youtube	4 subscribers		
Feeding the 5000 http://www.feeding5k.org/	Twitter	4,789 followers	Organises the act of 'Gleaning', harvesting surplus farmer's fruit and vegetables in the UK to feed those in poverty.	Use of Twitter to promote its own campaign, the issue of food waste and recruiting.
	Website			
Food Waste Network http://www.foodwastenetwork.org.uk/	Twitter	715 followers	Aids UK organisations in finding local food waste recycling services	Use of Twitter to promote the issue of food waste.
	Website			
Plan Z Heroes http://www.planzheroes.org	Twitter	625 followers	Connects business in London, UK which produce surplus food with charities to feed those in poverty	Information on food waste and food banking topics on the twitter website as well as recruiting members.
	Youtube	3 subscribers		
	Website			
Fareshare http://www.fareshare.org.uk	Twitter	4,925 followers	Distributes surplus food from the manufacturing industry to poverty charities as well as providing education on food safety and nutrition.	Twitter solely for promoting its own campaign, website used to recruit donation organisations.
	Website			
Footprint http://www.foodservicefootprint.com	Twitter	1,146 followers	Information on sustainable practice for business in the food service supply chain industry in the UK.	Use of Twitter to communicate with organisations. A paid membership forum exists on its own website
	Website			
Community Composting Network http://www.communitycompost.org/	Twitter	314 followers	Supports individuals and community groups in implementing composting schemes in their communities in the UK.	Advertising events across the country to get more people involved.
	Website			

Table 2.4 shows that despite the lack of research, these organisations are using social media to engage with consumers about the topic of food waste on several levels from

individuals and students, to business and the charitable sector. In relation to behaviour change, several of these examples provide information in order to combat food waste and also aim to recruit a volunteer base, such as food cycle, to then establish food waste reduction or diversion practices. Furthermore the nature of the food donated through these networks, raises two points. The first is the lack of a network which aims to share food unwanted by individuals which is eatable, only surplus manufactured food is shared. The second is the extent to which the embodied practice of wasting food is affected through social media interactions, which both empirically and methodologically remains unexplored.

Overall there is a lack of research noting not just how initiatives use social media to change food waste behaviour but also how organisations and individuals interact with food through social media. Questions remain over whether such embedded interactions exist through social media and the extent to which this can provide a 'social context', influencing people's behaviour of wasting food.

In conclusion, this section has sought to show how technology and social media are influential in changing behaviours towards more sustainable consumption. Social Network Theory is useful in analysing such networks to uncover the formation and structure of networks from a personal to an organisational level. Instances where social media have been utilised show that in creating a virtual space where people can interact leads to an increased awareness of the impact of their actions in relation with others as well as competition, which acts as an incentive towards change. Finally academics in the field of HCI have drawn upon both 'embodiment' of food and a 'practice approach' in order to examine our everyday consumption practices and how they relate to food waste. Currently however academics and organisations have not gone far enough to investigate food waste prevention in relation to sharing unwanted food within a HEI setting.

2.4 Conclusion: 'Embodiment' and 'Practice' a pathway to further critical knowledge.

In conclusion the literature review has detailed current literature and debates across academic disciplines showing how further academic knowledge is possible by exploring two conceptualisations of food waste. By directing the review towards behaviour change literature, a more critical perspective was adopted in relation to our embodiment of food and the practice of food waste as a cultural performance. The mechanism behind understanding why we waste food through behaviour change initiatives was better understood through the theory of practice rather than 'methodological' individualism due to the 'value- action' gap. There is a lack of research in relation to the social context and interaction with wasting food, furthermore in influencing 'carriers' of practice in changing organisational standards in HEI's to implement change. Social media has potential to be used as a tool to analyse the complex interactions and practices within organisations, proven to have an effect over the 'invisible' routine practice of wasting food, by increasing our awareness of such acts.

The second section based upon perceiving food waste as a 'practical problem' showed research on sustainability in higher education can be seen as idealistic through the 'whole-of-university' model and with an absence of literature on the failures of environmental initiatives. The real situation is a complex web of organisational inefficiency which acts as a barrier to implementing Waste Management Strategies. The characterisation of waste itself is not universal across studies with a lack of accountability for HEI's to reduce and manage waste. Despite this a number of initiatives have been successful such as composting and anaerobic digestion and tracking waste in universities canteens however too much effort is focused on disposal rather than preventing the initial acts of wasting food.

Overall in seeing waste as a 'practical problem' research is limited in firstly failing to understand why waste is arising but more importantly failing to uncover the 'invisible' nature of waste practices which are entangled in organisational and policy discourse. In taking a more 'embodied and embedded' approach, these limitations are addressed

by creating a space to critically analyse such acts which lead to waste and address them at the prevention rather than the reduction level in the waste pyramid, ultimately leading towards not only less food waste, but less environmental impact. The term 'embodied conceptualisation' is taken to incorporate both the embodied

Chapter 3: Methodology

3.1 Introduction

This chapter details the methods chosen to undertake this research project and explains why they were suitable in order to meet the outlined aims and objectives. Firstly this chapter defines the methodological framework by explaining the epistemological approach taken, next the considerations to be aware of when researching in the field of food waste, behaviour change and social networks followed by a description of each method and why they were appropriate. Finally the chapter explains how the data was analysed, ethical implications and the positionality of the researcher.

3.2 Epistemological Approach

The following discusses the chosen epistemological approach and why it is appropriate. This research project is based upon a post structuralist approach in keeping with the embodied conceptual framework set out in the previous chapter. Post modernism and post structuralism are underpinned by an understanding that knowledge cannot be held accountable to a metanarrative or grand theory but instead is pluralistic. In accepting that there are multiple 'truths', knowledge becomes 'situated' and can be deconstructed by analysing text and language to interpret meanings (Bennington, 1993). Such knowledge formation is informed by social factors, such as culture, to allow "different ways of 'reading' social relationships" which has been significantly influential in the disciplines of human geography (Graham 2005:28).

The 'cultural turn' was a critical turning point in the formation of knowledge when culture was recognised as an accountable and influential factor in the constructions of people and place (Barnett 1998:381). This can be related to this piece of research through people's interaction with food waste within a HEI environment. The notion of 'culture' is central to producing and understanding 'warranted geographical knowledge' specifically through representations, beliefs and embodiments as

reasoning for human agency (Gibson. *et al.* 2004). Harvey's notion of 'Geographical Imagination' explains that "transactions between individuals and between organisations are affected by the space that separates them" (Harvey 1973:24). Further to this it is important to note a multitude of 'imaginings' are present meaning that a number of factors make up this epistemological approach representing one possible discourse in understanding the research subject (Gregory, 1994).

Within this field of geography, the 'cultural turn' created an interest for the multiple discourses of culture and nature in relation to how they are imagined and experienced. (Graham 2005: 28-29). Such a multitude of 'imaginings' is underlined by a pluralistic or post-modern approach to knowledge which recognizes the existence of multiple truths, experiences or constructions in the world and refutes that there is an overall grand theory, aiming to be specific rather than representative in research. This research understands that there are different experiences of food waste, which can be known by using qualitative methods to collect accounts from participants and by acknowledging their implications in relation to the study (Jackson 2011:64).

In drawing upon methodological approaches from the geographies of food, previous ideas such as political economy have failed to give a conclusive explanation for the complex nature of the food system as a whole. New methodological approaches instigated due to the cultural turn investigated into the behaviours, beliefs and values related to issues such as food waste within a heterogeneous agri-food landscape. Specifically a postmodern epistemology highlights the credibility of qualitative research, particularly data showing value and meaning to give reason to complex issues such food waste and its origins within such a complex food system. Specifically this methodological approach is key in gathering information regarding behaviour change and attitudes regarding food waste.

Further to this, the exploration of the role of language, meaning and representation within the production of knowledge is critical in attributing meaning from behaviours and attitudes. The deconstruction of these allows the exploration of "the constitution of 'reality' and knowledge of reality" itself (Barnett 1998:380). Language is recognised

as holding cultural prejudice and imposing an illusory order, producing knowledge which is “built on categorisation and opposition” (Graham 2005:29). A multi-site ethnographic piece of research of this type is underpinned by post-structuralist theory. Cook and Crang (1995:660) notes that within the discipline of the geographies of food, using the methods of ethnography and participant observation enable researchers to consider the perspective of the participants involved in research.

This ontology and epistemology was also chosen as little would be gained from using a positivist approach of proving or disproving a hypothesis, under a naturalist or anti-realism agenda, considering the desired outcome of the human experience. One point in relation to post-structuralism is that in seeking not to privilege any ‘voice’ above others, the extent to which a conclusion can be drawn which moves towards a common idea or goal can be questioned. Furthermore the ‘cultural turn’ has been criticised for “over-emphasis on symbolic systems and... an under-emphasis on the material” within the field of human geography (Jackson 2011:65). Within the context of this research project, the actions involved in the practice of food waste were an important part in refocusing Freidberg’s (2003:4) quote of food ‘sold with a story’ to ‘food wasted with a story’ within the western world where the highly developed food industry dominates. Jackson (2011:68) has shown that such a story method informed by the cultural turn can uncover the ‘complex materialities’ of food as well as social and relational practices.

The final point to note is the role of space within ‘new cultural geography’ noting a shift in the acceptance of spatial relativism where spatial fields of influence are defined by activities and objects meaning space is now explored as a fluid rather than fixed concept (Harvey 1969:208). Space is socially constructed and is invested with meanings that in turn then shape the spaces themselves and the identities of those who inhabit them (Valentine 2001:5). This is critical to this research’s epistemological approach as the research context of an institution must be conceptualised not as a fixed structure but as a set of practices which through a process of ‘organising’ is represented through its “dispersed networks of resources, knowledge and power” (Valentine 2001:142). It is

constructed socially through the 'talking' of organisations into existence creating unwritten omnipresent rules that influence practice and understanding (Philo and Parr 2000:519). This had a great influence in how the researcher understood practices and behaviours within the context of Coventry University as an institution.

3.3 Methodological Considerations when researching food waste, behaviour change and social network theory

This section will evaluate the methodological issues from current literature in implementing methodologies to research food waste in HEIs, environmental behaviour change initiatives and using social media as a tool in such initiatives.

3.3.1 Researching Food Waste in HEIs

As made clear in the previous chapter, much of the current literature bases its research on auditing methods to record the amount of food wasted within a naturalist paradigm of research, with little influence from social sciences. Academics have used various means of enquiry to measure food waste. Langley *et al.* (2010) divide food waste audit methodologies into two main categories of implementation, the first being a third party collection, sorting and measurement and the second being the same activities undertaken by the consumers. Within each of these categories exist a multitude of different methods of carrying out an audit, however in general third party approaches are deemed as more valuable due to the external validation of data, whereas consumer approaches are more commonly based upon estimations. There is a lack of literature which amalgamates auditing of food waste in higher education and public sector environments. However MEL (2009) does give an overview of different types of public sector institutions noting the complex nature of universities having multiple catering environments placed across campuses and cities with a variation of meal numbers throughout the year.

Table 3.1 of the audit methods found from the literature review shows a variety of methods from holistic waste characterisation studies which audit all waste to more specific organic residue or edible food waste audits. The table shows a lack of a consistent auditing methodology also spanning differing periods from only two days of data gathering in Babich and Smith (2010) to longer periods which give a study greater reliability due to the nature of University catering. In terms of weighing food, multiple methods can also be seen in undertaking this process at different stages. For example from weighing at consumer level in the Whitehair (2011) study to measuring processed pulp by Babich and Smith (2010).

Table 3.1 Overview of the different methods of auditing explored by academics

Study	Main Objective	Audit method implemented	Results	Estimation of proportion of food waste?
Mason <i>et al.</i> (2003)	Outline of environmental management structures at New Zealand University	A 'Zero Waste programme' including an organic residue study.	Successful due to amalgamation of university staff, students and practitioners	Yes – Food, green residuals and animal waste quantified
Armijo de Vega <i>et al.</i> (2008)	Determine the quantity, quality and recycling potential of the waste generated at the University of Baja California.	Waste characterisation study which investigated the weight of solid waste	Gives an extensive overview of all of the waste produced.	Organic waste quantification
Mbuligwe (2002)	Municipal solid waste management using a case study of academic institutions in Tanzania.	Audit which segregated waste to give a description of the waste arising from the universities	Most waste in the form of food and waste paper showing that it is not well managed in the developing world.	Recorded food waste within organic wastage
Smyth <i>et al.</i> (2010)	Investigated the composition of waste at Prince George University, Canada and where further reductions are possible.	Uses a waste characterisation method, sampling and analysis to give a holistic view of wastage at the campus.	A number of recommendations were made showing areas where further waste reduction is possible.	Organic waste quantification
Whitehair (2011)	To review edible food waste behaviour in a University dining facility	Food waste was weighted from students trays	Along with questionnaires, patterns of student waste related to the weather, menu, holidays and social events as well as food waste beliefs.	Only recorded food waste

Babich and Smith (2010)	Analysis of food system a university setting.	Food waste analysis over two days for measuring pulp waste generated from food, no characterisation.	Evaluation of waste per student amounts by dining halls and recommendations in relation to food mileage and food wastage established.	Food waste estimation
Sarjahani <i>et al.</i> (2009)	Analysis of food and compostable waste in a university dining setting in USA.	Food waste classified as edible or an edible compostable.	Use of trays results in more waste.	Food waste recorded
Zhang <i>et al.</i> (2011)	Review why sustainable waste management is an issue for the higher education sector and the issues involved.	Auditing of all waste at the university of Southampton, explained the steps they have taken, recycling, composting etc.	Accurate idea of waste production and a means to why this occurs – mentions behaviour change incentives.	Separate food waste auditing

In relation to the categorisation of waste, there is a lack of a framework to establish consistent characterisation of waste. Figure 3.1 shows one example from Armijo de Vega *et al.* (2008) using a waste characterisation method. This is one example of a characterisation of waste from the many examples highlighted in table 3.1. They can differ greatly in terms of their structure, for example the number of categories used, and also in their length, Smyth *et al.* (2010) uses an expanded version to even include ferrous metals and textiles.

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Figure 3.1 Waste characterisation data collection sheet (Armijo de Vega et al. 2008:523)

In relation to this research methodology, they show it is important to give a clear outline of how waste will be categorised. This research methodology clearly does not need such an expansive categorisation of all waste as the audit is only concerned with food waste. However specific identifiable types of food wastage were established to distinguish between the different food thrown away as there is a lack of literature about food waste characterisation. Further methodological issues also exist in relation

Degradation

- Lack of information on the age of the food analysed and its state of degradation, no agreed methodological protocol to record this

Packaging

- Whether food packaging is separated from the food waste, recording in weighted estimation, and also confusion over decomposable packaging

Sorting

- Some studies use a sorting process to ease the categorisation process by 'sieving out' smaller material waste leading to underestimation.

Interaction

- The subject of food waste has negative connotations and can be something which participants find it hard to engage with or do not see as important

*Figure 3.2 Methodological issues in food waste research literature
(Langley et al. 2010:225)(Leborsorger and Schneider, 2011)*

The issues in figure 3.2 show that despite an analysis of several food waste studies, inconsistencies can still be found showing that no waste audit methodology is perfect. A range of different audits exists to suit the type of food waste, avoidable or unavoidable, as well differing in their scope and purpose. Therefore this shows this researcher's audit must record waste of the relevant type and also at the relevant stage in order to meet the aims and objectives.

3.3.2 Behaviour Change Methodological Considerations in Higher Education

Within HEIs data on behaviours and attitudes is gathered through questionnaires and surveys, for example Whitehair (2011:71) uses a questionnaire to find out student's attitudes towards food waste and sustainability more broadly in calculating a

relationship between beliefs and food waste behaviour. Zhang *et al.* (2011:1614) also highlight the importance of using such methodologies but conclude “there is a lack of research on behaviour change interventions targeting transient groups such as university students”. Robertson and Walkington’s (2009) study of waste minimisation student behaviour uses an online survey method to show behaviour is influenced by ‘situational variations’. The online survey was effectively a questionnaire but also had the advantage of reduced material costs and greater accessibility.

In relation to practitioner’s attitudes, Kwon *et al.* (2010) also conducted a similar study of University food service administrators which used a focus group to research the practice and management of food waste. Hansen *et al.* (2008) also used focus groups to find out student and staff attitudes towards recycling as well as individual interviews and both paper based and online surveys. In relation to changing behaviours, Whitehair *et al.* (2012) implemented a visual behaviour change strategy using posters and a survey to monitor students’ attitudes as well as their food waste habits. Despite the quantitative nature of the findings, critical data regarding why students wasted food was possible using questionnaire and survey methods. In seeing food waste as a practical problem in this setting, methods are not based around a single method but used a range to gather both qualitative and quantitative data. Such methods lack the ability to separate behaviours and attitudes in their research and furthermore attribute such behaviour to wider aspects within this setting.

In comparison, although little research exists under an embodied framework, Evan’s (2012) study of food waste practices in households is particularly relevant in using a mixture of ethnography, food waste diaries and in the field interviews. Using such method provided a more critical analysis of practices explored and understood within their context and in relation to the spaces and places they were undertaken within. The study describes this as “a methodological approach that locates talk within on-going and situated action” (Evans 2012:43). This analyses food from “its social life to social death” through diaries and cupboard inventories to find out the extent to which the process of wasting food was an embodied practice related to provisioning and ‘the

home' (Evans 2012:46). Such a method is extremely valuable when applied to a HEI context in order to break down the discourse of seeing food waste as a practical problem and instead reveal the 'embodied and embeddedness' within food waste practices.

3.3.3 Social Network Methodological Considerations

In researching beyond the field of human geography due to the multi-disciplinary nature of this research, the field social network analysis takes a more deductive approach, typically using hypothesis to 'test' a predicted statement that an actor or idea will have an impact upon a network (Prell 2012:61). In relation to this research agenda, the theoretical framework of diffusions of innovations is most appropriate in order to investigate the impact of a network. This framework examines the process in which a new technology becomes adopted by a given community (Prell 2012:54), through interpersonal communication which influences the adoption and change in behaviour (Valentine and Davis, 1999). Examples of where such analysis has been used in relation to the field of geography is limited however Murdoch (1998) explains how network analysis gave rise to new spaces of exploration in geography using the example of the application of actor-network theory.

The usage of network theory can be seen as a means navigating ... dualisms present in geographical work to move towards more relative explanations (Murdoch 1998:359). Such research of spatial relations uses networks to explore 'topologies', defined as "the ways that spaces emerge as socio-material relations [which] are arranged into orders and hierarchies" (Murdoch 1998:359).

3.4 Details of chosen methodological strategy and in the field limitations

This section will give an overview of each method, why it was appropriate in meeting the aims and objectives of the project, how the data was analysed and finally the

ethical implications and positionality of the researcher. The methodologies chosen were informed by the previous section evaluating how other academics have investigated similar topics as well as designing methods which will specifically contribute towards the aims and objectives of this research project. This section will be structured according to each method implemented.

A mixed methodology approach was taken consisting of the following:

- Semi-structured Interviews
- Focus groups
- Questionnaires
- Food waste audit
- Participant observation
- Secondary data collection
- Social Network Application (Coventry University Food Network)

Table 3.2 Table to show which methods met which objectives.

Objective	Method
1: To conduct a review of existing research and practice related to food waste prevention in universities with a particular focus on the use of social media in relation to food waste prevention	<ul style="list-style-type: none"> • Literature review and thematic analysis
2: To carry out an audit of food waste at Coventry University to record food waste and connect unused food with recipients locally.	<ul style="list-style-type: none"> • Food Waste Audit • Questionnaires • Semi-structured interviews • Participant observation
3: To develop a Facebook 'app'lication to record food waste and connect unused food with recipients locally.	<ul style="list-style-type: none"> • Social network application • Secondary data collection • Food waste audit • Questionnaires • Leafleting
4: To evaluate the broader utility of the application in promoting attitude and behaviour change relating to food waste, and assess the implications of the research for the UK university sector.	<ul style="list-style-type: none"> • Focus groups • Semi-structured interviews • Secondary data collection • Analysis of data
5: To contribute to the development of the university's sustainable food policy and communicate the results of the research through a short documentary film.	<ul style="list-style-type: none"> • Analysis of data

The primary data collection was exercised under the supervision of Coventry University's ethics and procedures regulations from January to May 2013. Information was collected within the following areas of the university campus (See figure 4.1 in analysis chapter for a map of Coventry University's campus):

- The Hub
- Riley Lounge in the Richard Crossman building
- Deli Marché café next to the library (Fredrick Lanchester building)
- Supermarket retail outlet
- Technology catering area
- Buffet service provided across campus

3.4.1 Gatekeepers and Number of participants

Table 3.3 shows the number of participants involved in the research. Students and staff were particularly difficult to recruit for the focus group for two reasons. Firstly the lack of interest in the subject, and secondly the lack free time staff have, as even sending an email to the whole of the Business Environment and Society faculty's staff, only one staff member attended (a further email was also sent to students in order to make up numbers however only one student attended). It is difficult to estimate the number of people involved in other methods, for example when carrying participant observation, the number of customers in catering environments was not noted, only patterns of behaviour. Furthermore this was also the case with the food waste audit, leafleting and the collection of secondary data.

There were three types of gatekeepers which were useful in accessing each of the three university groups. In accessing students, participants for focus groups were recruited at a 'Green Event' on campus through raising awareness about the issue of food waste as well as distributing questionnaires and inviting students in person during lectures with the permission of two lecturers known to the researcher. As already noted a faculty wide email was used as a gatekeeper to access academic staff. Finally

operations staff (any staff who are involved in the infrastructure of the university, not attached to an academic, research or learning support department), specifically those providing catering services were accessed first through the University’s estate department then through the catering operations managers and through lower level supervisory roles such as head chefs and the head of hospitality catering.

Table 3.3 Number of participants involved in the research

Methodology	Students	Academic Staff	Operations Staff	Total No. of Participants
Focus group 1	4			12
Focus Group 2	1	1		
Focus Group 3			6	
Semi-structured Interviews			5	5
Questionnaires	90	10	4	104

3.4.2 Semi-Structured interviews

Semi-structured interviews were used as a method of investigating the behaviours and attitudes towards food waste which contributes towards objective 4 and also to gain insight into the nature of catering operations on campus. Interviews were carried out with catering staff to understand how the issue of food waste was addressed. This method also contributed towards objective 2, information regarding the number of sites catered for, how the catering operation was structured and at what times of the day and at which locations catering was carried out. Understanding the operation of Chartwells catering establishment also addresses objective 3 to develop the application as it was important to design a new system which could work well with current catering and waste practices. All semi-structured interviews were recorded using a digital audio recording device and were later transcribed.

The method of semi-structured interviews allows participants to express their views relating to food waste as well as their role within the structure of the catering outfit. Critically the semi-structured interview style gives a conversational element to “allow interviewees to construct their own accounts and experiences” (Valentine 2005:11). A schedule was deemed inappropriate to be undertaken identically with each

interviewee, instead allowing questions to be raised outside preparatory notes. The discursive nature of interviews supports the post-structural epistemological approach giving an individualistic context to each interview (McDowell 2010:160).

Participants were identified through a Chartwells company representative disclosing the information of which catering staff were employed within each environment. Two schedules were implemented, the first with managers of the procurement and catering and the second with catering staff. The first interview schedule (Appendix 1) established the background and issues surrounding food waste within the university enquiring into ideas about the amount of food thrown away and the nature of the catering operations (meeting objective 2). Following this questions were asked about attitudes towards food waste and the behaviours of those who are catered for (meeting objective 4). The second interview schedule (Appendix 2) differs only slightly in removing more general questions regarding the nature of the operation Chartwells run across campus. The schedule still enquired into the amount of food waste and attitudes towards meeting objective 2 and 4.

3.4.3 Focus Groups

Focus Groups were organised with staff and students in order to understand attitudes towards food waste meeting objective 4. Conradson (2005:129) notes that focus groups allow the research to gain further understanding of an issue or topic through the personal experience of a selected group of individuals. Undertaking a focus group can be justified as a valuable methodology as it allows more in depth discursive practices than interviews or questionnaires regarding attitudes and behaviour change. In depth qualitative information is produced through a range of positions held on such an issue or topic as well as the way in which interaction takes place between participants. This can again be related to a post-structuralist understanding of knowledge from a multitude of social spheres, focus groups creating an environment to 'negotiate meanings' through conversation (Cook and Crang, 1995). Specifically focus groups are suited to research enquiring into issues of behaviour and attitudes in

giving the opportunity to develop opinions and arguments but also further information from how these arguments are constructed. Furthermore conversation is less confrontational with the interaction dynamic promoting more open discussion (Conradson 2005:132). However this method also has its limitations, for example it does not allow equal contribution, with some participant's views more prominent than others creating a power hierarchy.

Three focus groups were undertaken consisting of a student, an academic and student and a catering operation participant grouping. These were undertaken either in pre-booked rooms in the university where a lunch was provide in the case of students, whereas the catering chefs focus group took place in their canteen during a break, minus the focus group presentation as the resources were not present. A presentation was prepared (see Appendix 3) which used a variety of different exercises. The purpose of this was to stimulate conversation regarding food waste. This was achieved by first showing a series of photographs of the food industry discarding food still eatable, for example supermarket wastage bins. This was supplemented by information on a global, national and university level on the amount of food wasted. After this an exercise was carried out to establish the extent of participant's knowledge regarding food waste from different sources. This involved working out how much of the EU's 90 million annual food wastage originated from manufacturing, households and retail and service sector sources as well as providing an explanation for why these sectors create food waste. Conversation was guided by the content of the presentation and also a schedule of questions to allow transition between topics to cover as many aspects of food waste as possible (Appendix 4).

3.4.4 Questionnaires

The next method to be discussed is questionnaires, which met objectives 2 and 4 in this research (see figure 3.6). This method collected both qualitative and quantitative information in order to understand how important food waste was in relation to other

environmental concerns as well as actions taken to reduce food waste and the motivations behind this.

Questionnaires placed participants within one of the three groups which make up the university community: Students, academic or operations (staff from estate management, catering and other professional services). Further questions noted details such as the faculty belonged to, course studied and year of study, moving on to food waste actions and behaviours. The design process first established what variables were needed. A series of pilot questionnaires tested different variable responses such as tick boxes, scales and feedback boxes to establish the most efficient means of acquiring the data need.

There were two types of variable used. Uncontrolled variables gave participants the ability to answer questions themselves by writing in a text box however had the disadvantage of being discouraging to fill in due to the fact that it takes longer to do this than tick a pre-selected option (Parfitt 2005:102). Controlled variables were used for example in asking the frequency of visiting different catering outlets using a scale of 5 answers from every day to never. The advantage of using uncontrolled variables was that a greater depth of information was generated, for example when asking what would motivate people to reduce food waste, if pre-selecting answers the research must already have some idea of these motivations and to give options. The questionnaire in total featured 19 questions across 4 pages (Appendix 5).

The advantages of using such a method in this environment was the ability to gather information from multiple participants at one time, rather than talking to each one in turn, and also greater integrity of data through removing direct pressure to answer questions which can manipulate or force answers. Such 'attitude forcing' can be a weakness which frames questions using predetermined knowledge (Parfitt 2005:79), therefore participants were left to complete the questionnaire in their own time.

The limitation of this method is the inability to record data regarding behaviour and dialogue. Another limitation was access to participants as with the exception of students, academic staff were based in their own departments and operations staff

were either very busy or worked in areas with limited access such as kitchens. To solve this issue an online version of the questionnaire (Appendix 6) was created with identical questions which were then distributed using emailing and social media.

3.4.5 Food Waste Audit

Originally a food waste audit was planned in order to establish the amount of waste generated at the selected catering outlets, thus directly contributing towards objective 2, to carry an audit of food waste, and also objective 3 (see Figure 3.2). This method aimed to contribute towards developing the social network application as it was critical to establish the amount of possible food wastage available to be redistributed via the 'app'. Whilst planning this stage of data collection, due to the time and cost restrictions of this Masters by Research dissertation, it became evident that it was not feasible to carry out a holistic analysis of all catering operations due to its size. Even in planning to audit just one outlet, a number of barriers were encountered which meant that no audit of food waste was undertaken.

The first of these was having access to equipment needed to measure such a large amount of food wasted. In order to record plate scrapings, food would have to be put into a container, most likely a wheelie bin, and then weighed. No scales were available to record such a large volume. The second reason was that as plate scrapings were dealt with by catering staff whose job was to keep canteen areas clean, implementing such an audit would have needed help from them to firstly change their daily practices to allow for recording and furthermore add to their duties. Due to the nature of the catering being run by a separate company at Coventry University these barriers were not overcome, particularly due to the disconnected communication the university has with the company which is explored in the next chapter. Despite this, results of an audit of food waste at the hub building undertaken by WRAP between February and March 2012 was available to the researcher which is referred to later.

3.4.6 Participant observation

Participant observation was used as a method in order to meet objectives 2 and 4. In the case of food waste, observation was undertaken by commenting upon the behaviours of those who consumed food in various environments across the university. This method was carried out at all five of the catering environments, excluding the supermarket retail outlet. Notes were self-reflexive regarding how knowledge was created through the researchers 'gaze'. This method was used as it was beneficial in Evans (2012) study to observe the daily patterns of behaviour of wasting food that forms consumption habits. The disadvantage of using this method is that without any guiding notes present in other methods, for example interview schedules, it was difficult to know what the most relevant information was to record.

3.4.7 Secondary Information

This method of data collection was relevant to objectives 3 and 4 of the research. By undertaking interviews with catering managers and staff often pieces of secondary information relevant to the research project were collected. Not only was this information useful for furthering the understanding of the structure and operation of the catering outfit, such information written by participants revealed information through the analysis of how they constructed and wrote about food waste. Specifically information collected related to the amount of waste generated from the catering operations log books, food safety information, an externally conducted audit and environmental and sustainable food policy.

This disadvantage of using such data is that as the researcher did not collect it themselves, therefore integrity of the data cannot be guaranteed. Despite this such data was useful, particularly the audit information, due to the inability to collect similar data, lacking the time and resources.

3.4.8 Social Media Application

The final method that was implemented as both a means of data collection and as a tool to change behaviour was the creation of a Social Media Application in order to meet objective 3. This section will detail the design stage of the application, further details on how it functioned are given in the analysis.

3.4.8.1 Designing the application

The purpose of the application was to act as a platform to increase communication between the three university groups allowing the sharing of food that would otherwise have been wasted. This idea was born from the issue that the catering operations produce sandwiches ordered for a meeting and if not eaten then it can only be wasted as health and safety guidelines prevent the company giving them away. However when the sandwiches are still in the possession of those who ordered them, it is their responsibility to do with them as they like. This idea of sharing food could also be used for food other than buffet catering, for example for food served in the canteen or food people have brought into the university. Figure 3.3 shows a diagram of how the application was envisaged to work.

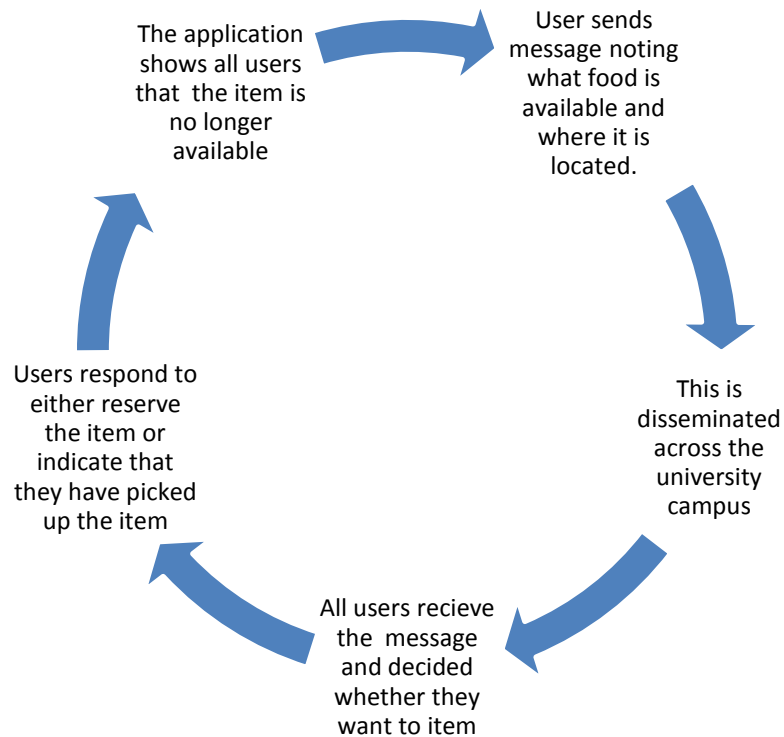


Figure 3.3 Diagram to show the different stages of the Food Waste Sharing application

There was a range of possible platforms to choose from in order to create such an application. During the design stage the feasibility of possible platforms was considered with table 3.4 showing the features, advantages and disadvantages of the final three options.

The final decision, despite stating that Facebook would be used when setting out to undertake this study, was to use Twitter. This was due to the disadvantages of using Facebook, the cost and time of developing an application requiring specialist knowledge, but predominantly the advantages that that a similar system to share food could be created with development on Twitter. Originally the shortened wording of 'app' (short for application) was used to denote the creation of a contained sharing function within a smart phone, however due to the reasons identified above, the sharing facility instead was based around the functions of the social media website twitter. The university already had an established communication network using the Twitter platform having a centralised University account (see figure 4.12), and several research groups and departments also running accounts which could be interacted with in order promote sharing food.

Table 3.4 Features, Advantages and disadvantages of using Google groups, Facebook and Twitter as a platform to facilitate the sharing of food in HEI's

	Features	Advantages	Disadvantages
Google Groups	An Email system which allows messages to be sent out to specific groups	Communication by email is common practice with every student and staff having an email address	The large amount of emails received may mean messages are lost or ignored. Furthermore when replying to emails stating there is food to share, everyone must be emailed in order to know that the food has been taken, therefore adding to the problem
Facebook	The ability to create a profile and share messages, photos and videos with friends as well as a built in chat functionality	Commonly used by younger people to communicate daily with the ability to create an in built application accessible by anyone using Facebook.	Over personal nature of the platform which is used to document private lives which contrasts with interacting with people that may not be known.
Twitter	The ability to create a profile and communicate with others through sending 140 character messages known as 'tweets'. Hash tagging and mentions add further functionality in communicating with others.	Used in a more professional manner than Facebook with the ability to 'retweet' information to be passed on to others.	Not as popular as Facebook or used as much as emailing as a mean to communicate. Limitation of send only a 140 character message.

3.4.9 Data Analysis

The data collected was analysed using different means from quantitative statistical analysis to the thematic grouping of attitudes and behaviours. The first stage was to collate all information into a readable form. This involved creating transcripts for interviews and focus groups, entering the responses from the questionnaire into the statistical software SPSS and typing up ethnographic notes into a readable form. Two types of analysis took place in order to examine and present findings. Firstly with

interview and focus groups, transcripts were analysed thematically, sorting information on the catering operations from quotes that showed food waste behaviours and attitudes. This information was deconstructed using categorisation and coding to then interpret patterns and relationships to construct meanings. The second analysis stage was using the SPSS data to produce frequency tables and graphs to represent information. In relation to the open questions, frequency grouping were undertaken by hand to place answers into typical responses which was then re-entered into the database to use the cross tab function, correlating this data with closed questions. This allowed qualitative data to be correlated on a graph, for example motivations and actions are plotted against each other in figures 4.7 and 4.8.

This information was then structured to provide a background on the catering operations on campus and the current practices that deal with food waste as well as a summary of each food service outlet and the behaviours and attitudes of students, academic and operations staff. The analysis then drew on the embodied conceptual framework established in the literature review as well as virtual interactions in the form of tweets from the Twitter application to critically evaluate the barriers preventing food waste behaviour change in this setting and also its relevance to the UK university sector. Secondary information supplemented more macro level conclusions.

3.4.10 Ethical implications, positionality, risks and mitigation.

Implementing a range of methodological tools had a number of ethical implications. Firstly all participants were made aware before collecting information from them of their involvement in this research project and how their data was going to be used. This was implemented by using a participant information sheet (Appendix 9) and an informed consent sheet (Appendix 10).

At all times whilst undertaking the research an active effort was made to anonymise those involved. However whilst undertaking a project of this type, the voluntary nature of how the social network application worked meant that the researcher could not

guarantee this was the case when food was shared between participants. A disclaimer had to be drawn up and disseminated to all users upon accepting their participation to remind them of the rules involved. Critically this created an ethical dilemma in the fact that the researcher must place a certain amount of trust upon each user within the network in order for its operation to run efficiently.

There was also the risk that not enough food waste would be generated by the university, therefore reducing the amount of food that could be redistributed. No such food waste audit specifically regarding avoidable consumer waste on campus had been carried out previously therefore the availability of food is unknown. This could be mitigated by using a more holistic auditing process to identify not just consumer food waste but also waste arising during kitchen preparation or serving. However as already stated there were organisational barriers against undertaking such tasks (see section 3.4.5).

The second possible risk has misuse of the system. The application places a great amount of responsibility with users in order to accurately disseminate information regarding food items. There was a risk that the system could have been used to either disseminate surplus food that does not exist or even for other purposes. In order to mitigate this, the application was moderated by the researcher, receiving the disseminated messages and also banning or blocking those who misused the system.

Further ethical implications were the moral and ethical impact of my research, for example how my own positionality affected the interpretation and analysis of data. No researcher can be deemed neutral as their own identity consisting of factors such as gender, age, race, class, sex and education can act upon his/hers position (Skelton, 2001). Another factor which affected my research was the awareness that some of my findings did not put the University in a good light in relation to my own understanding of the impacts of food waste. This to a certain extent was a predicament as on the one hand I was required to conduct critical research under University guidelines. On the other hand this research showed a lack of accountability regarding food waste.

3.5 Conclusion of Methods

In conclusion, this chapter has shown that there is a lack of methodological research and guidance relating to an embodied conception of food waste and the usage of social media as a tool for behaviour change. In giving a practical examination of methodological considerations, it shows on two levels how the described methods were relevant when exploring these disciplines but also how innovative new methods like the twitter application can critically further previous knowledge. This mixed method approach uniquely draws upon different forms of qualitative and quantitative data in order to produce an informed, integral, relevant and in-depth primary and secondary data.

4) Analysing Food Waste practice and behaviour at Coventry University

4.1 Introduction

The chapter discusses the structure and location of catering and then how the university manages food waste as well as behaviours by group. This is followed by an examination of the findings from the Social Media Application and concludes by discussing the extent to which an 'embodied' framework is useful in furthering the research area and the implications for the wider UK university sector.

The analysis will be organised under four headings; 1) Coventry University's Food Waste Management; 2) Dealing with Food Waste on Campus; 3) Food Waste Behaviours and attitudes on and off campus; 3) Findings from the Social Media Application; 4) An embodied conceptual framework: Implications for the research area and wider UK university sector.

4.2 Coventry University's Food Waste Management

4.2.1 Catering Operations at Coventry University

The University is responsible for providing a catering service on campus and in September 2010 a three year contract to privatise this service was awarded to Chartwells, a global food service company, part of the Compass group. The catering contract gave Chartwells responsibility for all the catering outlets on campus, excluding the Technology Centre. Here a company named Redcliffe Catering, previously owned by Chartwells, offer a food service for not just the university but also other Businesses located on the Technology Park. Figure 4.1 shows the location of each of the catering outlets on campus and details of their clientele.

The privatisation of catering on campus coincided with the construction of two new buildings; first The Hub at the centre of the campus which features a new canteen area

and secondly a new engineering building. Both of these now house new Cafés run under franchise names of popular coffee providers, Starbucks and Costa Coffee as well as a supermarket retail outlet in The Hub. These were new additions to the campus with Chartwell's required to give between 6 to 10% a month in revenue in order to use their branding. Over all the outlets, profit margins are monitored and checked in accordance with a 59.7% gross profit, and often there are difficulties in meeting such a target due to the nature of University catering. During an interview with the head chef of one of these new buildings their accountability of such margins became apparent as the following quote shows:

"I will probably be asked about last week, you've only sold x amount of stuff you know and it's not my fault that the students have gone home, so how come the staff's costs are so high, Well I still need the staff in as I've got to keep the place clean"

This quote shows the variable nature of student numbers. In the main catering area, The Hub, producing a plate of food for £2.75 was noted as a difficult task due to the amount of competition from other places providing food in the city centre, some of which sell baguettes for just £1. This also shows the pressure the catering staff are under, with chefs noting that they are "getting a bit worried [as] they are doing what they can do", unable to generate more profit through hard work due to the limitations in student numbers outside term time.

Costa Coffee - Chartwells
The Hub Building
Serves students and staff
Two Costa stands in The Hub

The Hub – Chartwells
The Hub Building
Hot food served from
Served students and staff
Offers Breakfast, lunch and dinner
Also a Grab and Go section selling sandwiches and snacks

Supermarket retail outlet - Chartwells
The Hub Building
Serves Students and staff
Main production area for food to be transferred to other catering outlets as well as food for buffets.

Riley lounge – Chartwells
Richard Crossman
Breakfast served until 11.30, lunch 12 to 2
Serves student and staff, caters special buffet for staff
Note there is also a smaller outlet also in this building run in co-operation with the Riley Lounge providing hot snacks only

Technology Centre – Redcliffe Catering
The Technology Centre
Serves staff in the Coventry University Enterprise building as well as food for companies located on the park such as Tata, Jaguar, BT, Seven Trent and the Chamber of Commerce

Costa Coffee (Under construction to be completed in December)
The Jaguar Building
Serves students and staff

Deli Marché – Chartwells
Fredrick Lancaster library
Serves students and staff
Offers Breakfast and lunch

Starbucks - Chartwells
Engineering and Computing Building
Serves Students and staff

This item has been removed due to third party copyright. The unabridged version of the thesis can be viewed at the Lanchester Library, Coventry University.

Figure 4.1 Map to show the locations of catering outlets on Coventry University's Campus (Adapted from Google Maps, 2013)

In relation to staff costs, since taking over, Chartwells has reduced the number of staff creating shared duties across food service areas, working in multiple environments. A typical shift would range from working at 7am until 3pm in the afternoon, with staff beginning shifts during that time to work through until the dinner service. The nature of having to plan ahead to the next service meant staff had little free time and were only able to be interviewed with permission to have a longer break which was evident in the focus group undertaken with this group.

As figure 4.1 shows, Redcliffe catering differs in providing catering to staff rather than students, producing more up market meals. This catering outlet is open to the public as it provides food for the surrounding businesses on the Technology Centre business park. The Hub on the other hand can only be accessed by students and staff with a valid ID card which was noted as a reason which limited the potential customer base. Despite this the Hub is the centre for producing meals which are then transferred to the other outlets and also produces buffet food to order, delivered to specific rooms across campus for meetings.

This outlet also has an agreement with the University to provide catering for the nearby student accommodation, Priory Hall, serving breakfast and dinner every week day. Between these meal times there are snack areas open, such as 'Grab and Go' in The Hub, which provides chilled sandwiches and simple hot snacks such as Paninis or sausage rolls to be heated up from 2.30 to 4.45pm.

Each of the catering outlets use a combination of service numbers and common sense in order to work out the amount of food needed to prepare each day. For example in the Technology Centre the head chef notes that although "it's guess work every single day" in knowing how many people to cater for, his experience of being there nine years meant he had more of an idea of how many people to cook for. At The Hub however, they rely on information from student services to understand the term dates and also their own data on the number of meals served daily. To a certain extent however there is a breakdown in communication between these two groups with one chef noting:

“This year we haven’t been given any dietary requirements, we know of one lad who doesn’t have egg, a vegetarian with no egg but we haven’t been informed of that by student services that was word of mouth by the lad”

This quote shows that although the catering operations are privatised, to a certain extent the University is still involved in providing information to aid this service. The chefs also state that they are inclined to meet the demands of the students who eat in the Hub Canteen regularly as this is prepaid by the university, having to prepare packed lunches and dinners. The nature of having to be customer focused was noted as a factor that contributed to a “wastage of money” directly impacting the tight profit margins catering staff must work under.

As noted by Philo and Parr (2000) the way in which catering staff discussed Coventry University brought the institution into existence through their speech, especially the unwritten rules and practices such as meeting the demands of students who need alternative lunches and dinners and estimating the amount of food to cook. The dynamics in the relationship between the University and the catering companies was also apparent in the way they shared spaces. An example of this was experienced when attempting to promote the food sharing application by putting up posters in The Hub building. The manager of the supermarket retail outlet stated when asked who owns the space:

“It’s not actually Chartwells, this buildings a paperless building, so you can’t really put anything up which isn’t sort of..... Any paper basically we are not allowed to put up”

Here the quote shows that because they do not ‘own’ the building, Chartwells, which run the supermarket retail outlet, has to abide by the ‘paperless’ status overseen by the building owners, Coventry University. It is also possible to comment on the virtual spaces between this institution and company. The following shows a tweet posted by the Coventry University main twitter account advertising a food service outside the Hub.



Figure 4.2 Tweet sent by Coventry University showing promoting of catering operations (Covcampus, 2013a)

Catering is an important part of the student experience, tweeted with the hashtag ‘CovOpenDay’ to communicate with prospective students visiting on this day. Although holding a twitter account themselves, Chartwells do not use it to communicate in the same means within each of their catering outlets. This shows that the university is responsible in disseminating information on the catering services available, shown through the sections of their website dedicated to this and also further twitter conversations between prospective students and the @covcampus twitter account.

4.2.2 Dealing with Food Waste on campus

This section will now move to discuss the practice of disposing food waste on campus, beginning with how it is dealt with within policy. This section then moves on to how the University and its contracted catering partners deal with waste, what an embodied conception can uncover and how food waste is dealt with on campus. Figure 4.2 shows these policies for 2013.

Table 4.1 Environmental and Sustainable Food Policy for Coventry University 2013

Environmental Policy	Sustainable Food Policy
<ul style="list-style-type: none"> – Reducing our carbon footprint and minimise our impact on the environment from emissions on campus. – Managing our consumption of resources. – Implementing sustainable procurement practices and managing our consumption of resources. – Optimising sustainable waste management opportunities. – Promoting the use of sustainable transport options – Developing the campus in a sustainable way including building design, us, space efficiency and the biodiversity of the external campus. – Support education for sustainable development by appropriate integration in the curriculum, research and multidisciplinary activities. – Communicating and encouraging participation among staff, students and other stakeholders. 	<ul style="list-style-type: none"> – Source local and seasonal products wherever possible to sustain the local economy and reduce environmental impacts. – Ensure catering suppliers support the University’s goals in reducing carbon. – Handle and dispose of waste in an environmentally sound way. – Ensure products meet welfare and ethical standards as appropriate. – Communicate the provision of sustainable food. – Reduce counter waste by 2% in relation to a 2001 base line. (65.5 litres of food waste per week was recorded in October 2011 being disposed of using a Trim Trax machine).

The above table 4.1 shows that reducing food waste falls under two of the environmental policies and that there is a built in cross over between sustainability developed through collective action and ensuring that the catering company support the University’s goal of reducing carbon emissions. In relation to food waste however it is questionable whether this falls under an activity to reduce emissions. The Statistics from the Higher Education Statistics Agency do not include food wastage as a contribution towards carbon emissions and do not even collect data on the amount of food waste each institution creates (HESA, 2012). This shows that this is a topic with little external pressure, over seen by internal policy which is absent in this case study with Coventry University’s only Food waste target within its Sustainable Food Policy being to reduce counter waste by 2% from a 2011 baseline. Table 4.2 shows the environmental policies of the both catering companies.

Table 4.2 Environmental policies of Chartwells and Redcliffe Catering (Chartwells, 2013;Redcliffe, 2013)

Chartwell's Environmental Policy	Redcliffe Catering Environmental Policy
<ul style="list-style-type: none"> - Reduce the water and energy used in our principal office and production units - Reduce the CO₂ emissions of our vehicle fleets - Reduce the waste packaging of our supply chain - Track, measure and reduce the volume of office waste (i.e. card, paper, plastic and metal) - Reduce food miles by increasing the use of seasonally available products sourced from the relevant domestic markets - Increase the volume of recycled used cooking oil - Increase the volume of biodegradable and compostable disposables - Increase the number of sites with ISO 14001 accreditation. - Initiative to implement Trim Trax machines to reduce food waste 	<ul style="list-style-type: none"> - Offers its clients local purchasing for the majority of its fresh ingredients, fair-trade products & sustainable stock produce. - Provide full traceability of products and suppliers to ensure that sustainability, ethical and safety standards are a prerequisite requirement. - Work in partnership with our suppliers to reduce the impact of our business on the environment. - Redcliffe have achieved a CO₂ saving of 6.78 tonnes within our supply chain by recycling waste cooking oil via the 3663 recycling scheme between 1st Jan - 31st Dec, 2010.

Table 4.2 highlights one issue with the structure of dealing with waste within Coventry University. Although catering companies are running the catering operations and creating waste, the University not the companies is responsible for its disposal and currently pays between £8 to £9 per 1100 wheelie litre bin, working out at 0.73p per litre, for all waste, with only cardboard separated. The only mention of food waste in figure 4.4, are initiatives to recycle cooking oil and the usage of a Trim Trax, (see later in this chapter). There is no target or obligation for the catering companies to reduce waste within their contracts with the University. Furthermore although the Estates department is responsible for monitoring how companies provide services on behalf of the University, the Vice Chancellor's office has the final say in which contract is chosen. Whilst undertaking the research a consultation was underway to implement a Food Waste collection service however this was significantly more expensive costing £9 per 240 litre wheelie bin or 3.75p per litre and was yet to be finalised.

An outcome of food waste being discussed in this manner is a ‘practitioners’ perspective, created through a discourse which was underlined by such policy and targets. This understanding acted as a barrier to the prevention of waste as practices that were ingrained into daily routines at the micro level remained hidden. An example of this can be seen from the researcher’s ethnographic diary transcript during a meeting with the University’s Environmental representative from the Estates Department, responsible for overseeing the implementation of such targets:

“I talked about what I had found whilst undertaking my literature review. One specific study found evidence of the difficulties of implementing behaviour change initiatives in workplaces. The environmental representative noted a similar example of trying to remove desk bins from offices at Coventry University. Resistance was generated from staff who used the bins as well as from cleaners. In the end a ‘temporary’ label was used to tell staff their bins are ‘temporarily’ being removed as part of a trial. In fact, the decision had already been made”

Here resistance can be seen from trying to change the ‘everyday’ practice of being able to dispose of rubbish through an office bin. On a micro level this practice is hidden as employees fail to realise the impacts of their waste due its regular collection by cleaning staff, whom themselves were resistant to change as it involved a change of their duties. The decision had already been made at an organisation level which impacted the practices of both operations and academic staff. Although creating targets to reduce the environmental impact of the university, in failing to establish a means to link such targets and the everyday routine nature of practices, issues such as waste suddenly revert from being invisible to a subject of resistance.

When conducting research with the various catering outlets on campus a number of practices were either observed or acknowledged which were implemented by the catering companies in order to reduce or manage food waste; these are shown in figure 4.3 ordering them from the most to the least desirable options. The most common means of tackling food waste which was spoken about at all the outlets

visited was at the prevention stage. Here chefs use a mixture of estimates and data on student numbers to prevent over producing food, as well as cooking portions in stages. With waste during service, the chef re-used vegetables to make into soups as well as cooking portions incrementally rather than producing all the food at the beginning of the service.

Food waste which arises from the kitchen is 'flushed' through a trim trax machine, a device which grinds waste into pulp and then flushes it into the nearby waste course, located at each of the catering outlets. The least desirable action of throwing food straight into the bin was the end result for plate scrapings across campus and any perishable items, such as sandwiches, which had either gone out of date or been left outside a chilled environment for more than 4 hours. According to the WRAP audit undertaken in The Hub building in 2012, 89.99% of food waste was avoidable, with 47.07% of this arising from plate scrapings. There were no guidelines on reducing food waste set out by the catering companies with the overreaching need to stick to a tight budget acting as a deterrent in wasting food in order to maintain the gross profit margin.

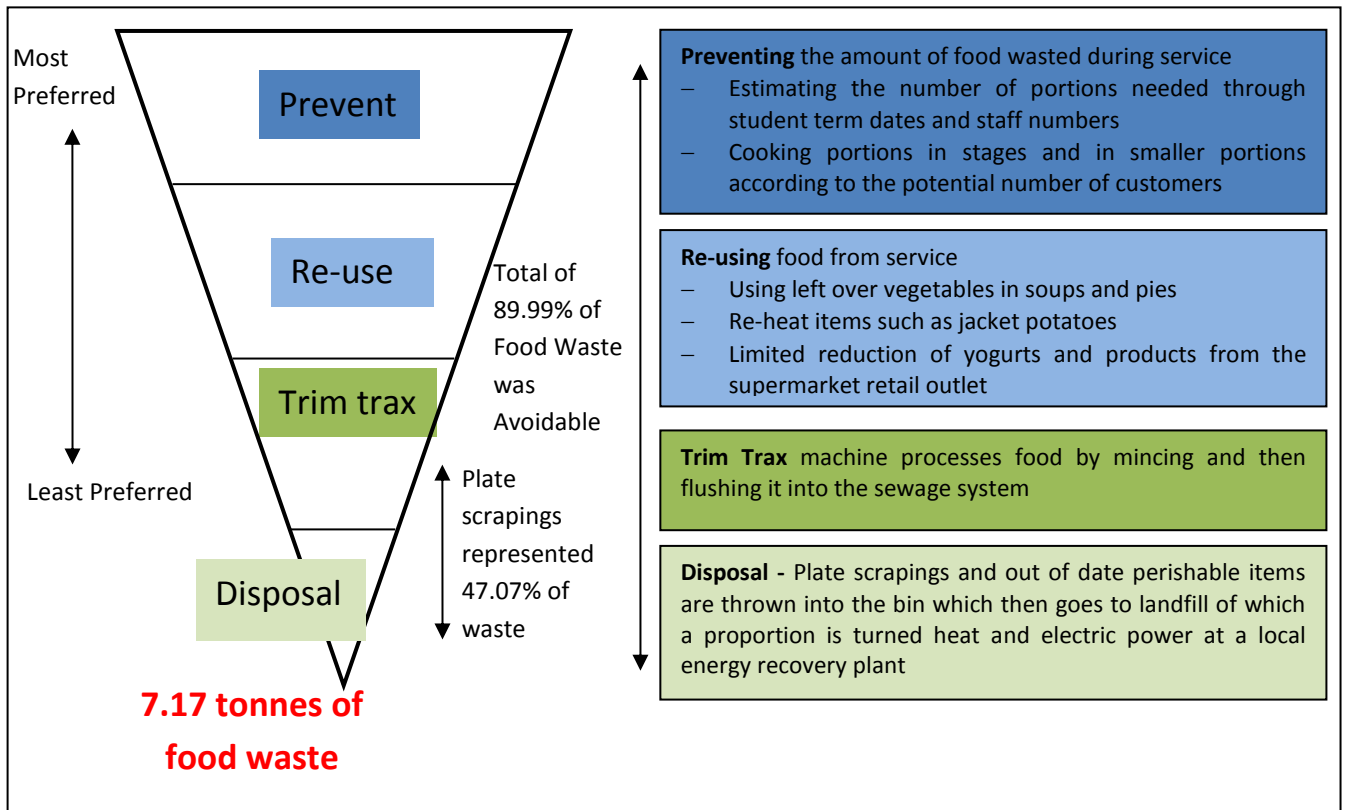


Figure 4.3 Diagram to show the preferred actions to reduce food waste implemented on Coventry University's campus (Own Research and information adapted from WRAP, 2013)

Figure 4.4 displays ethnographic notes from undertaking participant observation showing the arrangement of the Starbucks café in the engineering building. At the time of research, there was no clearing of tables with all three staff working behind the counter. Being within a university building, behaviour was noted showing customers clearing tables themselves as the normal with no obvious place for rubbish.

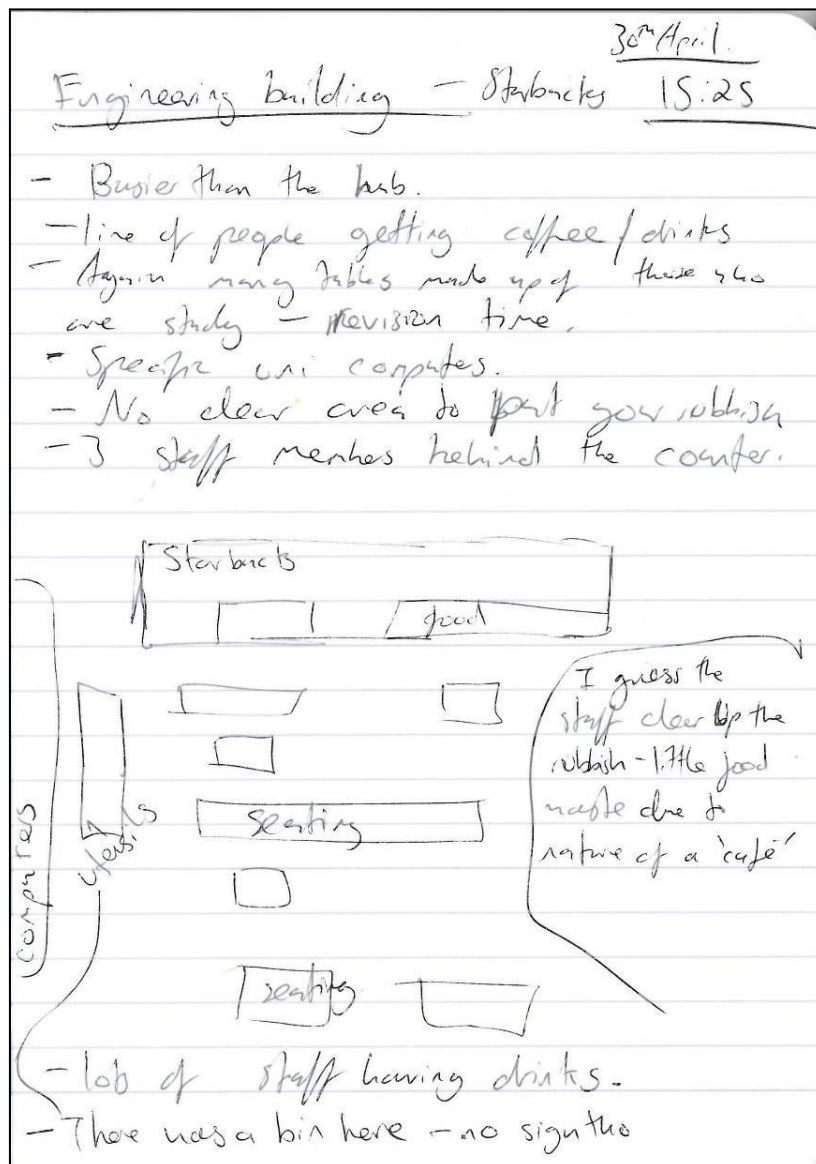


Figure 4.4 Ethnographic notes from participant observation of observing the café in the engineering building.

Staff highlighted a number of reasons why the amount of avoidable waste was so high, two of which will be explored here. The first is the creation of wastage toward the end of service as the staff at catering outlets were not allowed to reduce perishable items which cannot be saved or sold after their best before dates. The following conversation in an interview sums up the concern staff have about limiting reductions.

Chef 1: We were just saying that you can't give stuff away can you

Chef 2: You can't even cut price it,

Say the last half hour before I close, why can't we cut the price of the pie down you know start selling them for a pound, or maybe £1.30, or have two sausage rolls, or you know what I mean.

Chef 1: Sometimes they might do yogurts down

Chef 2: Yogurts is about it

Chef 1: Buts it's always been their policy,

They don't mark anything down but we used to when we worked for the University.

And then they came in, Compass came in and said oh no we don't do that, you just put it as wastage.

The above conversation shows the change in wastage practices since Chartwells took over and the frustration by staff of not being able to reduce items in order to make a sale. The one area where reductions were allowed was in the supermarket retail outlet but even here waste was created as staff noted that items reduced in the evening remained unsold as people were unaware of them.

The second reason was the health and safety concerns, which prevented food being given away which is near or past its best before date. The need to prevent food coming into contact with physical contaminants was indicated in each of the catering outlets visited. There was a heightened concern with food used in buffets as possible "breathing, sneezing and coughing" meant it had to be thrown away even if it was not eaten. An example of this was given at the technology centre where if only half as many people turned up for a conference, the buffet nature of the food served is already prepared so it must be served and cannot be re-used due to possible physical contamination whilst the catering company are still paid in full. The catering staff noted accountability if anyone was to fall ill from such food if it was given away or reduced. Chartwells prides itself on industry leading health and safety standards

recognising its legal and moral duty to abide by legislation such as the Food Standards Act 1999 to protect public health (Compass Group UK, 2013). This then explains Chartwells decision to limit the reduction and sharing of food instead diverting it to be wastage, especially since there is no cost incurred.

One interesting comment from a staff member was the story of a past employee who used to give food that would have been otherwise wasted to a homeless shelter. This was stopped and the employee “told off” again with health and safety the reason stated. Notions of ‘health and safety’ as a reason for concern can be underpinned by legislation such as the Health and Safety at Work Act (1974) which had a universal influence on workplace welfare. This following quote shows this health and safety concern:

Researcher: What do you do with the sandwiches then?

Chef 1: Just throw them away

Researcher: And you can't give them to students or anything?

Chef1: No they prefer to throw them away

I think one girl got told off a couple of years ago as she went to the homeless and give it to somebody

Sometimes we take them over to, you know The Hub, and the students have them on the night time shift

Researcher: Is it to do with health and safety?

Chef1: They don't have chartwell's names on [the sandwiches] but I think that's the reason

You can't give them away because of health and safety, if anyone got food poisoning or anything like that, it would be down to us.

Here again the unwritten rules of an institution are reproduced through the consumption and wastage of food. This practice is embodied with an unequal power relationship between the employees of Chartwells and the company themselves,

seeming to uphold unaccountable rules of always throwing away perishable food. On a macro scale the issue of poverty provides a context for the act of resistance in going against such rules to help those in need. Furthermore, the way in which this group interacts with food has become subjective to the regulations and policy by which they are bound economically as an employee which heightened their concern of how others may experience food, for example in case it may be 'off'. Nevertheless, in asking catering who decides that they cannot give away such food, staff were unable to quote a guideline or name another higher staff member, even referring back the rumour of the employee who donated food to charity.

The final topic to discuss in examining how food waste is dealt with is the auditing methods used to record waste. As already seen from figure 4.3, there is no diversion of waste apart from kitchen and preparation waste to the Trim Trax machine which is "recorded by volume, categorised and assigned a value" in relation to the stock used (WRAP,2012). Apart from this the only record of food wastage related to any possible lost income. Each of the catering outlets had a 7 day book within which portions left over from service were recorded to calculate the cost of this food and a comparison with stock levels. Figure 4.5 shows two such examples of record sheets from the Grab and Go section selling sandwiches in The Hub and the Riley lounge.

not down to the miniscule". The examples above are by no means representative of how sheets are filled in across campus or are examples of a typical wastage but do raise questions on the accountability of such methods and the extent to which such data could be used to calculate losses over a longer period.

Other information recorded in the 7 day log book related to food safety such as a daily check of fridge temperatures and that of food which is being delivered as well as information on any food transferred from The Hub to other catering outlets on campus. A total of how many litres of waste had been processed by the Trim trax machine was also meant to be recorded however as figure 4.5 shows this was not always recorded accurately. As already stated plate scrapings are not recorded and when discussing the subject with one chef he mentioned the lack of time and the large volume of waste which arises from this source as a barrier in undertaking such an audit.

4.2 Food Waste behaviours and attitudes on and off campus

After discussing how food is dealt with on campus, next this section moves to understand the attitudes and behaviours of the university community, beginning with general attitudes towards food waste and then the specific behaviours of students, academic and operations staff. This section will draw from questionnaire analysis where 104 participants consisting of mostly students as well as operations and academic staff answered questions on their behaviour and attitudes on not just food waste but also importance in relation to wider environmental and societal problems.

4.2.1 Behaviours and attitudes in relation to social and environmental issues

In relation to other social and environmental issues food waste was not seen as greatly important ranked sixth out of eight possible issues to choose from which can be seen in figure 4.6.

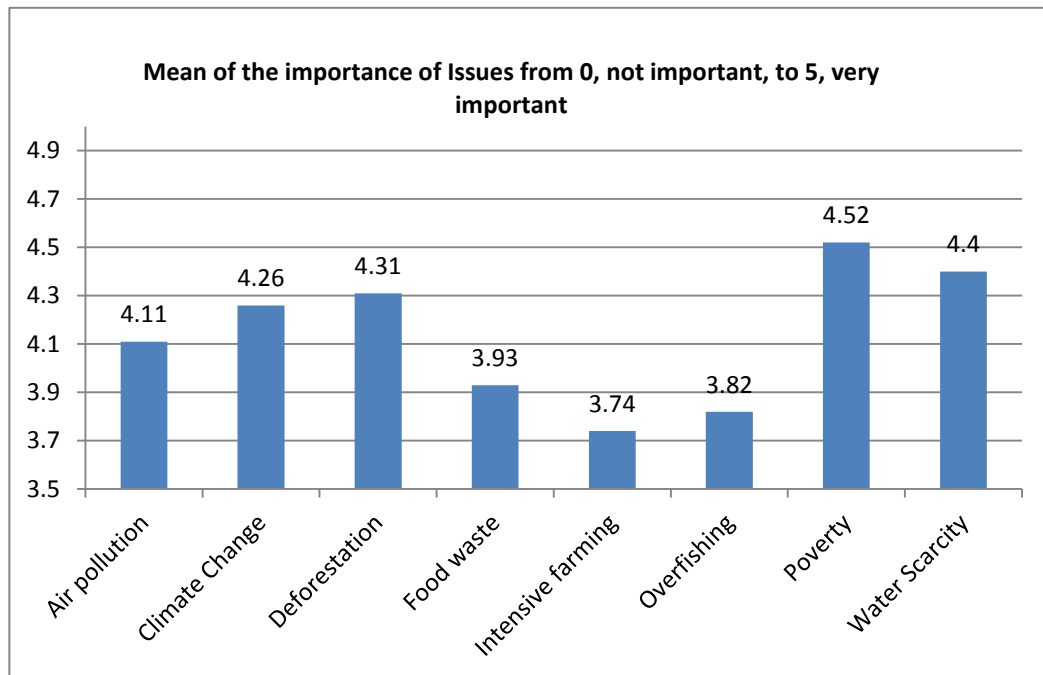


Figure 4.6 Graph to show the environmental issues participants felt were most important

Of these concerns, figure 4.7 displays the actions taken by participants in order to combat these issues, with recycling the most common action taken (26%) and food related activities coming second representing 21% of responses. Within these categories, “recycling and reusing” was the most common responses however in relation to food related activities responses were of a greater variety from controlling portion sizes to buying food from organic sources and even growing their own food. Figure 4.7 also relates such actions to the motivations shown by the colours in the bar chart. The greatest motivation for action was the need to provide for future generations or to “create a more sustainable future” as one participant noted. Participants were equally likely to be motivated by these macro level factors than

more micro level factors, noting people close to them such as children and personal commitments as personal factors.

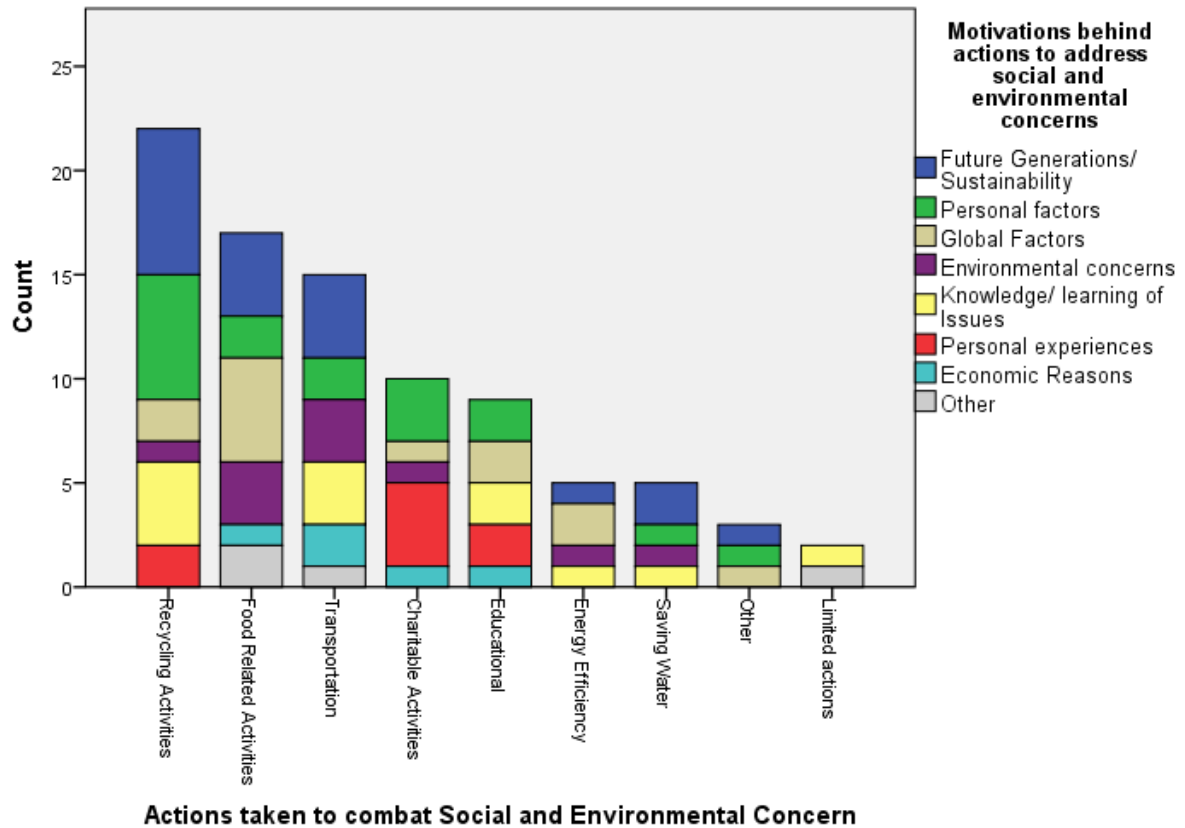


Figure 4.7 Graph to show the individual actions taken to address social and environmental concerns against the motivations behind these actions

Critically, the graph shows that actions taken which relate to food are more likely to be underlined by attitudes and motivations of global factors and environmental concern than personal factors. Furthermore all of these actions, with the exception of charitable activities, are part of everyday routines. When asked the extent to which such actions had an impact on the overall problem comparatively 41% of participants believed that their contribution was overshadowed by others and 40% believed that it was important to make small changes as collectively they made a difference. Therefore current attitudes towards environmentally positive actions are underlined

not only by the micro and macro or personal and interpersonal factors that motivate people but also the extent to which such actions can impact the overall issue. Table 4.3 shows a contrast in these two views unearthed in this study.

Table 4.3 A contrast in the extent to which participants felt that their actions contributed towards overall social and environmental issues.

My contribution is only small and over shadowed by other impacts – 41%	Small collective changes can make a difference – 40%
For everything I do, there will somebody wasting lots more and not really care	I feel everyone who does a little is helping in a small way to some extent
Not enough people feel the same as me. Tesco [do] not promote [the issue] enough	If everyone did a little, it would make a lot. So I feel I make an impact even by doing the little things
An individual can't make much of a difference	Every little helps
My personal carbon footprint during my lifetime is probably produced by one factory in china in less than an hour	Despite the pollution of America or China. I feel that I am one less person heavily contributing to pollution
I'm only one person, hardly going to make an issue	As an individual not much of an impact but collectively gains can be seen in regards to farming methods and also the awareness of combating poverty
Too many people who don't do anything	Small actions by individuals can, when aggregated by communities or nations, make substantial improvements
UK contributes 1% to world CO ₂ ? We are 5/60million in UK	Even small actions have a small impact, it is important to realise this, otherwise you may think that it isn't worth doing.

Both of the views from table 4.3 show how the personal and the political are inherent in attitudes. Global references are drawn upon to depict countries such as America and China as polluting as well as emphasising the individual's role is small but powerful when united. This shows that the attitudes behind implementing positive actions are a reflective construct on how we live our own lives and our understanding of the lives of others across different spaces and places.

4.2.2 Behaviour and attitudes in relation to food waste

After building a background on how attitudes are established and their relationship to social and environmental actions, this section now moves to discuss food waste behaviour and attitudes specifically. The first point of call is to contrast data collected on actions, motivations and the extent which these impact the overall issue of food waste with the previously discussed information on other social and environmental issues. From the questionnaire data, when asked what actions do you undertake to reduce food waste, responses were all in relation to routine consumption practices with 32% of participants actively eating and cooking the right sized portions and 22% saving food and eating it at a later date. Figure 4.8 attributes these actions predominantly to be motivated by cost and less by global issues in comparison with wider environmental actions. Although 14% of participants stated that they were not motivated by a need to address the issue of food waste, actions such as eating the right sized portions were still undertaken. This was due to participants noting that they were “already motivated enough” or that “food waste is inevitable”.

A higher proportion felt that the extent to which their actions to address food waste were over shadowed by others than the analysis of wider social and environmental issues representing more than half of participants. The majority of answers ran along a common theme of emphasising that they are only “one person” and that a joint effort is required in order to make any impact. A greater number of people commented to state that they were either unable to do enough or were limited in some way by their own actions. Two responses that showed this stated “I don’t go dumpster diving, which might help reduce food waste” as well as “recycle lots of packaging, food goes in general rubbish, could be used for compost”. Here a barrier can be seen in the fact that participants know of means to reduce food waste but were unable to engage with them. This shows that people were aware that they “could do more” as one questionnaire responses stated.

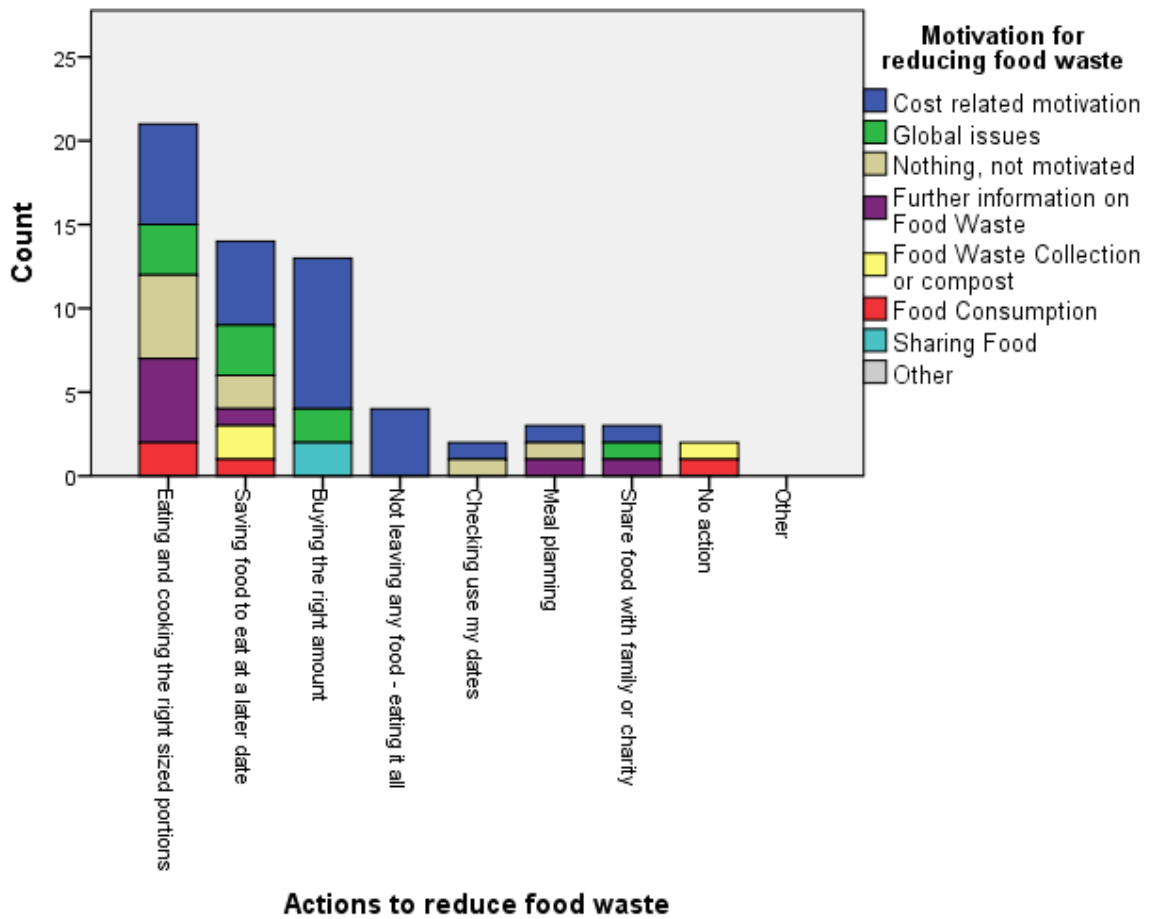


Figure 4.8 Graph to show the individual actions taken to address food waste against the motivations to reduce food waste

4.2.3 Interaction with food waste on and off campus

As stated in the literature review chapter, our interaction with food waste is important in understanding the reason why waste occurs. The interaction with food waste differed between general food waste behaviours and those which were specific and took place on campus.

The first relates to 'visceral' and personal aspects of how we 'experience' food. Within focus groups, participants noted that they wasted food due its feel and texture with one academic member of staff stating:

“Every now and again I just have a clear out of the fridge of loads of stuff that’s fresh I’m quite picky as well with fresh stuff so tomatoes, they have to be firm, if they’re not firm I bin them I won’t buy any carrots or potatoes that I’ve not handpicked myself and looked at”

The quote above shows that the appearance and the standards envisaged by the consumer when choosing food relates to its wastage in the experience of consuming the product. The visceral aspects of experiencing food create a set of standards which must be abided by in terms of appearance, smell and feel. The notion of 'leftovers' or 'wasted food' has a negative impact on these standards causing a heightened concern for peoples senses.

This is supported by figure 4.9 that respondents from the questionnaire were mostly likely to share food with those they lived with (37%) rather than someone they had no social interaction with. This can be linked back to Evans (2012) study noting food waste can be connected to food provisioning. An interruption of food linear journey from creation to disposal due to its re-use as 'leftovers' is facilitated by trust, which is particularly apparent when sharing food within households.

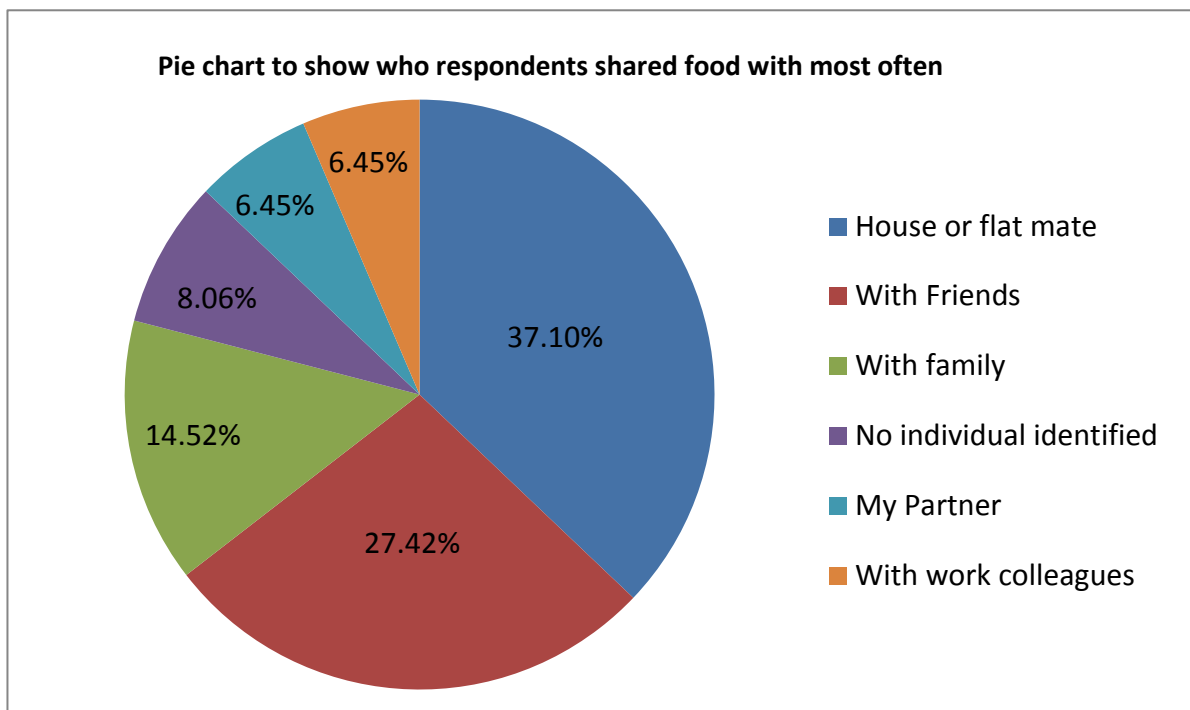


Figure 4.9 Pie Chart to show who questionnaire respondents most often shared food with

A contrast is evident between the ways in which we interact with food waste at home, dependant on trust in order to facilitate sharing as previously stated, with its interaction on campus. Figure 4.9 shows that only 6% of questionnaire responses stated that they shared food with work colleagues. The reasons for this are summed up in this following quote recorded in a questionnaire by an academic member of staff:

“The lack of infrastructure that can be accessed by an individual to recycle food is inhibiting, how much time does it take to reduce food waste? Lunch tends to be a quick meal in a short break (if one stops working at all) so convenience is essential”.

Here convenience is highlighted to relate to both the wastage of food, due to this space’s nature as a place for work and study, and also that people have a lack of time to spend reducing or preventing their food waste. The fast paced nature of consuming ‘on the go’ acted as a barrier in people’s realisation that they wasted food within this space. Of those people surveyed who consumed food on campus, the majority, 77%,

stated they wasted no food during their last meal eaten on campus. This is incompatible with the vast amount of avoidable food waste stated in WRAP's 2012 audit, 89%, showing the invisible nature of the practice of throwing away food HEI's.

One of the reasons for this is that catering staff are employed specifically to keep The Hub canteen area tidy, responsible for clearing tables, cleaning and maintaining the waste collection area. Here customers after eating place their trays on trolleys which are then taken away by staff with a bin also situated to throw away rubbish. This is experienced whilst undertaking participant observation in this area as figure 4.10 shows.

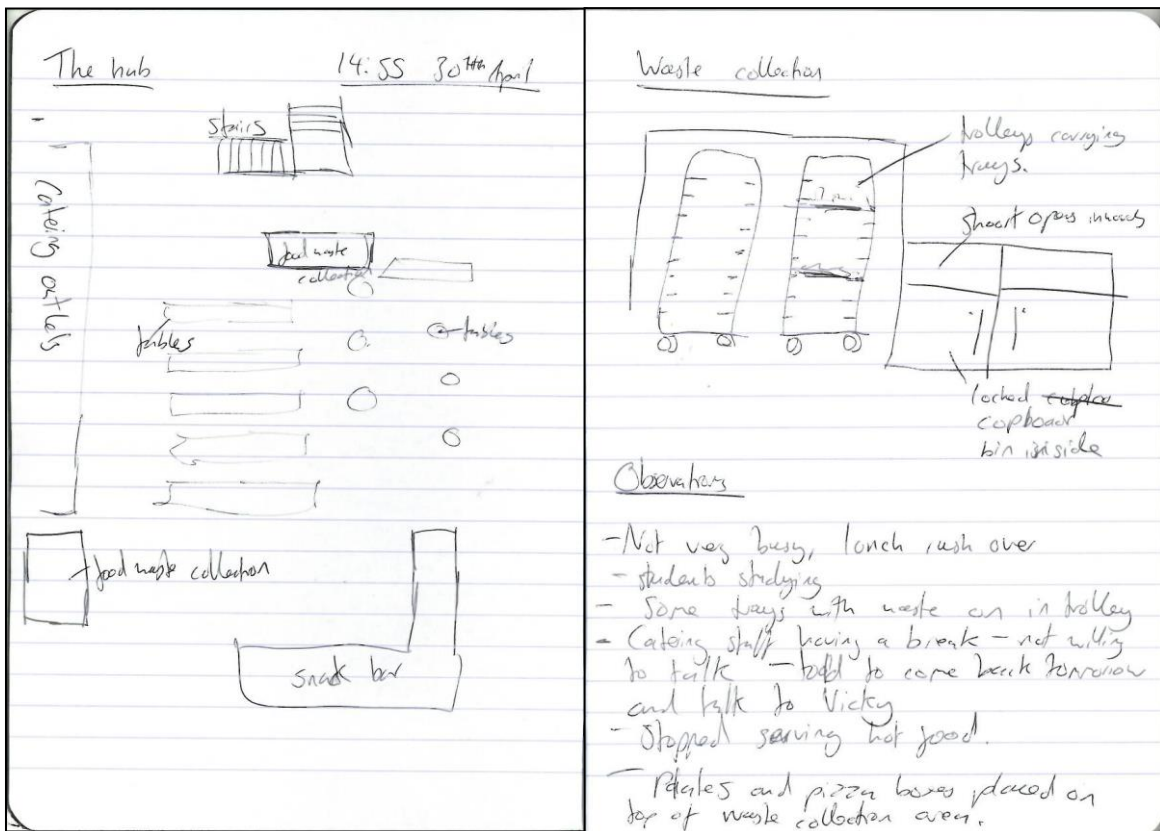


Figure 4.10 Ethnographic notes from participant observation of The Hub canteen area

The significance of this is to facilitate the disposal of waste making it convenient for the consumer and removing their role in the practice of wasting food. This can be

linked to wider technological developments in the management of waste which enforces the invisibility of throwing things away as a practice as it is taken care for by others and therefore its final destination is not thought about. Food waste from the canteen areas was attributed to either portion sizes being too big or a dislike to the food itself, due to the taste or the repetitiveness of the menu.

Table 4.4 shows that a summary of the actions people took to reduce or avoid food waste from the questionnaire data. Only the actions of finishing food rather than leaving some and also sharing food, can be applicable outside 'the home'. The majority of practices either took place in the home or were related to purchasing practices. This shows that food waste prevention behaviour spans environments starting with what to buy in the supermarkets, planning meals in the home, and finally eating decision on campus, for example whether a prepared lunch is brought in or whether purchasing food from a catering outlet.

Table 4.4 Actions undertaken to reduce food waste by the University Community as individuals

	Number	Percent	Typical Responses of actions to reduce food waste
Eating and cooking the right sized portions	25	31.65%	<p><i>Responses discuss ways of cooking less or portion control to waste less food</i></p> <ul style="list-style-type: none"> – Yes, by eating what I know I can Finish – Only eat when hungry, eat what you like – Yes, cook less, or ask for a smaller portion, or see if I can save food for the next day.
Saving food to eat at a later date	17	21.52%	<p><i>Responses discuss saving food for a later date using different methods</i></p> <ul style="list-style-type: none"> – Save the food for later – I put waste in containers at University – Just the save as much food as possible and when can instead of throwing away
Buying habits	13	16.46%	<p><i>Responses mentioning buying habits to reduce food wastage</i></p> <ul style="list-style-type: none"> – Yes, only buy fresh food that will be eaten in short times scale or can be frozen – Only cook quantity that will be eaten – Not really - I only buy what I know I will eat
Not leaving any food – eating it all	8	10.13%	<p><i>Responses mention an effort to always clear their plate and not waste any food</i></p> <ul style="list-style-type: none"> – Not actively but I am normally hungry enough to finish it – If it's on my plate it gets eaten – I do not throw food away. It is eaten or reused.
Meal Planning	5	6.33%	<p><i>Responses discuss ways of planning meals to reduce food waste</i></p> <ul style="list-style-type: none"> – Meal planning, cooking in bulk, ignoring best before dates – I try to plan weekly meals – Don't buy stuff I won't eat, plan meals
Checking used buy dates	4	5.06%	<p><i>Either using these dates as an indication or going against them to make food last longer and not throw it away</i></p> <ul style="list-style-type: none"> – Make sure I check the best dates when I buy food – Ignore sell-by dates, cut-off mould or dried 'crust' from cheese and other products and use the remainder, occasionally save leftovers from one meal to eat on another occasion
Share food with family or charity	3	3.80%	<p><i>Donating food or sharing excess food with family members</i></p> <ul style="list-style-type: none"> – I donate any spare food to food banks – Yes I re-use food or share with housemates – I give some food away (eg to family members) if something is going out of date and I won't eat it.
No Action	3	3.80%	<p><i>Two responses blamed others for their lack of action against food waste</i></p> <ul style="list-style-type: none"> – No, because they don't understand – No- my wife is always throwing out of date stuff out of the fridge
Other	1	1.27%	<p><i>Only one answer related to recycling – no details given</i></p> <ul style="list-style-type: none"> – Recycle what I can

Overall, five main factors were identified which linked the consumption of food on campus and the amount of food waste created. The first of these is portion size; this was noted in the questionnaire responses and in focus groups as too large causing consumers to leave food uneaten. The second of these was the taste and quality of food. Particularly in relation to The Hub providing student catering, food was noted as being “tasteless” and that consumers “lost interest” in the food. Here it is important that food lives up to the ‘visceral standards’ which govern eating practices through being enticing however this is limited by the need to produce a plate of food to meet gross profit margins. The third of this was appearance which can relate to how the consumer experiences food. To a certain extent taste is linked to appearance and an unattractive plate of food is linked to the creation of more food waste. The fourth factor, price, is the most important motivation in reducing food waste due to a perceived loss of money on food, also affecting purchasing decisions within food service environments. The final factor is the management which relates to the ‘invisibility’ of waste. On the one hand food service environments such as canteens must implement a system to quickly and effectively dispose of food. However on the other hand this creates waste as it removes the active thought of having to dispose of food. Ideally a disposal system should both encourage the prevention and sharing of food as a means of sustainability as well as reducing the amount sent to landfill through composting or anaerobic digestion. These factors are summarised in figure 4.11.

- **Portion Size:** The right sized portions are important as too large and food waste is created from plate scrapings of uneaten food and too little and this affects the perceived value for money.
- **Taste and quality:** Lack of good flavour or quality of food leads to waste through consumers not wanting to finish a meal, losing interest in the food. The quality of a meal is offset against the need to maintain profit margins whilst still being enticing to the consumer.
- **Appearance:** The appearance of food relates directly to the experience of the consumer therefore an unattractive plate of food is more likely to be wasted
- **Price:** The most motivational factor in reducing food waste also influential in purchasing decision in what food to buy, for example a hot meal or a snack.
- **Management:** Establishing a convenient means of disposing of food waste on the one hand is crucial to maintaining canteen areas but on their other can lead to a invisibility of waste due to the fast pace of HEI learning and working environments.

Figure 4.11 Five factors linking the consumption of food on campus and the creation of food waste

4.2.5 Student Food Waste behaviour

Student’s consumption behaviour outweighs other groups in the contribution of how much food is wasted on campus. This group do not see food waste as an important issue which was shown whilst attempting to promote the issue on campus at a ‘Green event’, struggling to not only convince students that it is an issue but also in giving away free food to draw people over into having a conversation. This event was significant in being the first point to which the research gauged students’ attitudes towards the subject. In asking if students thought they wasted much food, a good proportion said they did not think they wasted much or any at all, even when challenged to think a bit harder about their eating habits.

This attitude was furthered in student focus group as when asked whether they thought it was an important issue one respondent noted that “it’s an issue that no one talks about”. Students stated that they were “too poor to waste food” and that they felt it would be more beneficial to target another more wasteful group. The reasons they attributed to the creation of food waste related heavily to their opinions of the

food system as a whole, discussing the arrangement of supply changes as the following quote shows:

“If you look at countries that grow that food they also don’t have the transportation and the storage and the refrigeration

So they are wasting loads over there before it even gets here and that’s not really something I really thought about but as soon as I read about that I was like yea of course

So it’s not even us that’s wasting loads it’s the whole supply chain, which is even more terrible”

Here ‘us’ was conjugated on a national level to move the blame away from the consuming end of a supply chain to those involved in production and transportation. Despite this the questionnaire respondents placed consumers as the most accountable actor in wasting food with food producers least responsible. During the focus group there was great surprise at the fact that in the UK food waste from consumers greatly outweighs food waste from food manufacturers and retailers. Participants emphasised the wasteful practices they associated with supermarkets and even used some of their own experiences of working in a cafe to supplement this.

As the conversation moved to wider issues an interesting debate emerged from discussing the practice of ‘freeganism’ which involves recovering food which is still eatable but deemed out of date by supermarkets and thrown away. A recent newspaper article on the prosecution of a woman for ‘stealing’ such food provoked this response:

Student 1: “Access to food is a human right, that’s the way she has had to go and get food she shouldn’t be prosecuted for that”

Student 2: “but isn’t the right to food.... isn’t it that you have to be able to obtain food in a socially acceptable way”

“In society it’s not really acceptable to be rummaging in bins”

Student 3: "But who is deeming this not acceptable?"

Student 2: "Society is but it doesn't mean it's not a good idea but it's just not normal"

Here the fact that students saw that society disapproving the practice of 'recovering' food showed that they were aware of why such actions were taken but also why they were unaccepted. Outside the home, interrupting the linear journey of food from creation to disposal is not accepted when it has been defined as 'rubbish' by a retailer even if it is still in an eatable condition. According to one student "we are too prestigious of a nation to ask for doggy bags" going against dining etiquette however the students themselves stated they took unfinished food such as pizzas home from restaurants.

On campus operations staff quoted students as being particularly wasteful with one catering employee noting:

"They do waste quite a lot especially when they first get their money; they seem to spend it all and then don't eat it"

There was evidence that this wasteful behaviour can be attributed to student new living situation moving away from "mum and dad". One student explained that as his student accommodation does not provide food at the weekend, and without the facilities to cook a proper meal, he ended up wasting more food. When asked what they would do to increase the awareness of the issue on campus, getting more people involved in catering operations, composting and increasing knowledge were suggestions put forward. Student's behaviours and attitudes reflected their disconnection from both the practice of its disposal and the management of food waste on campus as one student explained:

"When I started working at a cafe I didn't realise the extent to which the service sector made, like how wasteful it was.

So this made me think about at home, more about what I consumed

So maybe getting more people involved in getting people to work on a bigger scale and seeing it because at home you don't really see it

Well you do but you kind of don't as it's like, oh it's a mouldy tomato I'll throw it"

4.2.6 Academic Staff's Food Waste behaviour

Academic staff were noted as those employed to lecture, conduct research or anyone in support of such activities. In proving to be a difficult group to engage with, there is limited information on their behaviour however some conclusions can be drawn.

The first is that food ordered from the central catering team in The Hub for buffet meetings was commonly shared between colleagues to prevent its wastage as one employee describes.

"We literally have got no shame in our office, if we've had a meeting and there's loads of food left over, normally it's because we've paid for it, we'll just clear the lot and take it back to the office".

This behaviour showed a concern for wasting food in order not to throw away any sandwiches paid for by the department. The use of the term 'shame' denotes that the practice retrieving and eating left over sandwiches back at the office is negatively construed by others. The employee went on to state that sharing of food was more within his own department and rarely occurred outside this space. During the focus group, sandwiches were provided of which excess were left that which participants shared among themselves. This suggests that even if a social relationship does not exist between participants, sharing of food is still possible within a space where people are interacting with food collectively.

The second point was that this group are very busy and have a lack of time to even leave their offices and purchase lunch from one of the catering outlets, therefore limiting their food waste behaviour on campus. This was shown as despite sending a

faculty wide email, few turned up to a focus group set up providing free food. The busy-ness of this group was also seen whilst meeting the supervisors of this project, one of which was an operational staff member and the others academic members. The meetings, as well as providing supervision, created a space to discuss academic and operational projects a conversation which otherwise would not have happened. Again wider issues within the food system and within the University itself were related to.

4.2.7 Operations Staff Food Waste Behaviour

To a certain extent the actions undertaken to reduce food waste by the catering staff have already been discussed, however here their personal views will be discussed in greater detail.

Operational staff, particularly those involved in cooking or waste creation and disposal saw food waste as part of their jobs, using it as a resource in order to prepare soup for example from uneaten vegetables. It was not a subject of great concern to the chef for example who although willing to explain how they dealt with food waste, didn't see wastage as a problem on campus. The annoyance of the staff that were unable to sell reduced items did show a concern for waste however, but also a missed opportunity for economic gain. One staff member noted that there could have been a better way of sorting out the food waste system, but explained that dealing with such waste only made up about half an hour of daily duties. In the Deli Marché café, food waste from items bought outside the university by students was controversial adding to the cleaning duties. Overall some divergence can be seen between their food waste behaviours, which essentially are controlled by the catering companies and their own attitudes constructed from their experiences of consuming food.

4.3 Findings from the social media application

This section will evaluate the findings from the social media application by first giving an overview of how the application functioned, then how it was implemented, the barriers that limited its usage and finally recommendations for future use.

4.3.1 Social Media Usage at Coventry University

The purpose of the application was to bring about a change in behaviour by using social media as a tool to facilitate interaction and communication. Twitter was chosen as the most relevant platform to base the application upon due to its high engagement from students, academic and operational staff shown in figure 4.12. Each faculty has its own account, with some departments also holding accounts for example in the largest faculty of Business, Environment and Science. These along with the operational and student support twitter accounts undertake interaction with people within the University, as internal social networks and also outside in wider external networks. The research centres within the University form their own social networks, particularly on the technology park which is located away from the main campus. All accounts interact with the main Coventry University twitter account which serves as a point which intersects both external and internal interaction. It was important that the application was able to integrate within this network of communications to be as far researching as possible.

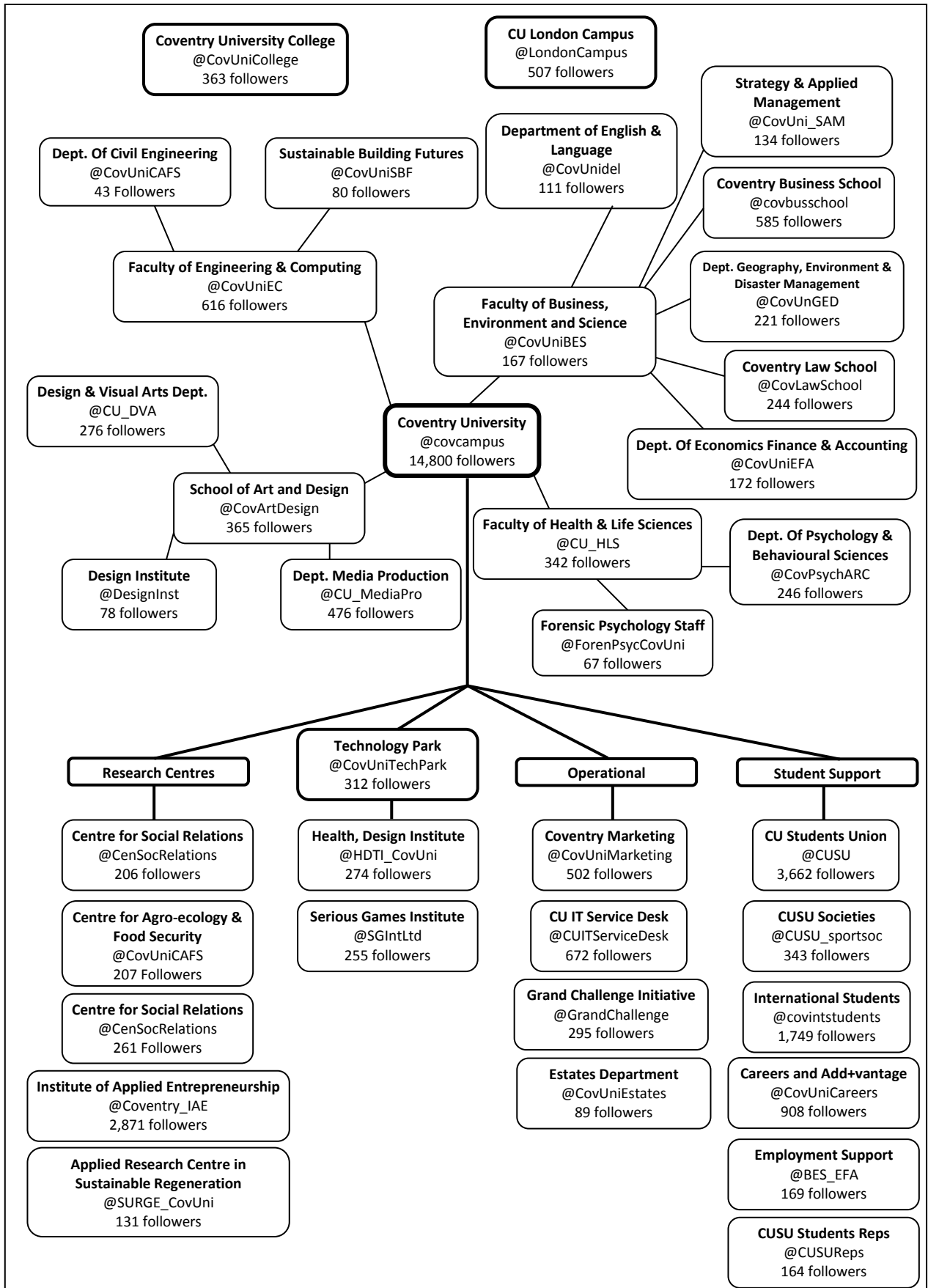


Figure 4.12 Graphical representation of twitter accounts in use by Coventry University

4.3.2 Coventry University Food Network

The application created was named 'Coventry University Food Network' and used an automatic re-tweeting service named 'round team' to distribute messages. Figure 4.13 shows how the application worked, first requiring users to 'follow' the account, next using a hash tag to tweet a message, and finally users seeing the message on their 'tweet' feed and are able to reply if interested.

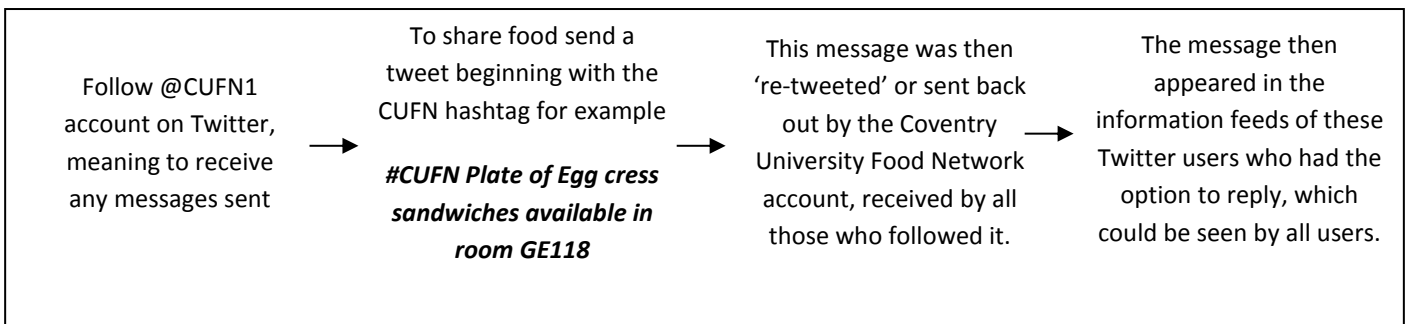


Figure 4.13 An explanation to show how food could be shared using Coventry University Food Network

The application aimed to collect data by recording the messages disseminated through Twitter to note what food is shared, by who and where on campus. Such information would build a picture of the proportion of food redistributed and those who collected it. Using such data would enable an analysis of the areas across campus where waste prevention is most prevalent as well as identifying the most active types of users, for example student or staff. Within the Twitter website was an archive function which gave the ability to record all such interactions in a format that could be analysed. A further advantage of using Twitter was its accessibility as the increase in smart phone ownership meant people were able to send message on twitter anywhere on campus using their phone.

A typical scenario which the application served was the ordering of sandwiches for a meeting. Often the amount of food delivered would be too large for attendees, either

due to a lower amount of people than expected attending or overestimation of the amount of food needed. One of the attendees would then send out a tweet using the hashtag '#CUFN' followed by what food is available and where the meeting was taking place on campus. Users who follow the CUFN twitter feed then receive this message and reply if they are interested in picking the food up. This situation was even experienced by the researcher during a meeting with the project's supervisors and also other lecturers and staff noted that this often happened. There was one case of the application being used for this purpose, as shown in figure 4.14 Below, when an academic staff team attempted to share their lunch, however there were no replies.



Figure 4.14 Tweet by an academic staff team to share their lunch

The application also was intended to be used by students in a similar manner. If a student for example was eating their lunch and perhaps purchased too much food, a similar message could be sent out on twitter. Whilst giving out questionnaire in one first year lecture, one student tested the system by attempting to share some water which, despite being jocular at the time, displayed to students the application in practice. Further usages were also foreseen in places such as the supermarket which discounted products and also in food events such as bake sales or conferences that took place on campus. There was limited success in this however the application was used at one food conference where the following tweet was sent out by the conference itself (Figure 4.15), in order to share food.



Figure 4.15 Tweet by the Food From Here Conference promoting Coventry University Food Network

In order to create awareness of the application, leafleting was used as a means to generate interest and posters put up across campus (Appendix 7). An image was also created and appeared on a digital information board in the Engineering and Computing building (Appendix 8). A crowd based or snowballing approach was taken in generating interest and usage of the application through word of mouth and poster campaigns as well as interacting on twitter with Coventry University accounts. Figure 4.16 shows messages sent out promoting the application by Coventry University Food Network which were then 'retweeted' by the main Coventry University and the Grand Challenges twitter accounts. Messages were also 'retweeted' by members of staff known to the researcher, the Faculty of Computing and Engineering, a student from the focus group and a London graduate recruitment agency. There were also too other interactions outside the university's social networks on from Dr. Shahid Chauhdary, Chairman of Pakistan Dehqan Assembly, praising the application's ability to reduce food waste through sharing food, the second from Root Consultancy, a company based in Coventry, which promoted CUFN.



Figure 4.16 Retweets of promotional messages by the main Coventry University twitter account

A number of rules were created to aid users of the application. These had two purposes, first as guidelines of how to use the application, for example how to post items and in what format, and secondly they acted as a disclaimer to prevent misuse of the application. These rules are shown in figure 4.17 and were available for users to view via a link on the profile page of CUFN. These guidelines standardised the system of reporting possible free food and were regularly tweeted to remind users to use the application in an appropriate manner. The disclaimer of the applications usage also covered how information was going to be used, what exactly will be recorded and how to remove themselves from the project if needed.

Coventry University Food Network: How to Post and Rules

Welcome to Coventry University Food Network. This group is part of an experiment to share food in order to reduce and prevent food waste across the Coventry University Campus. Users have the ability to post unwanted food items to allow anyone in the group to respond and collect it. This project will run for a limited time only.

In order to post food items:

- Follow @CUFN1 on twitter and post using the following format

#cufn (food item and your location)

Coventry University Food Network Rules

DO NOT

- Use this to post anything other than eatable food
- Repost items more than once
- Post items of food which do not exist, are uneatable or are inaccurately described
- Post any food items which are banned by law

PLEASE NOTE THAT MEMBERS USE THIS SERVICE AT THEIR OWN RISK

Coventry University Food Network accepts no responsibility for any risks involved in the posting, collecting or eating of advertised food.

USE OF INFORMATION

- This application will record data regarding posted and collected items.
- Data will be collected on staff and students at Coventry University. This is part of a research project which will run for 3 months after which all information held will be destroyed.
- You have the right at any time to remove your involvement and information from this project.
- You have the right to request any information that is held about you.

Any requests to remove involvement or data should be sent to coventryuniversityfoodnetwork@gmail.com

Figure 4.17 Rules of Usage of Coventry University Food Network

4.3.3 Barriers against the Implementation and Usage of Coventry University Food Network

The Coventry University Food Network application failed to gain momentum and achieve any change in behaviour. Nevertheless critical knowledge can be drawn from examining the reasons why this occurred.

The twitter account created resulted in 59 followers, not a sufficient number in order to create an impact on campus. Several messages were sent out by the CUFN account which used a 'mention' function of naming accounts such as the main @covcampus account in order to bring the application to their attention. However due to the high number of followers and tweets this account receives daily, messages from CUFN were lost and were only 'retweeted' twice over the course of the experiment. Using the mentioning function for other accounts was also not successful.

The reason for this is the difficulty to comprehend exactly what the applications purpose was and how to go about using it solely from information receive via social media. Whilst undertaking focus groups and interviews, when explaining the application the response was always that it was a good idea, for example catering staff noted that it would provide an alternative to throwing food away which could have been eaten as shown by the manager of the supermarket retail outlet in this comments:

"It would help us out a lot actually as sometimes because there is sort of like, we won't produce something until late Friday afternoon and then people don't know that it's reduced so it's a shame really"

In practice however there was no social networking activity relating to sharing food from those who were not spoken to directly or received promotion information. Chartwell's lack of presence within this virtual space also acted as a barrier as catering staff were not able to interact with the application themselves as the catering company did not have a twitter account for their Coventry operations. Here a value-

action gap can be seen with members of the university community voicing their opinion that the application was a 'good thing' but failed to take action.

One of the reasons for this was the system's reliance upon users fulfilling the duties of disseminating information on possible surplus food. The application was seen as a 'positive' thing encouraging food waste prevention and reduction as well as the opportunity to receive 'free' food across campus. Although this might have been enough to take an interest and 'follow' the account, it is questionable whether participants were motivated enough to post any food of their own, and what exactly would motivate them to do so. Whilst the application was being developed, the public nature of posting messages on social media was foreseen as 'social persuasion' to encourage behaviour change similar to Thieme *et al* (2011) example using a 'BinCam'. However the positive nature of sharing food via social media was not enough to enact prevention of food waste due to a lack of an underlying understanding of why food waste is an issue.

The negative connotations with food waste on a visceral level also acted as a barrier preventing the sharing of food. During the focus group, students mentioned that they would not mind if they knew the food was still in its protective packaging. This was also shown when discussing the idea with the catering staff as one chef noted during an interview at the technology centre:

"Some people might feel like it's dirty food, I don't know who you are, I don't know if you've got a cold, that sort of stuff"

Again the issue of trust can be seen as critical in the sharing of food in order to break the linear consumption path. On campus outside 'the home' where food is normally shared, people are more cautious as shown in figure 4.9 with only 6% of respondents to the questionnaire shared food with colleagues.

This heightened concern also acted as a barrier to the amount of food that could be shared through the application as already noted due to Chartwell's policy of throwing away perishable food. This meant that even if people were willing to post food to

share using the application, a key source of sharable food was being discarded. Despite promises from the Manager of the supermarket that messages would be sent to the researcher on reduced items that would then have relayed using the application, no such communication ever materialised.

In comparison with the Food Waste reduction examples discussed in the literature review on American campuses, legislation there ensures that liability is transferred to the party sharing the food, removing the food service company from any health and safety obligation. No such legislation equivalent to the Bill Emerson Good Samaritan Act (1996) exists in the UK, and even in the USA it has little promotion and it is even argued to have moved responsibility of food poverty to the private sector (Cohen, 2006).

The management of space was the final reason identified which limited the application's ability to have an impact on behaviour. Areas where food was prepared were normalised as 'safe' and upon leaving was seen to be transferred into a dangerous area where catering staff could no longer control how people interacted with the food and in what conditions. Effectively such a control was used as a safe guard to upkeep health and safety legislation, moving responsibility to those who pay for and consume the food not allowing any of it to be 're-used'.

The aspect was also a barrier in the sharing of food in two ways. Firstly was that certain areas of the campus were only accessible to certain groups which was a concern to catering staff when explaining the application. Catering staff noted that academic staff would be concerned that students could access areas of the campus which they are prohibited from, such as personal offices, showing a divide in the spaces these two groups inhabit. A further concern at the technology centre was that staff outside the University would be sharing food with staff at Coventry University and may not agree to let people take food paid for by another organisation. This concern was shown in the following quote:

"And sometimes people like that might get a little bit funny, I've paid the money why are these people flocking over to help themselves, see what I mean"

4.3.4 Recommendations for future use

After reviewing the application and the barriers against its use, recommendations are made for future use of social media as a tool for behaviour change.

1. Build up a picture of current attitudes and practices with a particular focus on the environments within which they take place.

The first recommendation relates to the questionnaire within this research which posed questions not only on food waste but also on other societal and environmental problems to gain information on motivations and practices. This was critical in placing this behaviour change initiative within the context of current concerns. A recommendation would be to gain further insight into current behaviours not only related to the change of behaviour desired but also the participants current use of social media in order to develop a strategy to relate this to current practices.

2. Ensure there is a link between motivation for change and interacting with social media

In this study too much emphasis was placed on social presence and persuasion of undertaking a positive act viewed virtually by others holding enough motivation in order to use the system. A more detailed picture needs to be built of what motivations are behind the desired behaviour change and how these can be incorporated using social media. Seeing the application work in practice is particularly evident in leading towards usage of social media in the desired way in order for it to be 'normalised'.

3. Develop a clear understanding of accountability in relation to the intervention

Staff's lack of accountability in relation to whether they were permitted to share food items significantly restricted the sharing of food, therefore a recommendation is to develop an understanding of who and how participants will be accountable for the actions taken using social media.

4. Establish full support of all actors across environments

A further recommendation is to note the different environments behaviour takes place within and any barriers. For example in this study there were certain areas of the campus which students were prohibited from as well as areas which were separate from the main campus. Furthermore the full support from all these actors is needed with a recommendation being more concrete agreements of involvement.

5. Understand the current use of social media and the feasibility of each platform

The choice of using Twitter rather than Facebook as a platform for the application was based upon two key factors. Firstly is that Twitter was well integrated as a means of communication and dissemination of messages by University groups and departments and also its use by both staff and students. A recommendation for future use would be to gain a better understanding of how students, academic and operational staff use social media.

6. Place appropriate controls upon the system

A recommendation is to place the need to place controls such as making the participants role clear in the behaviour change application and their responsibilities whilst giving participants a degree of freedom. The usage of social media can be seen as a self-expression and any behaviour change initiative should not limit social interaction.

7. Develop a means of establishing whether a change in behaviour took place and its relation to practices.

The final recommendation is to gather data relating to users experience of using the application and correlate this with the original data on motivations and practices.

4.4 An embodied conceptual framework: Implications for the research area and wider UK university sector.

The final section of this chapter will seek to evaluate the usefulness of the embodied conceptualisation in practice and the implications for the wider UK university sector.

4.4.1 An evaluation of research under an embodied framework

This research to a certain extent can be seen as a pilot or experiment in two ways. Firstly that in bringing together academic literature to establish such an embodied framework little was written in relation to methodological framework and selection. From the range of methods implemented in this study it is now possible to comment on whether the data recorded supports this conceptualisation.

The data which provided the most in-depth account of people's experiences of dealing and managing food waste arose of from focus groups and semi-structured interviews. Focus groups were critical in encouraging a group to discuss food waste through which debated created interesting dynamic of the whether it was an issue. In the case of students, the very nature of what society deems appropriate in relation to food sharing and recovery practices was discussed, which could not have been achieved through other methods. Furthermore by interviewing the catering staff in their working environments a direct link could be drawn between practices of waste management and the spaces they are performed within.

These methods aided the construction of meanings in how people interpreted food waste and furthermore the other methods which although not as effective in uncovering such in-depth data, were crucial in understandings behaviours and attitudes as well as giving the research its context. In surveying a larger number of participants, the questionnaires were able to give a greater range of details of food waste behaviours with the ethnographic observations supplementing the construction of space and the researcher's journey of undertaking the research. Overall the type of data recorded did support the embodied framework in relation to examining the

behaviours and attitudes as well as the experiences of wasting food within the HEI environment.

The second way in which this can be seen as a pilot study was the usage of the social media application to share food on campus. The conclusions drawn from this study are illustrative rather than representative of implementing food waste prevention strategies in HEI's. Despite the failure of the social media application, the choice of methods were able to expose why the application failed from a micro to a macro level. A crucial factor for this was the choice of a post-structuralist epistemology which dismissed any voice or opinion of any group or individual to hold more importance than others. The students, academic and operations staff all had a part to play in understanding not only how food waste is managed by also implementing a strategy to prevent it in a campus environment.

An example of this can be seen in the student focus group which much like Hargreaves's (2011) paper that creates a space to critically analysis the everyday 'invisible' action of wasting food as one students notes food waste is an "issue no one talks about" and that in taking part in the focus group now she is thinking more about what other people waste. In listening to all these voices the embodiment of food waste was disentangled from personal factors of the 'visceral' aspects to macro level factors such as organisational management. Figure 4.18 displays factors which impacted food waste practices on these two levels.

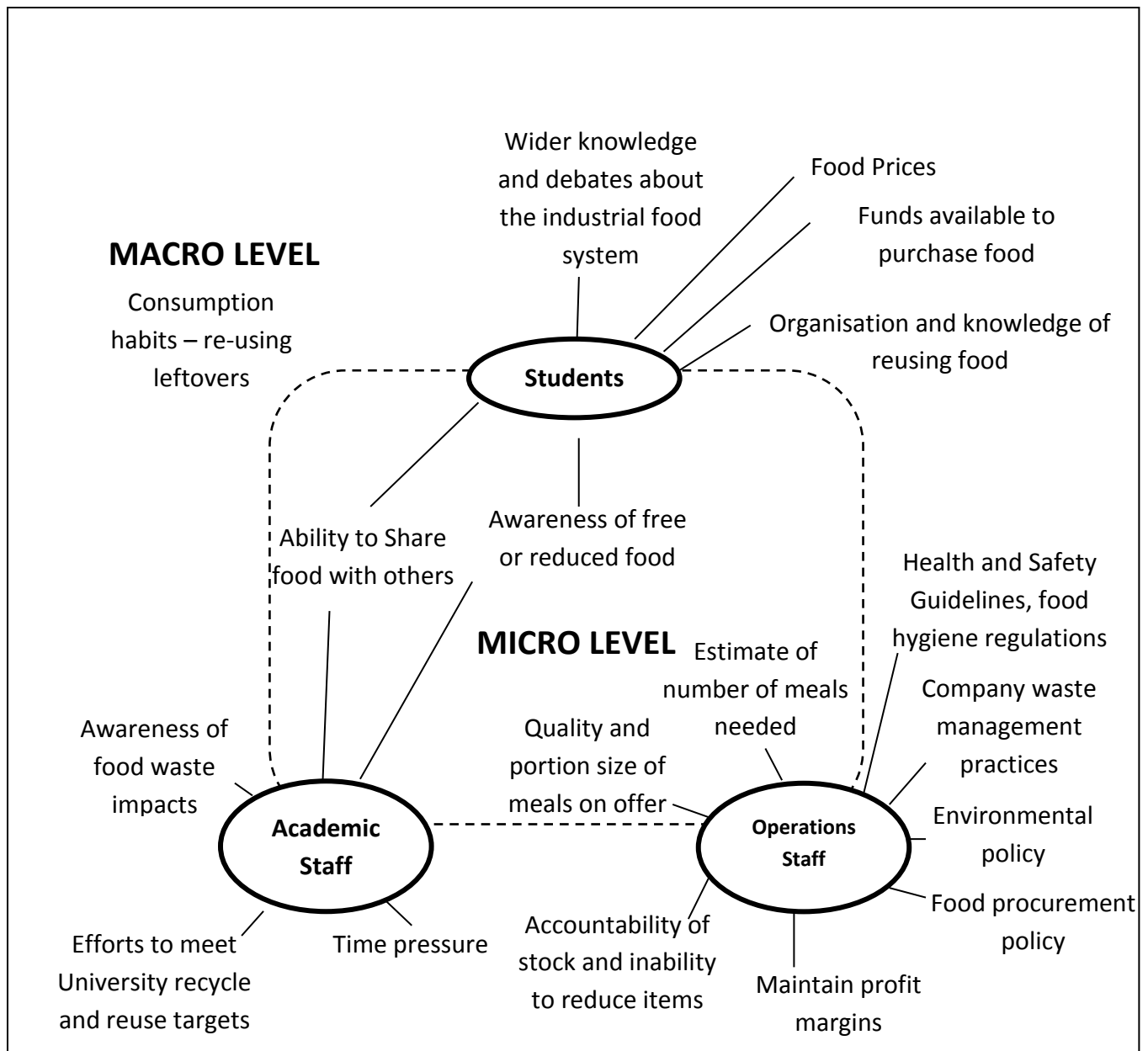


Figure 4.18 Diagram to show the micro level factors (within Coventry University - internal) and the macro level factors (Outside Coventry University -external) which impact food waste practices

The critical point from figure 4.18 is that the practice of wasting food consists of a number of factors from economic, social and environmental spheres of influence. Furthermore they are an amalgamation of both micro level and macro level factors as such as student’s knowledge of the industrial food chain but also their consumption habits within Coventry University. This micro and macro split also is relational to sharing food with level of trust developed from living in shared spaces brought into the University facilitating the sharing of food.

4.4.2 Further Implications for the UK University sector

Through implementing this strategy to prevent food waste, the organisational structure between the institution and the external catering company was examined questioning their relationship. A critical point from the study is that it is important that all three spheres that make up a university, the students, academic and operations staff communicate and work together effectively in order to implement sustainability. There was a distinct lack of accountability of the catering company's contribution towards the University's environmental targets with little incentive to reduce food waste.

Furthermore as an issue there was little concern about the topic from students and staff. This was a fundamental flaw in the social media application meaning more effective awareness and involvement is needed for future strategies to prevent food wastage. This is important on a personal level relating to everyday practices to wasting food, breaking the linear journey of food from creation to disposal in order to facilitate sharing, and also on an organisational level by developing such a system into current practices particularly having influence upon individuals that are 'carriers of practices'.

Such a holistic approach is defined in Coventry University's corporate responsibility pages within their website as the following quote shows:

"To ensure environmental issues, energy conservation and carbon reduction are a driving force in the University's Estates strategy and are supported by staff and student engagement" (Coventry University, 2013b)

In order to implement this more effectively more needs to be done by University to increase the involvement and engagement of staff and students on campus, particularly with food waste, to make them aware of their 'invisible' actions, the impact they have and how to get involved in combating such problems.

Studies which analyse waste streams in Universities need to consider methodologies from an 'embodied framework' in order to achieve a greater understanding of why

food is wasted. This study has proven that the behaviours and attitudes behind why food is wasted is inherently linked to personal factors from the visceral aspects of consuming food to the construction of spaces food is consumed within and the catering service on offer. In understanding student and staff experiences of food and food waste the strategy of prevention can be addressed directly rather than focusing on reduction of waste after it has already been consumed. This is particularly important within the food services space on campus where a more detailed account was needed of food waste streams and sources.

On a macro level, there is a need across HEIs to develop sustainable waste strategies as not all universities are aware of the amount of waste they create and the impact this is having. Food service standards must be established stating an acceptable percentage of avoidable food waste being thrown away, as little as possible, as well as more accurate auditing. Universities should seek to gather as much data as possible on their number of covers to reduce the amount of surplus food created. Such targets could be achieved through a 'code of waste conduct' for food service in university, in the same way the minimum nutritional standards have been implemented in schools.

The final implication of this research is that there needs to be more acceptance over sharing food rather than on concerns of health and safety. Although legislation is important and must be maintained, it should not act as a barrier to a university food service in order to decrease waste. The Food Recovery Networks in American Universities in comparison have a greater involvement between students and catering staff, allowing them into the kitchen to recover food. The privatisation of food service spaces to catering companies restricts their access and in doing so limits food waste reduction and prevention. As sites of learning, University departments which manage food service need to consult academics and students on how to implement sustainable practices which are often 'disconnected' from the operations on campus.

4.5 Conclusion of Analysis

In conclusion, this chapter has shown by first outlining the structure of Coventry University's catering operations that there is a lack of communication between the university and the catering staff which is critical to provide a sustainable food service. The catering companies are not accountable for their production of wastage and it is questionable whether they are working under the same environmental ethos. In dealing with food waste, the need to upkeep health and safety standards prevent the sharing of food with the majority of waste going to either landfill or flushed through the sewage system using a trim trax machine.

In exploring the behaviours and attitudes of students, staff and operations staff, typical waste practices were shown to revolve around daily consumption of food, for example eating and cooking leftovers. Motivations and actions taken were correlated to show that cost is the greatest motivator leading to the greatest number of actions. Staff and operations staff behaviour related to their daily routine as employees were either too busy to take an interest in the issue or hidden (often unwritten) waste practices were so engrained that prevention actions were absent, limited by company policies such as the inability to reduce items.

The final discussion in relation to the embodied conceptual framework to the reasons the application failed as a prevention tool looked in depth at interactions with food waste showing the reasons for wastage are related to the visceral aspects of the experience of food. When sharing food, social relations were shown as important to establish trust as the connotations attached to 'leftovers' and 'wasted food' heightened peoples standards of appearance, smell and touch. Finally the practice of wasting food was shown to be interdependent on both micro and macro level factors. In negotiating a change of food waste practices, the management and control of space within a HEI surfaced. Overall in attempting to change behaviours of food waste in a HEI using social media, our embodiment of food waste as a practice was further understood, critical analysing its role in the prevention of food waste.

5) Conclusion

5.1 Introduction

Drawing this thesis to close, the key findings of the research project are summarised in relation to the original aims and objectives, how the embodied conceptualisation moved the research in this area forward, the project's success and failures, suggestions for future research as well as recommendations for Coventry University's Sustainable Food Policy are discussed in this chapter.

This choice of a range of methods can be seen as a success in meeting the objectives as well as the overall aim to identify the barriers and opportunities for food waste prevention in Universities. Within the scope of this project, the methods were appropriate for a campus sized investigation but created some ethical and positional issues. Although the social media application did not achieve a change in behaviour, the research was shown to be reflective in using this experience to explain the barriers that prevent such a change of behaviour in HEI's.

5.1.1 First Objective: To conduct a review of existing research and practice related to food waste prevention in universities with a particular focus on the use of social media in relation to food waste prevention.

The literature review chapter examined two conceptualisation of food waste to show that current research on waste and food waste in the context of Higher Education Institutions is not critical enough in order to explain measures of prevention. Drawing on literature from the field of behaviour change, the notion of 'practice' was highlighted as important in conceptualising waste specifically as 'hidden' and invisible. There is lack of implementing a universal means of waste management strategy and auditing in HEI's, with few studies looking beyond the volume and sources of waste created to consider the behaviours of the three groups which make up the university community; Students, academic and operations staff.

5.1.2 Second Objective: To carry out an audit of food waste at Coventry University to record what food is wasted, how much, where on campus, and at what times of the day.

Although not conducted quantitatively, using a mixed method approach the research developed an understanding of the catering operations within each catering outlet through focus groups and semi-structured interviews with catering staff. Barriers such as a lack of measuring equipment, time and labour prevented the completion of an audit, despite this; qualitative data showed the staff opinions on the level of wastage. According to catering staff the majority of food waste was created by students at catering outlets, consisting of plate waste during the lunch period. Data from an externally conducted audit in 2012 showed that 89.99% of food waste was avoidable.

5.1.3 Third Objective: To develop a Facebook 'app'lication to record food waste and connect unused food with recipients locally.

An application was developed by assessing the possible social media platforms that facilitate the sharing of information, choosing Twitter as superior to Facebook due to its more professional nature. The application allowed members of the university community to share food which would otherwise be wasted by posting a message which was then disseminated to all followers of the 'Coventry University Food Network' account.

5.1.4 Fourth Objective: To evaluate the broader utility of the application in promoting attitude and behaviour change relating to food waste, and assess the implications of the research for the UK university sector.

This objective was met by analysing data collected in chapter four, first detailing how Coventry University manages food waste and the structure of catering and next the attitudes and behaviours of students and staff. Despite the lack of data from the application, a critical analysis explored the reasons for this in relation to an embodied conceptualisation of food waste.

5.1.5 Fifth Objective: To contribute to the development of the university's sustainable food policy and communicate the results of the research through a short film documentary.

This objective was met through the recommendations for the sustainable food policy in the Conclusion chapter. With regards to the film, this is currently work in progress and will cover the issue of food waste on campus and the attitudes and behaviours of the university community.

5.2 The Contribution of an 'Embodied Conceptualisation' to forward research on preventing food waste in HEI's.

Undertaking this piece of research using an 'embodied conceptualisation' has made a contribution to the research on food waste and waste management in HEIs. Firstly understanding food wastage as an embodied and embedded practice has critically shown that the wastage of this resource is subjective to everyday routines, which are often invisible, and the visceral experiences of food. The understanding of why food is wasted has been furthered in relation to the attitudes, motivations and most importantly the practices within HEIs, consisting of complex micro and macro factors that govern our experiences of food. Exploring food waste in this way also uncovered the decisions at a personal and organisational level that lead to food wastage.

Ultimately this conceptualisation has broken down the 'linear consumption path' of food to look in depth at its actors, processes and practices which is absent from the alternate conceptualisation of treating food as a practical problem. It is questionable whether the invisibility and the 'hidden' nature of food waste would have been unearthed without taking an 'embodied' approach, particularly as not all participants saw food waste as an issue.

Secondly this conceptualisation furthers waste and food waste research within the context of HEIs. In striving towards sustainable development, the methodology aimed to hear multiple voices on their perspectives and experiences of food waste. This can

be related to the 'whole-of-university' approach, emphasising the need to engage all members of the university community as sites of both food waste creation and pedagogy. Using such an approach unearthed the entangled, disconnected and unconscious life of the Institution for example the unaccountable rules and regulations, the management of space and organisational structure which 'talked the institution into life'. The reasons why food was wasted were embedded within these organisational structures which were critically uncovered using this conceptualisation.

Finally this conceptualisation contributed to questioning policies and legislation which are formulated to guide practitioners in implementing sustainable waste practices. In this study, waste was guided by a number of environmental and food policies as well as corporate information. These were challenged, for example the idea that students, academic and operations staff work together to decrease the University's environmental impact. Undertaking qualitative data collection looked in-depth at waste management in practice, therefore contributing to a more critical investigation of the barriers and opportunities of food waste prevention on campus.

5.3 Reflections on the Successes and Failures

The overall success of the project as mentioned above was exploring food waste using an 'embodied conceptualisation' allowing an in-depth analysis of food waste prevention in HEIs. The ability to collect qualitative data from all those involved in food waste from those creating the food in catering to those disposing of it was a success as few studies of this type allow all voices to be heard. The study was also able to comment on the barriers of implementing a behaviour change strategy of food waste prevention in HEI's.

On the other hand, the social media application only had a limited impact therefore extent to food waste prevention behaviour change was possible can be questioned. There was also a lack of awareness of the issue of food waste due to the barriers against promoting the application (see 4.3.3 page 109). However this did show that the

link between awareness of an issue and motivation to carry out an action is complex, particularly when this is facilitated through a social media platform.

5.4 Suggestions for future Research

The conclusions drawn from this piece of research raise a number of questions that could be explored in the fields of food waste, behaviour change and social media. Firstly the liability and accountability of food waste needs to be explored in relation to sharing food with others. The food service sector creates a significant proportion of food waste and without laws such as the Bill Emerson Good Samaritan Act in the US, in the UK companies are unable to prevent and reduce food waste by sharing food with those in need due to possible legal liability if the condition of donated food caused any harm. Where food re-distribution does occur in the UK, such legal liability acts as a barrier to further the benefits of organisations such as food banks.

ignoring the possibility to prevent and reduce food waste by sharing food with those who need it.

Within HEIs, another study of importance could be the effect of privatisation on the food service sector. It would be interesting to examine whether Universities are less able to meet targets relating to sustainable food practices due to lack of control. On the other hand catering companies which have national or even international expertise in catering outlets may have greater knowledge of how to manage waste.

In relation to behaviour change, further research is needed to link motivations to share food and undertaking these practices. The experience of food is wrapped in a number of social factors and more knowledge is needed to break the linear consumption pathway in order to prevent food waste. This research must pay particular attention to the environmental aspects as this study showed the practice of wasting food spans multiple spaces.

Finally, the influence of social media initiatives which relate to food also needed to be further explored. The motivations which encourage real life action from social media influence that relate to food consumption would be an interesting study, showing how virtual spaces and interaction relate to our experience of food and its wastage.

5.5 Coventry Universities Sustainable Food Policy

The following recommendations are made to improve the university's sustainable food policy

- Develop a greater understanding of food waste streams on campus, the practices they involve and their internal and external factors
- Increase co-operation and communication across departments and also across academic, student and operations boundaries. Set up a panel made up of each of these three groups to discuss possible projects to reduce food waste as well as voice concerns over issues
- Introduce a means of collecting and distributing leftover food which complies with food and safety standards. For example opening up access to catering kitchens to allow student volunteers to prepare and redistribute food to charity
- Introduce accountability into catering contracts in relation to the amount of food waste to add an economic imperative to catering suppliers to encourage a reduction in waste

6) References

Al-Domi, H., Al-Rawajfeh, H., Aboyouisif, F., Yaghi, S., Marshal, R. and Fakhoury, J. (2011) Determining and Addressing Food Plate Waste in a Group of Students at the University of Jordan. *Pakistan Journal of Nutrition* , 10(9), pp.871–878.

American University (2013) What AU is doing to eliminate waste. [online] Available from < <http://www.american.edu/finance/sustainability/Waste.cfm>> [01 January 2013]

Aramark (2008) The Business and Cultural Acceptance Case for Trayless Dining. [online] available from < <http://www.aramarkhighered.com/assets/docs/whitepapers/ARAMARK%20Trayless%20Dining%20July%202008%20FINAL.PDF> > [04 May 2013]

Armijo de Vega, C., Benítez, S. O. and Barreto, M.E.R. (2008) Solid Waste Characterization and recycling for a university campus. *Waste Management*. 28. 521 – 526.

Armijo de Vega, C., Benítez, S. O. and Barreto, M.E.R. (2003) Mexican Institutions and waste management programmes: A university case Study. *Resources, Conservation and recycling*. 39 283-296

Babich, R. and Smith, S. (2010) “Cradle to Grave”: An Analysis of Sustainable Food Systems in a University Setting. *Journal of Culinary Science & Technology*. 8 (4) 180-190

Barnett, C., (1998) The Cultural worm turns: fashion or progress in human geography? *Antipode* 30, 379–394.

Barylak, C.H., (2008) Integrated Waste Management at The Ohio State University: Economic and Institutional Determinants of Sustainability. Unpublished undergraduate thesis. Columbus: The Ohio State University

BBC (2013) *UK supermarkets reject 'wasted food' report claims*. [online] Available from < <http://www.bbc.co.uk/news/uk-20968076>> [26 September 2013]

Bennington, G. (1993) *Jacques Derrida*. London: University of Chicago Press

Bekessy, S. a., Samson, K. & Clarkson, R.E., (2007) The failure of non-binding declarations to achieve university sustainability: A need for accountability. *International Journal of Sustainability in Higher Education*, 8(3), pp.301–316.

- Bekin, C., Carrigan, M. and Szmigin, I. (2006) Empowerment, waste and new consumption communities. *International Journal of Sociology and Social Policy*, 26(1/2), pp.32–47.
- Bray, J. (ed) (2013) *Food Waste – The Policy Perceptive*. ‘Waste Not Want Not: Agro-Food Waste Solutions for a Hungry World’. Held 5th March 2013 at The Society for Chemical Engineering HQ. London: SCI Agri-Food Hub.
- Cappellini, B. (2009) The sacrifice of re-use : the travels of leftovers and family relations. *Journal of Consumer Behaviour*. 8 365–375.
- Carpenter, M. A., Li, M. and Jiang, H. (2012) Social Network Research in Organizational Contexts: A systematic Review of Methodological Issues and Choices. *Journal of Management*. 38 (4) 1328-1361
- Castree, N., Nash, N., Badmington, N., Bruce, B., Murdoch, J. and Whatmore, S. (2004) Mapping posthumanism: an exchange. *Environment and Planning A*. 36 (8) 1341-1363
- Chartwells (2013) Pillar four: Environment [online] Available from <<http://www.chartwells.co.uk/Pillar-four-Environment.htm>> [01 August 2013]
- Chow, S. And Tsun, T. (2005) Organic Waste Diversion at Ron Eydt Village: A Waste Audit. University of Waterloo. [online] Available from <<http://www.adm.uwaterloo.ca/infowast/watgreen/projects/library/w05revfoodwasteaudit2.pdf>> [15 November 2012]
- CIWM (2013a) ‘Commission Seeks Answers To “Unacceptable” Food Waste’. *The Chartered Institute for Waste Management Journal*. August Edition. 6
- CIWM (2013b) ‘Courtauld Commitment Phase 3 “Needs Tougher Targets”’. *The Chartered Institute for Waste Management Journal*. August Edition. 10
- Clugston, R. and Calder, W. (2007) Food and Higher Education for Sustainable development. *Journal of Education for Sustainable Development*. 1 (2) 209-218.
- Coenen, L., Benneworth, P. and Truffer, B. (2012) Towards a spatial perspective on sustainability transitions. *Research Policy*. 41 (6) 968-979
- Cohen, J.A. (2006) Ten years of Leftovers with Many Still Hungry Left Over: A decade of Donations Under the Bill Emerson Food Samaritan Food Donation Act. *Journal of Social Justice*. 5 (1) 455-496

Comber, R., Ganglbauer, E., Chio, J.H., Hoonhout, J., Rogers, Y. And O'Hara, K. (2012) Food and Interaction Design: Designing for Food in Everyday life. *CHI '12 Extended Abstracts on Human Factors in Computing Systems*. Held May 5-10, 2012, Austin, USA. 2767-2770

Comber, R. and Thieme, A. (2012) Designing beyond habit: opening space for improved recycling and food waste behaviours through processes of persuasion, social influence and aversive affect. *Personal and Ubiquitous Computing*. 17 (6) 1197-1210

Compass Group UK (2013) Health, Safety and the Environment: Safety first in everything we do. [online] Available from <<http://www.compass-group.co.uk/health-safety-environment.htm>> [12 August 2013]

Conradson, D. (2005) 'Focus Groups' in *Methods in Human Geography: A guide for Students doing a Research Project*. 2nd edn. Flowerdew, R. And Martin, D. Harlow: Pearson Education. 129-143

Cook, I. *et al* (2006) Geographies of Food: Following. *Progress in Human Geography*. 30 (5) 655-666.

Cook, I. And Crang, M. (1995) *Doing Ethnographies: Concepts and Techniques in Modern Geography*. Norwich: Environmental Publications.

Covcampus (2013) "Ice cream and jacket potatoes for lunch outside TheHub #CovOpenDay pic.twitter.com/dy3HGme9UR" . [online] Available from <<https://twitter.com/covcampus/status/345868910119247872>> [14 August 2013]

Coventry University (2013a) Corporate Plan 2015. [online] Available from <<http://www.coventry.ac.uk/life-on-campus/the-university/about-coventry-university/corporate-plan-2015/>> [01 August 2013]

Coventry University (2013b) Environment and Energy. [online] Available from <<http://www.coventry.ac.uk/life-on-campus/the-university/about-coventry-university/corporate-plan-2015/sustainability/environment-and-energy/>> [01 August 2013]

Cox, J., Giorgio, S., Sharp, V., Strange, K., Wilson, D.C. and Blakey, N. (2010) Household waste prevention--a review of evidence. *Waste management & research : the journal of the International Solid Wastes and Public Cleansing Association*, ISWA, 28(3), pp.193-219.

Dahle, M. And Neumayer, E. (2001) Overcoming barriers to campus greening: A survey among higher educational institutions in London, UK. *International Journal of Sustainability in Higher Education*. 2 (2) 139-160.

DEFRA (2011) Government Review of Waste Policy in England 2011. [online] Available from <
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69401/pb13540-waste-policy-review110614.pdf> [02 December 2012]

Duffy, R., Fearn, A. and Healing V. (2005) Reconnection in the UK food chain: Bridging the communication gap between food producers and consumers. *British Food Journal* 107 (1) 17-33.

Easley, D. and Kleinberg, J. (2010) *Networks, Crowds, and Markets: Reasoning about the highly connected world*. Cambridge: Cambridge University Press.

EAUC (2013) Food Waste (including food preparation waste). [online] Available from <
http://www.eauc.org.uk/page.php?subsite=waste&page=food_waste_including_food_preparation_waste> [09 May 2013]

European Commission (2010) Preparatory study on food waste across EU 27. Technical Report. [online] Available from
<http://ec.europa.eu/environment/eussd/pdf/bio_foodwaste_report.pdf> [01 February 2013]

Evans, D. (2012) Beyond the throwaway society: Ordinary domestic practice and a sociological approach to household food waste. *Sociology*. 46 (1) 43-58

Evans, D. (2011) Waste Matters. *Sociology*. 45 (4) 707-712

Evans, D., Campbell, H. And Murcott, A. (2013) A brief pre-history of food waste and the social sciences. *The Sociological Review*. 60 (S2) 5-26

Evans, D., McMeekin, A. and Southerton, D. (2012) Sustainable Consumption , Behaviour Change Policies and Theories of Practice. *Helsinki Collegium*. 12 113-129

Felder, M.A.J., Petrell, R.J. and Duff, S.J.B. (2001) A solid waste audit and directions for waste reduction at the University of British Columbia, Canada. *Waste Management & Research*. 19 (4) 354-365.

Foden, M. (2012) Everyday consumption practices as a site for activism? Exploring the motivations of grassroots reuse groups. *People Place and Policy Online*, 6(3), pp.148–163.

Foster, D. and Lawson, S. (2013) 'Liking' Persuasion: Case Studies in Social Media for Behaviour Change. *CHI'13*. Held April 27 – May 2, 2013 Paris, France.

- Foster, D. and Lineham, C. (2013) 'Liking' Carbon: Can social media play a role in carbon management? *Carbon Management*. 4 (1) , 1-4.
- Freidberg, S. (2003) Editorial: Not all sweetness and light: new cultural geographies of food. *Social & Cultural Geography*. 4 (1) 3-6.
- Froehlich, J., Findlater, L. and Landsay, J. (2010) The Design of Eco-Feedback Technology. *CHI'2010 Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. Held April 10-15 2010, Atlanta.
- Galaskiewicz, J. and Wasserman, S. (1994) 'Introduction: Advances in the Social and Behavioural Sciences From Social Network Analysis' in *Advances in Social Network Analysis: Research in the Social and Behavioural Sciences*. Ed by. Wasserman, S. and Galaskiewicz, J. London: SAGE. Xi-xvii
- Ganglbauer, E., Fitzpatrick, G. and Comber, R. (2013) Negotiating Food Waste: Using a Practice Lens to Inform Design. *ACM Transactions on Computer-Human Interaction*. 20 (2) 11:2 – 11:22
- Gibson, C., Costello, L. and Hughes, R. (2004) Introduction: Doing Cultural Geography. *Australian Geographer*. 35 (2) 123-120
- Gloucestershire Council (2012) Our advice Sheet: The Disposal of Food Waste. [online] Available from < http://www.tradingstandards.gov.uk/cgi-bin/glos/bus1item.cgi?file=*BADV632-1001.txt > [09 May 2013]
- Goodman, M.K. (2013) Wrapping and Stuffing Food Relationally: Pleasure, Place, Production and Power.
- Goodman, M.K., and Sage, C. (2013) *Food Transgressions: Ethics, Governance and Geographies*. (Forthcoming) Aldershot: Ashgate.
- Google Maps (2013) Google Maps – Coventry. [online] Available from < <https://www.google.co.uk/maps/preview> > [02 July 2014]
- Google (2012) Welcome to Google Groups. [online] Available from <<http://support.google.com/groups/answer/46601/?rd=1>> [05 December 2012]
- Graham, E. (2005) 'Philosophies underlying human geography research' in *Methods in Human geography: A guide for students doing a research project*. 2nd edn. Ed by Flowerdew, R. And Martin, D. Harlow: Pearson Education. 110-127
- Gregory, D. (1994) *Geographical Imaginations*. 1st Edn. Oxford: Blackwell

- Hansen, L.T., McMellen, C., Olsen, L., Kaplowitz, M., Kerr, J. and Thorp, L. (2008) Recycling Attitudes and Behaviours on a College Campus. Use of Qualitative Methodology in a Mixed-Methods Study. *Journal of Ethnographic & Qualitative Research*. 2. 173-182
- Hargreaves, T. (2011) Practice-ing behaviour change: Applying social practice theory to pro-environmental behaviour change. *Journal of Consumer Culture*, 11(1), pp.79–99.
- Harvey, D (1973) *Social Justice and the city*. London: Edward Arnold
- Harvey, D (1969) *Explanation in geography*. London: Edward Arnold
- Hawkins, G. (2005) *The Ethics of Waste: How We Relate to Rubbish*. Lanham: Rowman & Littlefield.
- Haye, K., Robins, G., Mohr, P. and Wilson, C. (2010) Obesity related behaviour in adolescent friendship networks. *Social Networks*. 32 161-167
- Health and Safety at Work Act (1974) London: The Stationery Office
- HEFCE (2012) Measuring Scope 3 Carbon Emissions - Water and Waste: A guide to Good Practice. [online] Available from <<http://www.hefce.ac.uk/pubs/year/2012/201201/name,68742,en.html>> [01 January 2013]
- HESA (2012) Estates Management Statistics 2011/2012 – Data definitions. [online] Available from <http://www.hesa.ac.uk/index.php?option=com_content&task=view&id=2591&Itemid=233> [01 August 2013]
- HESA (2013) Headline Statistics – Coventry University 2011/212. [online] Available from <<http://www.hesa.ac.uk/>> [01 August 2013]
- HESA (2009) Total Income and Expenditure by Institution 2006/2007 to 2007/2008. [online] Available from <http://www.hesa.ac.uk/dox/pubs_archive/Resources_07_08/Tables/Table_0a.xls> [17/02/2014]
- IISD (International Institution for Sustainable Development) (1996) Declarations for Sustainable Development: the Response of Universities. [online] Available from <<http://www.iisd.org/educate/declare.htm>> [01 January 2013]

Ilbery, B. and Maye, D. (2005) Alternative (shorter) food supply chains and specialist livestock products in the Scottish-English borders. *Environment and Planning A*. 37 (5) 823-844

Institute of Mechanical Engineers (2013) Global Food. Waste not, Want Not. [online] Available from < http://www.imeche.org/docs/default-source/reports/Global_Food_Report.pdf> [01 August 2013]

Jackson, P. (2011) Families and food: Beyond the “cultural turn”? *Social Geography*. 6. 63-71.

Juris, J.S. (2012) Reflections of #Occupy Everywhere: Social media, public space, and emerging logics of aggregation. *American Ethnologist*. 39 (2) 259-279.

Kneafsey, M., Dowler, E., Lambie-Mumford, H., Inman, A. and Collier, R. (2013) Consumers and Food Security: Uncertain or Empowered. *Journal of Rural Studies*. 29. 101-112.

Kwon, S., Bednar, C.M. Kwon, J. and Bush, R.M. (2010) An Investigation of College and University Foodservice Administrators’ perceptions of Food Waste Reduction Activities and Food Waste Disposal Methods. *Journal of Foodservice Management & Education*. 4 (1) 16-21

Langley, J., Yoxall, A., Heppall, G., Rodriguez, E. M., Bradbury, S., Lewis, R., Luxmoore, J., Hodzic, A. and Rowson, J. (2010) Food for thought?--A UK pilot study testing a methodology for compositional domestic food waste analysis. *Waste management & research : the journal of the International Solid Wastes and Public Cleansing Association, ISWA*, 28(3), pp.220–7.

Lebersorger, S. and Schneider, F. (2011) Discussion on the methodology for determining food waste in household waste composition studies. *Waste management*. 31(9-10), pp.1924–33.

LIFE (2012) Framework and Functionality. [online] Available from < http://www.thelifeindex.org.uk/pdfs/Frameworks_and_Functionality_June2012.pdf> [09 May 2013]

LIFE (2013) Our Institutions. [online] Available from < <http://www.thelifeindex.org.uk/uk/our-institutions/>> [09 May 2013]

Lipinski, B., Hanson, C., Lomax, J., Kitinoja, L., Waite, R. and Searchinger, T. (2013) Reducing Food Losses and Waste: Instalment 2 of “Creating a Sustainable Food Future”. *World Resources Institute Working Papers*. [online] Available from <<http://www.worldresourcesreport.org>> [01 August 2013]

Love Food Hate Waste (2013a) About Food Waste. [online] Available <
<http://england.lovefoodhatewaste.com/content/about-food-waste-1>> [01 May 2013]

Love Food Hate Waste (2013b) Food waste recycling: what to do with the food you
can't eat. [online] Available from <
<http://england.lovefoodhatewaste.com/content/food-waste-recycling-what-do-food-you-cant-eat>> [01 May 2013]

Mason, I., Oberender, A.K and Brooking, A. (2004) Source separation and potential re-
use of resource residuals at a university campus. *Resources, Conservation and
Recycling*, 40(2), pp.155–172.

Mason, I.G., Brooking, A.K., Oberender, A., Harford, J.M. and Horsley, P.G. (2003)
Implementation of a zero waste program at a university campus. *Resources,
Conservation and Recycling*. 38. 256-269

Mbuligwe, S. E. (2002) Institutional solid waste management practices in developing
countries: A case study of three academic institutions in Tanzania. *Resources,
Conservation and Recycling*. 35 (3) 131-146

McDowell, L. (2010) 'Interviewing: Fear and Liking in the field' in *The Sage Handbook of
Qualitative Geography*. Ed by Delyser, D., Herbert, S., Aitken, S., Crang, M. And
McDowell, L. London: SAGE.

McClure, A. (2009) Composting on Campus. University Business. [online] Available
from < <http://www.universitybusiness.com/article/composting-campus>> [04 May
2013]

McMillin, J. and Dyball, R. (2009) Developing a Whole-of-University Approach to
Educating For Sustainability: Linking Curriculum, Research and Sustainable Campus
Operations. *Journal of Education for Sustainable Development*. 3. 55-64

MEL (2009) A Study of Public Sector Food Waste Arisings and Processing Options
within the North East Region. [online] Available from
<[http://www.resourcesnotwaste.org/upload/documents/reports/RENEW%20Final%20
Report%20-Phase%20_66.pdf](http://www.resourcesnotwaste.org/upload/documents/reports/RENEW%20Final%20Report%20-Phase%20_66.pdf)> [25 November 2012]

Murdoch, J. (1998) The Spaces of Actor-Network Theory. *Geoforum*. 29(4) 357-374.

Nye, M. and Burgess, J. (2008) *Promoting durable change in household waste and
energy use behaviour*. University of East Anglia: DEFRA

O'Brien, M. (2007) *A crisis of Waste? Understanding the Rubbish Society*. Basingstoke:
Taylor and Francis.

Ouseley, M., Wei, N. and Yu, Y. (2011) The Green Dining Standard: Greening Canada's Heart through its stomach. [online] Available from < <http://yanyu.ca/projects/GreenDiningStandard.pdf>> [01 January 2013]

Papaioannou, D., Sutton, A., Carroll, C., Booth, A. and Wong, R. (2010) Literature searching for social science systematic reviews: consideration of a range of search techniques. *Health information and libraries journal*, 27(2) 114–22.

Parfitt, J. (2005) 'Questionnaire design and Sampling' in *Methods in Human Geography: A guide for students doing a research project*. 2nd. Ed by Flowerdew, R. And Martin, D. Harlow: Pearson Education

Parfitt, J. and Barthel, M. (2011) Global food waste reduction: Priorities for a world in transition. *Foresight Project on Global Food and Farming Futures*. London: The Government office for science. [online] Available from < <http://www.bis.gov.uk/assets/foresight/docs/food-and-farming/science/11-588-sr56-global-food-waste-reduction-priorities.pdf>> [6 October 2012]

Parfitt, J., Barthel, M. and Macnaughton, S. (2010) Food Waste within Supply Chains: Quantification and Potential Change for 2050. *Phil. Trans. R. Soc. B*. 365. 3065-3081.

People and Planet (2013) Coventry University awarded 1st class in the People & Planet Green League 2013. [online] Available from < <http://peopleandplanet.org/green-league-2013/tables?ggl13profile=9929&test=f2923f>> [01 August 2013]

Petticrew, M. And Roberts, H. (2006) *Systematic Reviews in the Social Sciences – A Practical Guide*. 1st edn. Oxford: Blackwell Publishing.

Philo, C. and Parr, H. (2000) Institutional Geographies: Introductory remarks'. *Geoforum*. 31. (4) 513-521.

Prell, C. (2012) *Social Network Analysis: History, Theory and Methodology*. 1st Edn. London: SAGE publications.

Probyn, E. (2000) *Carnal appetites: Food Sex, Identities*. London: Routledge.

Rasmussen, J. and Bergstorm, B. (2011) Food Waste Diversion at Urban University. *Biocycle*. 52 (12) 34-35

Redcliffe (2013) About Redcliffe Catering [online] Available from < <http://www.redcliffe.com/about-redcliffe-catering.php>> [01 August 2013]

- Robertson, S. and Walkington, H. (2009) Recycling and waste minimisation behaviours of the transient student population in Oxford: results of an on-line survey. *Local Environment*, 14(4), pp.285–296.
- Salhofer, S., Oberstainer, G., Scheinder, F. And Leborsorger, S. (2007) Potentials for the prevention of municipal waste. *Waste Management*. 28 (1) 245-259
- Sarjahani, A., Serrano, E.L. and Johnson, R. (2009) Food and Non-Edible, Compostable Waste in a University Dining Facility. *Journal of Hunger & Environmental Nutrition*. 4 (1) 95-105
- Sharp, L., (2009) Higher education : the quest for the sustainable campus. *Sustainability: Science, Practice & Policy* , 5(1), pp.1–8.
- Sharp, L., (2002) Green campuses: the road from little victories to systemic transformation. *International Journal of Sustainability in Higher Education*, 3(2), pp.128–145.
- Skelton, T. (2001) ‘Cross-cultural research’ In *Qualitative Methodologies for Geographers: Issues and Debates*. Ed by Dwyer, C. And Limb. London: Arnold.
- Smithers, R. (2012) UK retailers fail to meet food and packaging waste pledges. [online] available from < <http://www.theguardian.com/environment/2012/jan/31/retailers-supply-chain-food-waste>> [30 March 2014]
- Smyth, D. P., Freedeen, A. L. and Booth, A.L. (2010) Reducing Solid waste in higher education : The first step towards ‘greening’ a University Campus. *Resource, Conservation and Recycling*. 54 1004-1016
- Sonnino, R. and McWilliam, S. (2011) Food waste, catering practices and public procurement: A case study of hospital food systems in Wales. *Food Policy*. 36. 823-829
- Southerton, D, McMeekin, A. and Evans, D. (2011) International Review of Behaviour Change Initiatives. [online] Available from <<http://www.scotland.gov.uk/Publications/2011/02/01104638/0>> [03 May 2013]
- Southerton, D. (2001) Consuming Kitchens: Taste, context and identity formation. *Journal of Consumer Culture*, 1(2), pp.179–203.
- Stern, P.C. (2000) Toward a Coherent Theory of Environmentally Significant Behaviour. *Journal of Social Issues* 56(3), pp.407–424.
- Stuart, T. (2009) *Waste: Uncovering the Global Food Scandal*. London: W.W. Norton and Company.

Sullivan, D. (2010) College Students Initiate Food Waste Diversion. *Biocycle*. 51 (9) 65-67.

Sustain Appalachian (2013) Appalachian State University Environmental Sustainability Report. [online] Available from < <http://sustain.appstate.edu/initiatives/campus-initiatives/waste-reduction> > [01 January 2013]

Thiagarajah, K. and Getty, V. (2012) Impact on plate waste of Switching from a Tray to a Trayless Delivery system in a University dining hall and Employee Response to the switch. *The Academy of Nutrition and Dietetics*. 113 (1) 141-145

Thieme, A., and Weedon, J., Kraemer, N., Lawson, S. and Oliver, P. (ed.) (2011) *BinCam: Waste Logging for Behavioural Change*. 'ACM CHI Conference on Human Factors in Computing Systems' held 7-11 May 2011 at Vancouver. Association for Computing Machinery.

United Nations (1987) Report of the World Commission on Environment and Development – Our Common Future. Oxford: Oxford University Press

Valentine, G (2005) 'Tell me about:Using interviews as a research methodology' in *Methods in Human geography: A guide for students doing a research project*. 2nd edn. Ed by Flowerdew, R. And Martin, D. Harlow: Pearson Education. 110-127

Valentine, G. (2001) *Social Geographies: Space & Society*. 1st Edn. Harlow: Pearson Education.

Valentine, T.W. and Davis, R.L. (1999) Accelerating the Diffusion of Innovations Using Opinion Leaders. *The Annals of the American Academy of Political and Social Science*. 566 (1) 55-67.

Van Handel, B. (2004) Quantifying Food Residuals in Campus Cafeteria. *Biocycle*. 43 (3) 43-44.

Velazquez, L., Munguia, N. & Sanchez, M., (2005) Deterring sustainability in higher education institutions: An appraisal of the factors which influence sustainability in higher education institutions. *International Journal of Sustainability in Higher Education*, 6(4), pp.383–391.

Vermeir, I. and Verbeke, W. (2006) Sustainable Food Consumption: Exploring the consumer "Attitude – behaviour intension" Gap', *Journal Of Agricultural & Environmental Ethics*, 19, 2, pp. 169-194

Warde, A. (2005) Consumption and Theories of Practice. *Journal of Consumer Culture*, 5(2), pp.131–153.

Warde, A. and Southerton, D. (eds.) (2012) *The Habits of Consumption*, Helsinki: Open Access Book Series of the Helsinki Collegium of Advanced Studies.

Wasserman, S. and Faust, K. (1994) *Social network analysis: Methods and applications*. New York: Cambridge University Press.

Whitehair, K.J. (2011) Investigation of strategies to decrease food waste in college and university food service. Unpublished PhD Thesis. Kansas: Kansas State University.

Whitehair, K.J., Shanklin, C.W. and Brannon, L.A. (2012) Written Messages Improve Edible Food Waste Behaviours in a University Dining Facility. *Journal of the Academy of Nutrition and Dietetics*. 113 63-69

WRAP (2013) The Courtauld Commitment: What is it?. [online] Available from < <http://www.wrap.org.uk/node/14507>> [11 January 2013]

WRAP (2012) Compass Group UK and Ireland: Eliminating Kitchen Waste [online] Available from < <http://www.wrap.org.uk/content/compass-group-uk-ireland-eliminating-kitchen-waste>> [01 August 2013]

WRAP (2006) Food Behaviour consumer Research: Quantitative Phase. [online] Available from < <http://www.wrap.org.uk/sites/files/wrap/Food%20behaviour%20consumer%20research%20quantitative%20jun%202007.pdf>> [01 May 2013]

Zhang, N., Williams, I.D., Kemp, S. And Smith, N.F. (2011) Greening academia: Developing sustainable waste management at Higher Education Institutions. *Waste Management*. 31 1606-1616

Zhou, Y.Z. (2007) Determining Sustainable Waste Management Practices in College and University Dining Services Using the Theory of Planning Behaviour. Unpublished PhD thesis. Kansas: Kansas State University

7) Appendixes

Appendix 1

Semi-structured interview questions -Procurement/ Catering/ Chartwell Managers
Semi-structured Interview Schedule

Opening – Confirm position within the structure of the catering system

Firstly I would like to ask questions regarding Food Waste within the University

How do you define food waste? At what point does food become waste? How much food is wasted? To what extent is this known within different time frames, each year, term, day, month?

What happens to the food waste?

- How much is thrown away?
- Recycled?
- Flushed away?
- Composted?

Do you see food waste as an issue? Economically? Or also environmentally?
Sustainability policy

Do you know the cost of disposing of food waste

Is there currently any policy or projects in place which reduce food waste?

Do you encourage students or staff to waste less food?

Is there an issue with food waste which does not arise from within the university?

How many different environments are catered for within the university campus? How many staff and students are served daily, yearly?

To what extent does food waste differ through the academic year?

What different types of services do you provide? Staff and student catering?

Which areas generate the most amount of food waste or are provided with the most/least amount of food service?

Next I would like to explore Attitudes Towards Food Waste - What do you think the overall attitude is towards food waste? Do you think more could be done to reduce level of food waste?

How important is education and behaviour change specifically about food waste?

Appendix 2

Catering Staff Semi-Structured interview Schedule

Opening – Confirm position within the structure of the catering system

Firstly I would like to ask questions regarding Food Waste within the University

How do you define food waste? At what point does food become waste?

How much food is wasted? To what extent is this known within different time frames, each year, term, day, month?

What happens to the food waste?

- How much is thrown away?
- Recycled?
- Flushed away?
- Composted?

Do you see food waste as an issue?

How much of your time is spent dealing with food waste

Is there an issue with food waste which does not arise from within the university?

What are the current practices in dealing with food waste? Staff training or advice?
Targets?

Next I would like to explore attitudes towards food waste

Of the areas in which you work, which was the worst for clearing up waste?

Do you think that there is a negative or positive attitude towards the issues of food waste?

Do you think more could be done to reduce level of food waste

Appendix 3 – Focus Group Presentation

Focus Group exercises

Identifying the barriers and opportunities for food waste prevention in Universities

EU advert on Food Waste

- ▶ https://www.youtube.com/watch?v=9K72SHEPOCE&feature=player_embedded

This item has been removed due to third party copyright. The unabridged version of the thesis can be viewed at the Lanchester Library, Coventry University.

Contents of a Waitrose bin on August 2008, UK
(Tristram Stuart, 2009)

This item has been removed due to third party copyright. The unabridged version of the thesis can be viewed at the Lanchester Library, Coventry University.

Facts on Food Waste

- The US alone wastes 40 million tonnes of food waste each year which is enough to feed the one billion malnourished
- 10% of rich countries' greenhouse gas emissions come from growing food that is never eaten.
- Up to 50% of food is wasted in Western countries. If crops wastefully fed to livestock are included,
- European countries have more than three times more food than they need.
- US has around four times more food than is needed, and up to three-quarters of the nutritional value is lost before it reaches people's mouths.
- An estimated 20 to 40% of UK fruit and vegetables rejected even before they reach the shops - mostly because they do not match the supermarkets' excessively strict cosmetic standards.

All statistics are fully referenced in Tristram Stuart, *Waste: Uncovering the Global Food Scandal* (Penguin, 2009)

UK context

- ▶ 15 million tonnes of Food Waste
- ▶ Enough to fill Wembley 15 times!
- ▶ 2/3rds of this is avoidable
- ▶ 50 %, 7.2 million from household waste
- ▶ Potato example
- ▶ 5.5 to 6 million tonnes a year grown
- ▶ Waste 1.4 million tonnes
- ▶ 30% wasted in grading post harvest
- ▶ 4 to 10% wasted in storage over a 2 to 10 month period.

The EU waste 90 million tonnes annually of food waste, how much does each of these sectors waste and why?

Manufacturing Household Retail and Service sector

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35 38 17

How does the UK compare?

Estimates on the amount of Food Waste by sector for EU nations (European Commission 2010:12)

This item has been removed due to third party copyright. The unabridged version of the thesis can be viewed at the Lanchester Library, Coventry University.

Coventry Universities Food Waste

Waste Type	Tonnes per year	Percentage of Total Weight
Avoidable food waste	5.17	72.10%
Unavoidable food waste	0.57	8.02%
Potential recycling thrown away in Kitchen/ catering	0.38	5.19%
Other Wastes	1.04	14.55%
Total kitchen/ catering wastes	7.17	100.00%

References

- European Commission (2010) Preparatory Study on Food Waste across EU 27. Technical Report. 2010 - 054
- Stuart, T (2009) Waste: Food Waste Images. [online] Available from <<http://www.tristramstuart.co.uk/photography.html>> [12th December 2012]
- Stuart, T. (2009) *Waste: Uncovering the Global Food Scandal*. Penguin
- Waste not want not conference information (2013) Society of Chemical Engineering
- TED talk on food waste http://www.youtube.com/watch?v=cWC_zDdF74s&feature=youtu.be

Thankyou!

lazellj@uni.coventry.ac.uk

Focus Group Questions

Introduction

Tell us who you are and what you are studying/teaching/position employed in at Coventry University - favourite hobby/ something interesting about yourself?

Introductory questions

Do you throw away a lot of food?
Why?

Key Questions

Do you think that food waste is an issue?
Do you think that students/ staff on campus are wasteful?
Does this issue get enough attention?
Have you heard of any campaigns or policy?

Transition Question

What would it take for you to decrease the amount of food you waste?

Key Questions

I realise that most people don't prioritise food waste so how do you think people could become more interested in the topic?
If you were to run the Hub or other canteens across the University, what would you do to reduce food waste?
How would you measure the success of these ideas?

Finishing questions

Is there anything that we have missed?

I thoroughly appreciate you completing the following questionnaire

By completing this questionnaire you will be entered into a prize draw to win £50

Before you begin.....

- I have read and understood the participant information sheet.
- I am either a student or staff member at Coventry University.
- I understand that my name will not be used and all information provided will be kept confidential and not made publically available to identify me individually.
- I understand that my participation is completely voluntary. I can withdraw from the research at any time without given reason.
- I agree to participate in this research and agree to all of the above.



Section A: Overview of yourself

1 What Role do you undertake at Coventry University?

- ¹ I am a Student ² I am an Academic staff member ³ I am an operations staff member
- ⁴ I work for the Students Union ⁵ Other, please state
-

2 If you are a student or a member of academic staff, which faculty do you belong to?

- ¹ Business, Environment & Society ² Lifelong Learning ³ Health and life sciences
- ⁴ Engineering & Computing ⁵ Art & Design ⁶ Other please state
-

3 If you are a student, what stage are you currently in your studies?

- ¹ Diploma/ College ² Undergraduate ³ Postgraduate

4 If you are a student, what are you studying?

.....

5 How would you describe your household?

- ¹ Student Halls - Please state which
- ² Student House/flat – Please state number of residents
- ³ Semi- detached/ Terraced – Please state number of residents
- ⁴ Detached – Please state number of residents
- ⁵ Other - Please state number of residents

6 Do you have a local food waste collection service?

- ¹ Yes ² No ³ I don't know

Section B: Your priorities

7 Please rate how important you feel the following issues are on a scale of 0, not important, to 5, very important.

	0 Not important	1	2	3	4	5 Very Important
◆ Air pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
◆ Climate change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
◆ Deforestation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
◆ Food waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
◆ Intensive farming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
◆ Overfishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
◆ Poverty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
◆ Water scarcity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8 Of the things you consider important, what actions have you taken to make an impact?

.....

.....

.....

9 What motivates you to make a difference to this/these issues?

.....

.....

.....

10 To what extent do you feel that your actions have an impact on this/ these issues?

- ¹ To no extent ² To a little extent ³ To a large extent

Please give reasoning for you answer

.....

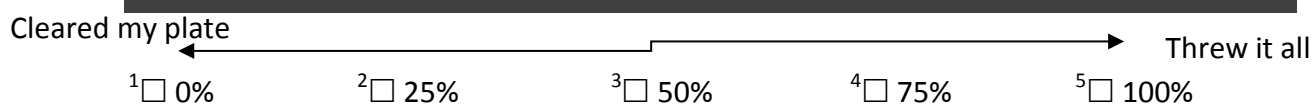
.....

Section C: About you and food waste

11 At University, How often do you use the following catering outlets?

	¹ Regularly	² Once a week	³ Once a Month	⁴ Less than once a month	⁵ Never
The Hub	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Deli Marche cafe near library	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cafe in Jaguar Building	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cafe at the Technology Centre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Student halls catering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11 Think back to the last meal you have eaten at University, how much did you throw away



12 If you threw some food away, please give a reason why

.....

.....

13 Do you undertake any actions to reduce the amount of food you throw away?

.....

.....

14 What would motivate you to reduce the amount of food you waste?

.....

.....

15 To what extent do you feel that your actions can impact the overall food waste issue?

1 To no extent 2 To a little extent 3 To a large extent

Please give reasoning for you answer

.....
.....

16 Rank the following from 1, most responsible, to 6, least responsible in reducing food waste.

- ___ The Government
- ___ Supermarkets
- ___ Manufacturers
- ___ Food producers
- ___ Consumers
- ___ Everyone

16b Please give a reason for your answer

.....
.....

17 What do you think Coventry University could do to reduce food waste?

.....
.....

18 Have you ever considered sharing food rather than throwing it away?

- ¹ No
- ² Yes

Please give details of how often and who with

.....

Thankyou for completing this questionnaire, please write your email address on the next page to be entered into the prize draw

Email Address

Would you be interested in taking part in further research using social media to share food across campus?

- ¹ Yes please contact me in the future by email
- ² No thank you

Please make sure you take a participant information sheet when returning this questionnaire.

Any further comments?

.....
.....

Appendix 6

Online Questionnaire – Coventry University Food Waste Survey

Welcome to the Coventry University Food Waste Survey

By completing this survey you will be entered into a prize draw to win £50

By responding to the survey, your consent to take part in the study is assumed and you agree to the use of anonymised quotes in publications

Project Information

The aim of the study is to measure the extent to which food waste can be prevented using social media as a tool for behaviour change.

Information will be collected regarding the behaviours and attitudes of students, academic and university operation staff.

As part of this University's community, your views are critical to understanding and improving the sustainability of this institution.

The information will be analysed and written up as part of a thesis and an extended summary submitted to The Chartered Institute of Waste Management

The research is organised by Jordon Lazell who is a Masters by Research student at Coventry University working within the Department of Geography, Environment and Disaster Management.

This project is partially funded by the Chartered Institute of Waste Management (CIWM).

Data management

Only the researcher will have access to the information recorded and once the Masters by Research project has been marked and returned, this information will then be destroyed.

Your participation is voluntary and if you change your mind about your involvement in the study you can withdraw at any point.

This can be done by contacting me by email and the information you provided will be withdrawn and destroyed.

The survey is completed anonymously, can be saved part way through and takes around 5 minutes to complete.

Further contact details:

Jordon Lazell

Lazellj@uni.coventry.ac.uk

Dr Moya Kneafsey

apy034@coventry.ac.uk

Section A: Overview of yourself

1. What role do you undertake at Coventry University?

- I am a Student
- I am an Academic staff member
- am an operations member
- I work for the students Union
- Other (please specify):

2. If you are a Student or a member of academic staff, which faculty do you belong to?

- Business, Environment & Society
- Lifelong Learning
- Health & Life Sciences
- Engineering & Computing
- Art & Design
- Other (please specify):

3. If you are a student, what stage are you currently in your studies?

- Diploma/ College
- Undergraduate
- Post Graduate

4. If you are a Student, What are you studying?

5. How would you describe your household?

Please state which student halls / Please state number of residents

Please tick most appropriate

- a. Student halls -
- b. Student House/ flat -
- c. Semi-detached/ Terraced -
- d. Detached -
- e. Other -

6. Do you have a local food waste collection service?

- Yes No I don't know

Section B: Your Priorities

7. Please rate how important you feel the following issues are on a scale of 0, not important, to 5, very important.

	0 Not Important	1	2	3	4	5	Very Important
a. • Air pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b. • Climate change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c. • Deforestation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d. • Food Waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e. • Intensive farming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f. • Overfishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
g. • Poverty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
h. • Water scarcity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

8. Of the things you consider important, what actions have you taken to make an impact?

9. What motivates you to make a difference to this/ these issues?

10. To what extent do you feel that your actions have an impact on this/ these issues?
To no extent To a little extent To a large extent

Please give reasoning for you answer:

Section C: About you and food waste

11. At University, how often do you use the following catering outlets?

	Regularly	Once a week	Once a month	Less than once a month	Never
a. The Hub	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Deli Marche	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Cafe in Jaguar building	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Technology Centre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Student halls catering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. Think back to the last meal you have eaten at University, how much did you throw away?

0% - Cleared my plate 25% 50% 75% 100% - Threw it all away

If you threw some food away, please give a reason why

13. Do you undertake any actions to reduce the amount of food you throw away?

14. What would motivate you to reduce the amount of food you waste?

15. To what extent do you feel that your actions can impact the overall food waste issue?

To no extent To a little extent To a large extent

Please give reasoning for your answer

16. Rank the following from 1, most responsible, to 6, least responsible in reducing food waste.

- a. The government
- b. Supermarkets
- c. Manufacturers
- d. Food producers
- e. Consumers
- f. Everyone

17. Please give a reason for your answer (previous question)

18. What do you think Coventry University could do to reduce food waste?

19. Have you ever considered sharing food rather than throwing it away?

No Yes

Please give details of how often and who with

Please write you email address below to be entered into the prize draw

20. Email address:

21. Would you be interested in taking part in further research using social media to share food across campus?

Yes please contact me in the future by email No thank you

22. Any further comments?

Thank you for completing this survey

Please follow this link to return to the Coventry University Homepage

[Coventry University Homepage](#)

New! Food Network
Follow @CUFN1
on twitter
for free food!

and the chance

to share your Food
across campus to
reduce Food Waste

Simply Follow
@CUFN1 

Then tweet #CUFN1
What you want to
share and where you
are at Uni.



Coventry University Food Network

New Food Network!

Follow [@CUFN1](#) on [twitter](#) for free food

Help reduce food waste by sharing your food across campus

Simply tweet [#CUFN](#) what you want to share and where you are at Uni



Coventry University Food Network

This is part of research funded by Defra-CIWM. Please contact Siraj Shaikh for more details

Appendix 9 - Participant Information Sheet

Study Title: Identifying the barriers and opportunities for food waste prevention in Universities: Using social media as a tool for behaviour change

What is the purpose of the study?

The aim of the study is to measure the extent to which food waste can be prevented using social media as a tool for behaviour change.

Why have I been chosen?

For the purpose of the study, I need information regarding the behaviours and attitudes of students, academic and university operation staff.

Do I have to take part?

No your participation is voluntary and if you change your mind about your involvement in the study you can withdraw at any point. This can be done by contacting me by email and the information you provided will be withdrawn and destroyed.

What will happen to me if I take part?

You will be asked to participate in a short focus group discussing your views on food waste/ undertake a questionnaire regarding food waste habits/ participate in a semi-structured interview regarding food waste at Coventry University.

All information about respondents will be kept anonymous and will not identify individual's views.

What are the possible disadvantages and risks of taking part?

None.

What are the possible benefits of taking part?

As part of this Universities community, your views are critical to understanding and improving the sustainability of this institution.

Will my taking part in this study be kept confidential?

Yes. Only I will have access to the information recorded and once my Masters by Research project has been marked and returned, it will then be destroyed.

What will happen to the results of the research study?

The information will be analysed and written up as part of my dissertation, an extended summary submitted to CIWM and if deemed of great importance academically, could be presented for publication in a peer reviewed journal.

Who is organising and funding the research?

The research is organised by Jordon Lazell who is a Masters by Research student at Coventry University working within the Department of Geography, Environment and Disaster Management. This project is partially funded by the Chartered Institute of Waste Management (CIWM).

Who has reviewed the study?

The Geography, Environment and Disasters Ethics Committee have reviewed and approved the study.

Contact for Further Information.

Jordon Lazell

Dr Moya Kneafsey

lazellj@uni.coventry.ac.uk

apy034@coventry.ac.uk

Informed Consent Form

Before completing this form you should have read and understood the participant information sheet.

Name of Respondent.....

Name of Company.....

Position.....

I have read and I understand the participant information sheet for this study.

By completing this form, I am giving my consent for you to use my information in this research study.

I understand that all information recorded will be kept anonymous and will not identify individual's views. This information may be recorded using audio equipment and anonymised quotes used in publications.

I understand that I have the right to withdraw my information at any point by contacting the researcher using the details on the participant information sheet and quoting the participant reference code written at the top of this questionnaire.

I have made a note of my participant reference code

Signature