HOW EFFECTIVE IS CENTRALISED FOOD WASTE COMPOSTING? - A CASE STUDY OF PUBLIC ATTITUDE TOWARD THE NEW FOOD WASTE SCHEME IN BROADLAND, NORFOLK

By

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Thesis presented in part-fulfilment of the degree of Master of Science/Master of Research in accordance with the regulations of the University of East Anglia

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August 2010

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Abstract

Due to targets imposed by the EU to reduce the amount of biodegradable municipal waste going to landfill, different methods are being devised to achieve these aims. One such method is the separate collection and subsequent centralised composting of household food waste. With the help of WRAP one such scheme has been implemented is in the district of Broadland, Norfolk. A major factor in the success of any scheme implemented by a local authority is how the public react to the scheme. This study aims to further investigate public attitude toward food waste collection with regard to its use, opinion on the scheme, effectiveness of information provision and overall knowledge of the scheme. In order to achieve this a detailed literature review was undertaken to assess the need for the scheme followed by a postal survey on residents recently exposed to the expansion of the food waste collection scheme. It was found that in general the scheme has been well received by the population of Broadland, with participation rates high, and residents displaying a high level of satisfaction and good knowledge of the scheme. Negative press was found to have a significant impact on formulation of opinion. In general the provision of information has been good.
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Acknowledgements

Firstly I would like to thank those individuals in Broadland who took the time to fill in and return my questionnaire. Without their input this study would not have been possible, and I
am extremely grateful. I would also like to thank Broadland District Council, especially Paul Smith for giving up so much of his time to talk to me about the scheme in which they have worked hard to get up and running, as well as providing me with invaluable information and data on the waste strategy implemented in the district of Broadland.

Special thanks must go to Dr Iain Lake my advisor. I will be forever thankful to him for the guidance and support he supplied throughout the whole process of conducting this project, from formulating an idea to final submission he has been patient and willing to provide help and assistance.

I would also like to thank Ruth Spilman for helping me address and stamp the envelopes, and generally helping me throughout this whole process, and Helen Fookes for proof reading.
Chapter 1 Introduction

1.1 Study Background

It is becoming ever more apparent that historically the way we manage our waste in the UK is unsustainable. Therefore there is a need for a radical overhaul of the “out of sight, out of mind” mentality often associated with the disposal of municipal waste. In the UK we dispose of over 435 million tonnes of rubbish every year, approximately 6% of this comes from household bins (Murray 1999). A major area of concern is the landfilling of biodegradable municipal waste (BMW). This fraction of the waste stream is composed of organic material that can be broken down by other living organisms, and can include green waste, waste paper, cardboard and biodegradable plastics (SEPA 2009). The focus of this report however will be on the food waste fraction of BMW.

1.2 History of Waste Management in the UK

Waste management is not a new concept. For thousands of years human beings have had to deal with the waste in which they produce. Waste management has only been an area of concern however in the past 200 years or so, since the industrial revolution. During the industrial revolution, there was mass migration of people from rural to urban areas. With this increased population density, so too came an increase in the volume of waste being produced (Waste Online 2004). It was soon realised that without effective waste management (in inner cities especially), waste could have a significant impact on quality of life due to odour and vermin, as well as posing secondary danger in the form of obstructing public highways. Due to vermin infestation spread of disease was rife (Williams 1998).

As the link between poor public health and poor waste management was established, the UK government began to introduce legislation to combat the issue. In 1875, the public health act was introduced. This charged local authorities with the duty to arrange the collection and disposal of waste (Waste Online 2004). As a result of the act, the dust bin was born. The majority of the waste collected at this time was incinerated.

At the beginning of the 20th century, there was a sway away from the use of incinerators. Instead the preferred method of waste management came in the form of landfilling. It was seen as a cheaper and more convenient method of waste disposal. By this time the early incinerators were seen as expensive and dirty. The “out of sight, out of mind” characteristic that landfill allows made it a far more appealing option to local authorities (Waste Online
2004). Although early landfill sites were poorly designed, often struggling with pollution and vermin problems, landfilling continued to be the principal method for waste disposal.

Unlike many other European countries, the UK failed to adapt their waste management strategies as sustainable development became a more and more prevalent issue. In 2003, the UK land filled an estimated 75% of its municipal waste, compared with 38% in France and 20% in Germany (National Audit Office 2006). This figure did fall to 67% by 2006, however a radical change is still required.

In the past 10 years however there has been a realisation that landfilling is unsustainable and damaging to the environment. Valuable recyclables are lost, there is a significant risk of pollution, limited space and emission of greenhouse gasses. Because of these reasons there has been a drive to reduce the amount of waste entering landfill by increasing recycling and recovery, and more importantly reducing the amount of waste that is produced. Kerbside collection and centralised composting of food and kitchen waste is just one method applied by local authorities to achieve this.

1.3 Study Area

Kerbside collection of food waste is becoming an increasingly popular method for local authorities to reduce the amount of BMW sent to landfill (WRAP 2009). In recent years, DEFRA has funded 19 trials of separate food waste collection throughout the country, supported by WRAP. The focus of this report shall be on the scheme implemented by Broadland district council. Broadland is in Norfolk. It includes the northern suburbs of the city of Norwich and the rural areas to the North East of the City, and covers an area of 55,240 ha (NCC 2006). This study shall be focus on the villages of Taverham, Horsford, Spixworth, New Rackheath and Brundall (see fig 1.1). The district of Broadland has a relatively elderly age profile when compared with the rest of England and Wales.

The initial trial for the food waste collection scheme in Broadland was introduced in March 2008 and encompassed 6000 properties on the urban fringe of Norwich. Due to the Success of the Scheme it is being extended into some of the more rural villages in the District, so that is covers around 10,000 homes (Broadland district council 2009).

A small 7 litre caddy is provided for the kitchen, and a 21 litre bin is provided for external storage of the food waste. Biodegradable starch bags are provided and the bins are emptied on a weekly basis. Once the food waste is collected, it is transported to a licensed disposal site operated by ORM North Norfolk at Scrubs farm, Edgefield. Here they process the waste
using a slow rotating drum. Once the food waste has been processed, it is mixed with garden waste and composted in poly tunnels.

Figure 1.1 Map of Study Area

1.4 Aims and Objectives

This study sets out to identify how the public perceive the new food waste collection scheme in Broadland. The following literature review will highlight the significance of public participation in the success of any scheme a local authority chooses to subject its population to. Although Broadland district council have undertaken their own follow up study on the success of the scheme, it was felt that it lacks detail, especially in relation to the success of the communication strategy associated with the scheme. 4 objectives have been set. In order to enable analysis to be undertaken, 2 hypotheses have been formulated. Proving or disproving these will help achieve each objective:

1. To identify participation and use of the scheme

   Older people are less likely to use the scheme than younger people

   Larger households produce more food waste than smaller households

2. To gauge public opinion of the scheme.
Older people are less satisfied with the scheme than younger people

Perceived problems with the scheme will be different to actual problems with the scheme

3. To identify what medium of communication is most effective

Leaflets through the door/with the bin are the most effective method of communication

The current communication strategy is adequate and does not need to be improved

4. To gauge the level of knowledge the public have on the need for separate food waste collection

Residents are aware of the reasons for implementing the scheme and agree with them

Level of education has an impact on how people perceive food waste collection

5. To provide recommendations for the improvement of the food waste collection scheme

Broadland is a relatively large district in Norfolk, therefore if the scheme is successful here, it is likely that it could be implemented throughout the county.
Chapter 2 Background

The aim of this study is to assess the public attitude toward a specific food waste collection scheme; if the general public perceive a scheme to be poor, then participation rates will be low and there is a high chance the scheme will fail.

Separate food waste collection is still a very new concept in the UK. In order to understand it fully, we must first understand the need for it. This includes understanding the relevant legislation, the need for changing policy in terms of environmental impact of food waste, and the potential benefits that food waste recycling/composting can bring.

2.1 Defining Waste

Defining waste is a contentious issue. In essence defining waste is subjective. For legislation to be enforced there must be a clear definition of waste in order to identify what needs to be controlled and monitored. Universal definitions are also required so that local, regional and national waste strategies can be devised without conflict. Williams (2005) makes the point that the definition of waste is a challenge since waste is heterogeneous and there can be great variation between different loads of waste. It is the member states responsibility to interpret the definition of waste correctly, as ignorance is no defence if a member state does not comply.

The definition of waste in the UK derives from the waste framework directive (75/442/EEC as amended by 2008/98/EC). The Environment agency defines waste as

“Any substance or object which the holder discards or intends to discard (Council Directive 75/442/EEC 1975)”.

Pongrácz and Pohjola (2003) state that the current definition of waste used by the EU lacks precision, and therefore each member state interprets it differently. This creates problems within the recycling industry due to trade barriers. Lox (1994) proposes the definition:

“Either an output with (‘a negative market’) no economic value from an industrial system or any substance or object that has ‘been used for its intended purpose’ (or ‘served its intended function’) by the consumer and will not be reused”

The second part of this definition covers materials that were intended for a specific purpose but have not fulfilled that purpose and have therefore become waste. An example of this is excess fertiliser on a farmer’s field (Pongrácz and Pohjola 2003).
The environment act 1995 sets out a number of categories in which a number of different wastes are defined. This study is concerned with household waste. In the act, it is defined as:

“Household waste means waste from private domestic accommodation, caravans, residential homes, universities or schools or other educational establishment, hospital premises and nursing homes (Environmental Act 1995)”

Food waste is also a municipal solid waste. In the environment act 1995 this is defined as:

“A common term used from the waste collected and disposed of by or on behalf of a local authority. In general the waste consists of mainly household and commercial waste (Environmental Act 1995)”

There is no one definition of food waste. Using these definitions, for the purpose of this report municipal food waste is defined as:

“Waste material resulting from pre and post preparation of food, that is of a quality suitable for recycling via composting”

2.2 Legislation associated with food waste management

The introduction of new legislation has meant it is now not legally or economically possible to dispose of the majority of our waste into landfill. The EU has a great deal of influence on how we manage our waste in the UK.

2.2.1 Waste Framework Directive and the Waste Hierarchy

The overriding piece of legislation introduced by the EU is the EU directive on waste (75/442/EEC as amended by 2008/98/EC), otherwise known as the Waste Framework Directive. It was 1st introduced in 1975 and the purpose is to provide the member states with a framework for the management of the waste that they produce. It also sets out to define terms such as “waste”, “recovery” and “disposal” (Waste Online 2005). Amongst others, one of the main concepts outlined in the waste framework directive is the concept of the waste hierarchy (fig 2.1). The purpose of the waste hierarchy is to give priority to waste prevention. Failing that it aims to promote the re-use and recovery of waste. Food waste collection and composting fits into the recycling stage of the waste hierarchy. Only when all other options have been considered, should waste be disposed of, usually in the form of landfill. The higher up the waste hierarchy a waste management strategy is, the more sustainable it is.
Once an EU directive has been published, it is up to the government of the member states to transpose it into their individual laws. It is up to the individual member state how they do this, however each member state must fulfil targets and conditions set in the directive or face financial penalty (Williams 1998). The waste framework directive has been implemented via the Environmental Protection Act 1990, the Control of Pollution act 1989, the Waste Management Licensing Regulations 1994 and the controlled waste regulation 1991. It is the job of the environment agency to regulate and enforce this legislation (Waste Online 2005).

![Waste hierarchy](Figure 2.1 Waste hierarchy Source: DEFRA (2007a))

### 2.2.2 The Landfill directive

The piece of legislation most significant to food waste collection is the introduction of the EU landfill directive (Council Directive 1999/31/EC). The landfill directive is intended to prevent or reduce the adverse effects of the landfill of waste on the environment, in particular on surface water, groundwater, soil, air and human health. It also aims to reduce the impact waste have on climate change. In the landfill directive it states that; 1) certain wastes, such as hospital and liquid waste are banned from landfill. 2) All landfill sites must be classified as inert, hazardous or non-hazardous. 3) All waste requires pre treating (or sorting) before going to landfill and 4) the UK’s practice of co disposal of hazardous and non-hazardous waste must have stopped by 2004 (which it has) (DEFRA 2003).
To achieve the aim of reducing the amount of BMW going to landfill, the EU have set challenging targets (table 2.1). If these targets are not achieved then the UK government faces heavy financial penalties, believed to be in the region of £500,000 a day for every day they are non compliant with the set target. The Prime Minister’s strategy unit suggests that fines could be in excess of £180 million p/a for non compliance (National Audit Office 2006). In the current economic climate, these penalties are simply not viable; therefore it is essential the UK fulfils targets. They are especially challenging for the UK, due to the UK’s historic reliance on landfill.

The landfill directive has been transposed into UK law through the landfill (England and Wales) regulations 2002. In these regulations, for a permit to be given, a site must be classified as set out in the landfill directive. It also set out conditions for licensing.

In order to encourage local authorities to divert BMW such as food waste from landfill, the UK government has implemented an increasing landfill tax. In 2007 it cost £24 per tonne to put waste into landfill. Currently the tax is double that at £48 per tonne. This is set to increase by £8 per year until 2013, making landfilling waste an economically unviable option. The proceeds from landfill tax go into investing in more sustainable forms of waste management (DEFRA 2007b).

<table>
<thead>
<tr>
<th>BMW Levels Allowed to Landfill</th>
<th>Target Year for UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>75% of 1995 Quantities</td>
<td>2009/2010</td>
</tr>
<tr>
<td>50% of 1995 Quantities</td>
<td>2012/2013</td>
</tr>
<tr>
<td>35% of 1995 Quantities</td>
<td>2019/2020</td>
</tr>
</tbody>
</table>

Table 2.1 EU Landfill Targets Source: DEFRA (2007)

2.3 Significance of Separated Food Waste Collection

2.3.1 Global Warming Potential of Food Waste

Amongst other factors, climate change is a major driver for changing our waste management strategy. Waste has the potential to generate a significant amount of greenhouse gas. Depending on the type of food used, food waste has a high potential for methane production (96–424 mL dry g⁻¹) (Lay et al. 1997). Recent studies indicate that release of greenhouse gasses (GHGs) from landfill account for approximately 3% of all green house gas emissions.
in the UK. 40% of the UK’s emission of methane gas originates from BMW in landfill (DEFRA 2007a). Methane has a global warming potential (GWP) 25 times higher than carbon dioxide (IPCC working group 1 2007), therefore if not managed properly, the release of methane from landfill sites can potentially have a significant impact on the global climate.

2.3.2 Helping to Meet Targets

To reach targets on reducing BMW to landfill set by the EU, the principal method of waste management being employed by the UK government is waste segregation. This involves individuals sorting their own waste into separate bins, which are in turn collected by different lorries and dealt with accordingly. The waste stream focused on in this report is the separated food waste stream. An estimated 8.3 million tonnes of food waste was produced in the UK last year (WRAP 2009), the majority of which could have been eaten or at the very least been diverted from Landfill. Figure 2.2 shows the estimated carbon benefits of diverting waste from landfill. Around 250 kg of CO₂ can be saved per tonne of food waste diverted from landfill.

![Figure 2.2 Estimated Carbon Benefits of Diverting Waste from Landfill](Source: DEFRA (2007a))
2.3.3 Success of Previous Schemes

A recent report published by WRAP (2009) stated that 31% of residual waste was food waste, therefore it is a stream of waste that is an obvious target for separation and treatment. WRAP (funded by DEFRA), aided local authorities in implementing food waste trials. These included: Belfast, Calderdale, Hackney, Mid-Bedfordshire, Newtownabbey, Preston, South London Waste Partnership, Waveney, the initial Broadland scheme, East Devon, Luton, Newcastle upon Tyne, Oldham, South Shropshire, Elmbridge, Mole Valley, Guildford and West Devon. These locations represented a range of demographics. If all schemes were deemed successful, then it would mean that separated food waste collection is a viable option to add into a national scale waste management strategy.

The results of the trial were promising. Of the 135,540 houses sampled, 10,200 tonnes of food waste was diverted from landfill, avoiding 4,600 tonnes of CO₂ emission. The success of the trial schemes prompted 3 of the districts to implement separated food waste collection on a district wide scale.

A key finding of the WRAP report was the significance of the wider waste collection strategy. Due to hygiene reasons, food waste collection should be collected on a weekly basis. However WRAP found there to be a statistically significant relationship between residual bin collection frequency and yield of food waste collected (see Fig 2.3).
Figure 2.3 Average waste yields per household in the WRAP supported trials  Source: WRAP (2009a)

Figure 2.4 Comparison of food waste yields obtained when used with fortnightly and weekly refuse collections  Source: WRAP (2009a)

The results of the study show that not only on average is the weekly yield of food waste higher, but that when used in conjunction with weekly refuse collections, in the 2nd half of the trial, there was a significant drop in yield (see Fig 2.4). The scheme in which this study is
based (Broadland) uses the food waste collection scheme in conjunction with alternate weekly collection, therefore in theory, will obtain a maximum yield of food waste.

As part of the WRAP report, an attempt was made to gauge public attitudes towards food waste collection. This is significant to my study as one of the main objectives is to attempt to identify what the people of Broadland think of food waste collection. They obtained data using a similar methodology to that of this study; delivering of door step questionnaires to a representative sample of the study area. The study areas chosen for the WRAP study were: Mid-Bedfordshire, Newcastle upon Tyne, South Shropshire, Waveney, West Devon. Of the study conducted by WRAP, 77% of respondents claimed to be participating in the scheme. Of those that stated they did not participate:

- 24% expressed concerns about hygiene
- 21% stated that they felt they did not generate enough food waste to make the scheme worth while
- 9% stated they did not use the scheme as they home composted all their food waste.

The WRAP report indicated that around 22% of respondents had experienced problems with the scheme at some point during the trial period. These came in the form of:

- Odour or Vermin (6%)
- Missed collections (4%)
- Insufficient liners (3%)
- Changing collection day (2%)

Participation was also examined in the WRAP report. They found that of 20 trial areas sampled, 10 areas achieved a participation rate of over 70% (see fig 2.5). Those areas with low participation rates tended to have a high number of properties of multiple occupancy. Participation varied depending on the demographic of the area. In most areas a drop off in participation was experienced, this however is to be expected with the introduction of a new scheme.

An area of significant interest to my study is previous attitude toward food waste collection, specifically home composting. From the respondents to the WRAP questionnaire, 24% said they already composted. Of this 24%, 63% said that the scheme had made no difference to the way in which they manage their food waste, 24% stated they home composted less since...
the introduction of the trials, and 5% stated that they home composted more since the introduction of the trials.

Another area in which my study focuses on is public satisfaction of food waste collection. This includes areas such as collection, bin and liner provision. The bags provided for the WRAP supported schemes (including the trial Broadland scheme) were potato starch bags, of 18 micron thickness (WRAP 2009). WRAP reported a 98% satisfaction rate with the liners, although available, liners with tie handles were not required and are an unnecessary cost. Table 2.2 highlights the pros and cons of providing liners for food waste collection.

Figure 2.5 Participation rates of 20 areas in the WRAP supported schemes. Some have been sampled several times. Source WRAP (2009a)

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
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<tbody>
<tr>
<td>Makes the process cleaner for residents</td>
<td>Adds an additional cost to the service, if councils supply them to residents</td>
</tr>
<tr>
<td>Many residents prefer to use liners</td>
<td>Can be time consuming to distribute if not done by collection crew</td>
</tr>
<tr>
<td>Potentially higher capture rates and yields achieved</td>
<td>Wastage of liners if distributed inefficiently and to non participating households.</td>
</tr>
<tr>
<td>Potentially higher participation rates achieved</td>
<td></td>
</tr>
<tr>
<td>Collections are easier for crews - food waste doesn’t stick to containers and all food waste is emptied from the container</td>
<td></td>
</tr>
<tr>
<td>Collection chambers in vehicles are kept cleaner and chances of spillages /leakages are reduced.</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.2 Pros and cons of liner provision  Source: WRAP (2009c)
Broadland district council provide liners with the bins at the start of the scheme. If any more liners are required, the resident must place a note requesting more liners with the bin on the day of collection. This is in an attempt to reduce the cost of unnecessary distribution of bags (Broadland district council 2010).

The WRAP report in general is a comprehensive study of the success of food waste collections in a wide range of areas. Where it is limited is it only conducts follow up studies to selected areas. This is probably due to time and financial constraints. There have been no specific studies conducted by WRAP into public attitudes and barriers to food waste collection in the district of Broadland. This therefore is an area in which my study can be seen as significant.

2.3.4 Composting Food Waste

When food waste is collected, it can be dealt with in 1 of 2 ways; Anaerobic digestion of composting. The method chosen by Broadland district council is a centralised composting scheme. Composting is “the aerobic biological degradation of biodegradable organic waste such as garden and food waste” (Williams 2005). Composting is advantageous as it removes a large proportion BMW from the waste stream, therefore helping fulfil targets set by the landfill directive (1999). When using a centralised composting scheme like the one Broadland have utilised, the food waste is transported to a treatment centre where a rotating drum composting system is used (see fig 7). Here the waste is placed in the drum, with air being forced into it to ensure aerobic conditions. Temperature is kept at a constant 30-35°C for maximum micro organism activity. This ensures an even breakdown of the organic material (Diaz et al. 1993; Swan et al. 2002). Once processed, the compost is removed and placed in poly tunnels. Once in the poly tunnels the compost is left to mature and reduce the moisture content. Once matured the food waste compost is then used as an agricultural fertiliser. The addition of composted bio waste helps with improved the soil structure of clay soils, as well as improving the nutrient content and the ability of the soil to retain moisture (Williams 2005).

Lundie and Peters (2004) state that in an ideal world, home composting would be the most ideal option for managing food waste, however it is clear that the majority of the population in the UK cannot or will not home compost. Due to the energy intensive nature of collection, they state centralised composting can be seen as unsuitable for certain areas. They state that when compared with landfilling BMW, centralised composting under performs in most areas, however has a much lower impact in terms of climate change and GWP. This is however not the case for all areas, and in suburban areas such as Broadland, the distance lorries and crews
must travel between collection and transfer is not large enough to warrant significant concern. It is also assumed that centralised composting facilities will operate under aerobic conditions, where as home composting may sometimes be carried out incorrectly and therefore operate undesirable anaerobic conditions.

Composting is also perceived as an environmentally friendly option of waste management by the general public (Schaub and Leonard 1996). If public communication is effective throughout the implementation of the food waste collection scheme, then the general public are more likely to participate if they are aware that the waste is to be composted. Similar to recycling, composting is a relatively easy way for the lay person to make themselves feel that they are doing their part for the environment.

2.4 Public Participation

For the food waste collection scheme in Broadland to be successful, then it is essential that a high proportion of people believe in the scheme. They must know why the scheme is being implemented, and the benefits of it. If these criteria are not met, then it is likely that public participation will be low and the scheme will fail.

Ackerman (2000) makes the point that it is essential we target waste management to reduce our carbon emission, as it is much easier to modify people’s attitudes to waste management than influence their opinions on other high emission areas such as transport or energy use. This is because modifying waste management practices will have little impact on quality of life, where as reducing the amount an individual uses their car. It is clear therefore that it is essential that we move away from a landfill centred approach to waste management.

2.4.1 Integrated Waste Management Strategy

The introduction of food waste collection scheme also can be used to alleviate concerns members of the general public may have over the recent trend towards fortnightly collection of the residual bins in an area, similar to the scheme implemented by Broadland district council. Since there implementation, there has been concern that only collecting bins every other week could affect both health and quality of life through increased smell, flies and vermin (DEFRA 2007a). With the introduction of weekly food waste collection, if done correctly, then there is a possibility that the issues associated with fortnightly collections and food waste could be alleviated. Woodward et al., (2001) highlight that a main point of opposition to fortnightly collection of waste is due to fears about public health and odour, especially in hot weather. Therefore if it can be proven to the public that the food waste
collection scheme compliments the alternate weekly collection scheme, then this may improve participation in the scheme and prevent drop off of interest.

2.4.2 Communication

A key aspect of a high participation rate in a scheme is the quality of the communication strategy that runs before and during. Much of the literature on public communication is associated with effective communication of risk. Since there is very little risk associated with the incorporation of a food waste collection scheme into a waste strategy, most of this does not apply. There is limited knowledge on public communication strategy associated with food waste collection schemes as they are a relatively new concept. There is however some literature on the success of communication in aiding recycling schemes. Many authors state that low participation or high drop of rate in recycling schemes is often down inadequate provision of information (Audit Commission 1997; Evison and Read 2001; Tucker and Speirs 2002; Mee et al. 2004; WRAP 2009). This highlights the need for an effective plan for the provision of information to the public.

Thomas (2001) states that an effective communication strategy will have benefits for the whole collection system as a whole, and improving knowledge of one area of waste will improve the performance of the overall waste management system. She also says that focusing on a specific type of material to recycle, coupled with an effective communication strategy is more effective than collecting a broad range of recyclables without a good level of public understanding.

Mee et al., (2004) state that although public opinion of recycling and composting schemes has improved over recent years, there is still a tendency for local authorities to neglect issues concerning public participation and the need for effective marketing communications to residents. They cite a case study in Ruschcliffe, Nottinghamshire as an example of effective communication toward recycling to increase participation in recycling schemes. The introduced a 4 tier recycling campaign, firstly they introduced the recycling2go branding concept to give the scheme identity. They then began a “pull” campaign in attempt to get more people involved in recycling. Communication media included direct mail, road shows, newsletters and creation of a dedicated Internet site. Then a “push” campaign encouraging partners to the local authority to promote pro-active recycling. Finally the “consultation” phase involved feedback from the general public about the scheme using questionnaires, online consultation, focus groups, semi-structured interviews and a Citizens’ Panel survey. The result of this campaign was a large proportion (65%) being very satisfied with the
information they were provided about the scheme, and only 3% being fairly dissatisfied or very dissatisfied (see fig 2.6)

Figure 2.6 Plot of residents of Rushcliffes satisfaction with information provided about new recycling scheme Source Mee et al., (2004)

Mee et al found that the most effective method of communication to the public was in the local newsletter, and that in terms of reasons why people do not recycle, the most common answer was there was no reason why the respondent didn’t recycle. They also found that the road shows were largely ineffective. Figure 2.7 shows how recycling rates steadily improved, indicating a successful communication campaign.

Figure 2.7 Plot of recycling rates in the Borough of Rushcliffe between Feb 02-Jan 03 Source Mee et al., (2004)
A main area of interest in my study is the success of the communication strategy implemented by Broadland District Council. To develop their strategy, Broadlands’s main source of consultation was WRAP. Since the completion of the WRAP assisted trial, WRAP have published a report (WRAP 2009) on the success of differing methods of communication. They identified several key points which must be covered within a communication strategy:

1. How to operate the caddy and bin system
2. What materials were to be accepted in the food waste collection scheme
3. Dispel myths about food waste collection that may reduce participation in the scheme

The methods used by WRAP are outlined in Fig 2.8

So far Broadland have published an introduction leaflet and an instruction leaflet, as well as the standard caddy sticker. The bin crews do have contamination tags however so far contamination has not been an issue. In the area of my study, as it has only been implemented recently, a follow up leaflet has not yet been distributed. WRAP have reported that when the following scheme was used in their trials, 95% if people felt that the leaflets told them everything they needed to know, 88% of people said that the leaflets had encouraged them to participate, and 80% of respondents said they had significantly altered the way in which they manage their was as a result of the leaflets.

- **Introduction leaflet** – a four page A5 leaflet to introduce the new service, when it would start and the benefits to householders and the environment. These were delivered two weeks or so before the delivery of food bins and caddies
- **Instruction leaflet** – an eight page A5 leaflet and calendar explaining how to use the service and when the collections would take place. These were delivered with the food bins and caddies
- **Caddy sticker** – an A5 vinyl sticker stuck to the kitchen caddy to act as a permanent reminder of what could be recycled.
- **Contamination tag** – for crews to attach to contaminated food bins. These repeated the things that could and should not be put in the food waste collection.
- **Follow up leaflet** – to be sent out after the scheme had been in operational for a while to inform householders of progress

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**Fig 2.8 Communication media recommended by WRAP for local authorities**  
*Source (WRAP 2009)*
This study will examine the effectiveness of the communication methods chosen by Broadland, and identify any possible improvements that can be made, the following section outlines the methodology used to assess the effectiveness of the communication strategy, as well as identifying satisfaction and use of the scheme.
Chapter 3: Methodology

3.1 Introduction

The main focus of this study is focused around the food waste collection scheme implemented by Broadland District Council. As mentioned, Broadland was one of many schemes assisted by WRAP, therefore there is a higher likelihood of the scheme being successful due to the provision of knowledge and resources. Broadland was chosen due to its close proximity to the city of Norwich meaning easy access to the study area, as well as the availability of literature on the scheme and similar scheme made available thanks to the numerous WRAP reports.
Figure 3.1 Summary of methodology
3.2 Interview and Literature Review

In order to fully understand the subject area prior to formulating a questionnaire, an interview was conducted with Paul Smith. The purpose of this interview was to gain an understanding into the reasons why Broadland District Council felt it necessary to include separate food waste collection into their waste management strategy. A review of the literature was then undertaken to further improve knowledge on the study area, in order to produce a well structured engaging questionnaire. The literature mainly came in the form of government and local authority reports, however where possible peer review literature was utilised. As well as reports and journal articles, books, websites and newspaper articles were also used a source of information.

3.3 The Questionnaire

The main body of the study is focused around the responses gained from a questionnaire sent out to a sample of the population of Broadland who had recently been subjected to the new food waste collection scheme. The interview with Broadland district council revealed that the expansion of the scheme would involve the number of participants rising by 4000 homes. It was decided therefore that sampling should occur in these areas.

3.3.1 The Sample

The first point to consider when sampling a population is who is to be sampled. As this studies aim is to gauge public opinion, a sample study will be taken. As mentioned, the sample will be taken from households who are new to the scheme. So that valid conclusions about the population of Broadland as a whole can be made, it is important that the sample taken is representative of the study area (Oppenheim 2005). To identify the demographic of the study area, data was obtained from Norfolk County Council (NCC 2006)(table 3.1).

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of People</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15</td>
<td>21,037</td>
</tr>
<tr>
<td>16-29</td>
<td>16,772</td>
</tr>
<tr>
<td>30-44</td>
<td>24,449</td>
</tr>
<tr>
<td>45-64</td>
<td>30,474</td>
</tr>
<tr>
<td>Over 65</td>
<td>30,547</td>
</tr>
</tbody>
</table>

Table 3.1 Data for the age profile of the District of Broadland  Source: (NCC 2006)
As the majority of households in Broadland are shared housing, and there is a tendency for the women of the household to manage the waste (Schults 1993), sex is not a particularly important factor in sample selection. Age however is an area in which the sample must be representative. I will not include the 0-15 age category as the study is based around sampling households, and it is unlikely that someone below the age of 16 manages a household's waste. An aim of the study is to identify reasons why a population’s opinion on food waste may vary internally, this could include age. Table 3.2 indicates roughly the age profile of the sample.

<table>
<thead>
<tr>
<th>Age</th>
<th>Approx Percentage of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-29</td>
<td>17</td>
</tr>
<tr>
<td>30-44</td>
<td>24</td>
</tr>
<tr>
<td>45-64</td>
<td>29</td>
</tr>
<tr>
<td>over 65</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 3.2 rough age profile of sample (percentage) target

Broadland population is older than the UK average, therefore any conclusions drawn from the results of the questionnaire with regard to age can’t be used to demonstrate trends throughout the country.

Moore (2000) states that in order to make any conclusions of any real meaning, the minimum quantity that should be sampled is 100 households. However as the study area is relatively large, a target of 200 households was set. Financial and time constraints dictate that 300 questionnaires is the maximum that can be distributed, therefore a 66% return rate was required.

Where possible sampling took place after 5pm to maximise the number of respondents from the working population. Table 3.4 outlines distribution time, date and number of questionnaire distributed in that area.

<table>
<thead>
<tr>
<th>Location</th>
<th>Date of Road show</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brundall</td>
<td>08/03/2010</td>
</tr>
<tr>
<td>New Rackheath</td>
<td>09/03/2010</td>
</tr>
<tr>
<td>Spixworth</td>
<td>10/03/2010</td>
</tr>
<tr>
<td>Horseford</td>
<td>11/03/2010</td>
</tr>
<tr>
<td>Taverham</td>
<td>12/03/2010</td>
</tr>
</tbody>
</table>

Table 3.3 Location and date of Road show conducted by Broadland District Council
3.3.2 Method of Survey

Once the study area and sample had been decided upon, the next step was to design the questionnaire. The first point to consider was how to undertake the study; whether it is face to face interviews, over the phone or a postal survey.

Interviews are generally conducted face to face. There are several advantages to using an interview approach when compared with a method such as a postal survey. Interviews provide the possibility for the interviewer to modify the line of enquiry, following up on interesting responses and brushing over those that may not be significant to the person in question, providing a more engaging method of data collection (Robson 2002). Due to the size of the study, writing up notes and inputting data would not be feasible given the time constraints.

Another method of collecting data on public opinion is the use of a postal survey. This is when questionnaire is distributed and then either collected at a later date or posted back. The validity of questionnaires depends on its clarity, and on the proficiency of the person running it. A poorly written questionnaire will not be engaging, therefore could yield a very poor return rate. If the return rate is good, then the survey will produce a large amount of dubious values (Robson 2002). Postal surveys also carry the burden of often having a very low response rate. Postal surveys have the potential to provide a large amount of the sort of data which is easy for the public to understand. The data is also standardised when it arrives, therefore little manipulation of the data is required prior to analysis. Postal surveys also provide anonymity for the respondent which encourages them to be open and honest about the answers they provide (Robson 2002). The matrix (table 3.5) below indicates the best option of undertaking a survey on the population of Broadlands opinion of food waste collection.

For this study, it was decided that a postal survey would be utilised. Although expensive with regards to cost of stamps and envelopes, these costs would be covered within the budget of the project. The ability to obtain a large amount of standardised data was a key factor in this decision. The pilot study was carried out in a face to face format, to test the coherence of the proposed questions on the questionnaire and adjust accordingly.
3.3.3 Questionnaire Design

"The simple truth is questions are the foundation stones upon which most contemporary social science rests" (Foddy 1993). For a study to be successful both in return rate and the quality of data, the most important aspect is the design of the questions. Research questions do not come from nowhere (Flick 2009), they come from the researchers personal experiences and history in the study area. It is therefore essential in question design that the bias of the researcher is kept to an absolute minimum.

A significant part of questionnaire design is what type of questions is to be asked; open or closed? There has been a great deal of debate as to which type of question yields the best results.

Those who use open questions state that it allows respondents to feel more involved in the study, allowing them to express their opinions in full, when compared with closed questions which they argue can at best yield limited responses as they lock respondents into arbitrarily limited alternatives (Foddy 1993).

The argument for the use of closed questions centralises round the ease of analysis. Closed questions provide answers to the same question. This means there is less variability within the answers making data analysis much easier, therefore making it easier for the researcher to establish statistically significant relationships (Foddy 1993). Once the data has been provided it is also easier to compute and manipulate to form valid conclusions (Gillham 2008).

For this study it was decided that the majority of questions were to be given as closed answers, due to the size of the sample and the need for a high response rate. However when necessary an “other” option with space to write will be given. This is to ensure that no
responses are missed due to the limited number of alternatives given in the close question. The first pilot study will be primarily open ended questions to establish common answers and attitudes.

So that the questions asked produced valid and usable responses, the questionnaire was split into 4 sections, each requiring different information, to provided data for each of the 4 objectives. At the begging of each sentence there was a brief statement informing the respondent about the theme of questioning. These sections intended as a loose framework. So that the questionnaire would flow, some questions are not in the correct category.

Objective 1: To identify participation and use of the scheme

“I am now going to ask you a few questions on your usage of the food waste collection scheme”

This section was focused around how people used the scheme, which parts of the scheme were effective or ineffective, and what perceived problems did they have, and where these problems realised after the scheme had been implemented. A particular area of contention highlighted by the pilot study was the issue of the starch liners, therefore in this section this was examined more closely.

Objective 2: To gauge public opinion of the scheme

“First of all I am going to ask you a few questions on what you think of the new food waste collection scheme implemented in your area”

In the first section the questions would be centred on the whether or not people used the scheme and their opinions of it. This was a way of easing them into the study without asking too many probing or personal questions. These questions are designed to be brief, not requiring too much thought. Non emotive language is used so as not to “lead” the respondent in on direction or another. A particular area of contention highlighted by the pilot study was the issue of the starch liners, therefore in this section this was examined more closely.

Objective 3: Identify what medium of communication is most effective, with a hope of establishing a relationship between communication and attitude towards the scheme and compare with data obtained by WRAP

“I would now like to ask you a few questions on the information you were provided about the new food waste collection scheme by the council”
Here the issues surrounding communication of the scheme to the public was addressed. Answers to the closed questions were formulated from both the examination of literature published by WRAP as to common methods used, and the use of pilot studies identifying common responses. In this section the public are given an opportunity to suggest possible improvements to the communication strategy with an open ended type response.

**Objective 4: To Gauge the level of knowledge the public have on food waste collection and the need for it.**

“Finally I would like to ask you what you now think of separated food waste collection”

In this section questions are centred around current public opinion on food waste collection. Questions in this question also include gauging public knowledge about the scheme, especially on knowledge as to why it is needed. It was decided however that putting a reference to gauging knowledge in the leading sentence may alienate respondents, as it may make them feel the knowledge levels are insufficient. Questions in the section relate to those in section one so that a comparison can be made.

It was decided that the request for personal information such as age, sex, qualification type, housing type and number in household would be placed at the end of the questionnaire. Asking for such information can sometimes seem intrusive and may deter people from responding. It was hoped that by placing it at the end, a rapport may have been built, therefore encouraging the respondent to be more open with information given.

### 3.3.4 The Pilot Study

Questionnaires do not emerge fully developed straight away (Oppenheim 2005). They take time to mature, and must be tested several times before they are complete. To achieve this it is essential that pilot studies are carried out to assess the coherence of the questions and the validity of the results that they provide.

For this study, 2 pilot studies were carried out. The first was a collection of open ended questions administered face to face to a sample of 20 people throughout the study area. The purpose of this particular pilot work was to conceptualize the research problem. The structure of this initial pilot work was a few topics that were discussed with the people, rather than specific questions, as recommended by Oppenheim. By using the technique of discussion rather than questioning, it meant that when questions were formulated, the influence from the researcher was minimal. From these early interviews, a number of questions were drafted, as well as a number of possible alternative answers to the closed questions. It was during these
initial stages that the liners were identified as possible area of concern, something that had not been considered previously.

The 2nd pilot involved talking 10 respondents through the draft questionnaire. The purpose of this was to test the order and wording of the questions, so that when the final draft was distributed, it would be answered correctly. This pilot introduced the first closed multiple choice questions. This proved to be useful as the questionnaire was amended to include other possible alternative to answers. If questions where not provided answers with information that was needed, they were changed or removed. Once this pilot had been completed, the questionnaire was amended and the final questionnaire was written (see appendix 2).

3.3.5 Return Rate

As mentioned, historically the issue with postal surveys is a low return rate (Foddy 1993; Barclay et al. 2002; Edwards et al. 2002; Oppenheim 2005). It was therefore essential that certain measures were taken to maximise the possible return rate, as a 66% return rate would be difficult to achieve.

The envelope it one such was of increasing response rate. Each respondent was provided with a hand addressed envelope (addressed to the researcher), as well as a 2nd class stamp. Suggestions that non respondents remove stamps from envelopes are largely unfounded (Oppenheim 2005).

Building a rapport with the respondent is important for high response rate. This was done in a number of ways. Firstly every questionnaire had an introductory paragraph at the top, so that the respondent had an idea of what the research was being used for. This paragraph included a statement ensuring confidentiality, to overcome apprehensions that the data they provide will be abused (Fink 1995). As well as the paragraph of intent, a picture of the researcher was added, as well as each questionnaire being signed by hand. The purpose of this was to make the questionnaire seem more personal, therefore increasing trust (Edwards, Robers et al. 2002; Robson 2002). A major strategy for increasing response rate was to distribute each questionnaire by hand, face to face. This was done by calling at each recipients door, with a brief introduction and statement of intend. Although time consuming, it was hoped that this would significantly increase response rate.

Once the questionnaires were distributed, the respondents were given 2 weeks to return them to the researcher. Once all possible responses had been received, the data could be analysed.
Chapter 4 Results

4.1 Introduction

Out of the 300 questionnaires distributed, 172 were returned, achieving a response rate of 60%. Although lower than the stated target, this number was still sufficient to draw valid conclusions from the data analysis. Out of the 172 returned, 25 were not filled in correctly therefore were discarded. The reason for the high number of poorly filled out questionnaires is unknown; however it is thought that they were filled in by elderly residents, who did not understand the ordering of questions. The decision to discard incomplete questionnaires was made on a case by case basis. It was felt poorly filled questionnaires were either not understood fully or had not had enough thought put into them by the recipient, therefore the responses could not be trusted. If only a few answers were not included, the cases were kept, but when used in conjunction with a comparative analysis, these individuals were temporarily discarded. If a number of responses were given to a question that required just 1, a response was picked at random. The number of questionnaires available for statistical analysis was 147.

From the respondents, 69% were women. This complies with the literature; that women tend to manage a household, therefore manage the waste. Table 4.1 shows the age profile of collected sample, compared with the target. There was a low response rate for the 16-29 age group category, and a high response rate for the over 65 age group category. The 30-64 category is relatively well represented. The bias for over 65 is likely to be due to the increased amount of spare time.

<table>
<thead>
<tr>
<th>Age</th>
<th>Target Percentage of sample</th>
<th>Actual Percentage of sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-29</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>30-44</td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td>45-64</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>over 65</td>
<td>30</td>
<td>41</td>
</tr>
</tbody>
</table>

Table 4.1 Target and achieved age profile of Broadland

The following chapter outlines the results obtained for the objectives set out in the introduction. For each objective there are 2 hypotheses that have been tested. The outcome of
analysing these will determine whether the scheme has or has not been successful from a resident’s perspective.

4.2 Results for Objective 1

Objective 1 was focused around assessing how well the scheme is used. This involved identifying participation rate, and attempting to establish why those who do not participate choose not to do so; do they feel they already manage their food waste effectively? Do they feel that the scheme is unnecessary? An additional aim was to identify any possible techniques that could be implemented to increase participation rates.

![Pie Chart 4.1 Participation in food waste collection scheme](image)

![Pie Chart 4.2 Reasons for non participation](image)
Pie chart 4.1 shows that the majority of respondents use the food waste collection scheme. All 147 respondents replied therefore N=147. Of the 13% (N=18) who do not participate in the scheme, pie chart 4.2 identifies the reasons. The biggest reason non-participation is people already home composting, which in terms of reducing green house gas emission, as long as its managed properly, is more effective than centralised composting (Lundie and Peters 2004). 7% of respondents have stated “other” reasons. These included giving their food waste to chickens or leaving it out for the birds. As long as there is no smell nuisance and all the food is consumed, this is an acceptable method of food waste disposal. No respondents stated that they could not be bothered, or did not understand the need for the scheme.

![Pie chart showing food waste management methods]

**How did you manage your food waste prior to implementation?**

- 30% composted it all
- 7% composted and threw away
- 8% threw all away
- 55% can't remember

**Pie chart 4.3 Methods of food waste management prior to scheme**

The most common method of managing food waste prior the implementation of the scheme was to throw it all away. There were no omissions therefore N=147. Out of the 147 respondents, 55% stated they put all their food waste into the residual bin. 7% claimed they composted it all, however it is unlikely that 100% of food waste was composted. It is more likely that cooked food was sent to landfill, as home composting cooked food is difficult.
4.2.1 Testing Hypothesis 1

**Older people are less likely to use the scheme than younger people**

<table>
<thead>
<tr>
<th></th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>16-44</td>
<td>39</td>
</tr>
<tr>
<td>Expected</td>
<td>37.3</td>
</tr>
<tr>
<td>over 45</td>
<td>89</td>
</tr>
<tr>
<td>Expected</td>
<td>90.7</td>
</tr>
<tr>
<td>Total</td>
<td>128</td>
</tr>
<tr>
<td>Expected</td>
<td>128.0</td>
</tr>
</tbody>
</table>

Table 4.2 Crosstabulation of age and response to question “do you use the scheme provided?”

Analysing this hypothesis was difficult, as only 12% of respondents stated that they did not use the scheme, equating to 18 people. Of the 147 recipients, 3 failed to provide and age therefore for this calculation N=144. To ensure the table was 2x2 the 16-29 and 30-44 age groups were merged, as were the 45-64 and over 65 age groups. A fishers’ exact test was carried out with an attempt to establish a relationship between age and participation. A significance value of 0.397 was calculated, therefore there is no significant relationship between participation in the food waste collection scheme and age.

4.2.2 Testing Hypothesis 2

**Larger households produce more waste than smaller household**

Pie Chart 4.4 Volume of food waste in respondent’s food waste bin on collection
Table 4.3 Crosstabulation of number in household and response to the question “last time your food bin was emptied, please estimate how full it was”

Pie chart 4.4 shows that the majority of bins are half full on collection. Only 2% (4) were overflowing. 3 respondents failed to give household size, so for this calculation N=144. A chi-squared test was done in an attempt to identify a relationship between household size and volume of waste produced. The chi-square value is 15.204 significant at the level 0.002, making it very significant. The hypothesis that larger households produce more food waste can therefore be accepted.

4.3 Results for Objective 2

Objective 2 was focussed around gauging public opinion of the new food waste collection scheme. This included overall satisfaction, perceived and experienced problems, as well as identifying any change in public attitude since the implementation of the scheme

![Overall what do you think of the scheme?](image)

Pie Chart 4.5 Satisfaction of the food waste collection scheme
In response to question 22, 4 people did not respond, therefore N=143. It is evident from pie chart 4.1 that overall, the new food waste collection scheme in Broadland has been well received. 77% of respondents felt it was either good or excellent, with only 6% having a negative reaction to it. At first glance then, it can be said that the scheme has been a success.

4.3.1 Testing Hypothesis 3

*Older people are less satisfied with the scheme than younger people*

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>Count</th>
<th>Satisfactory/Poor</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 16-44</td>
<td>36</td>
<td>6</td>
<td>42</td>
</tr>
<tr>
<td>Expected Count</td>
<td>31.2</td>
<td>10.8</td>
<td>42.0</td>
</tr>
<tr>
<td>over 45</td>
<td>71</td>
<td>31</td>
<td>102</td>
</tr>
<tr>
<td>Expected Count</td>
<td>75.8</td>
<td>25.2</td>
<td>102.0</td>
</tr>
<tr>
<td>Total</td>
<td>107</td>
<td>37</td>
<td>144</td>
</tr>
<tr>
<td>Expected Count</td>
<td>107.0</td>
<td>37.0</td>
<td>144.0</td>
</tr>
</tbody>
</table>

**Table 4.4 Crosstabulation of age with satisfaction**

As with testing hypothesis 1, 3 respondents failed to provide data on age so were discarded, making N=144. So that a chi-square value could be calculated the good and excellent groups were merged, as were the satisfactory, poor and very poor. As the groups do not specifically identify poor or very poor responses, we can’t assume that those who did not rate the scheme good or excellent are unsatisfied in the scheme. The chi-square value calculated was 4.042 significant at the level 0.044. There is a significant relationship between age and satisfaction. Therefore the hypothesis that older people are less satisfied with the scheme can be accepted.
4.3.2 Testing Hypothesis 4

Perceived problems with the scheme will be different to actual problems with the scheme

Bar chart 4.1 Comparisson of perceived and experienced problems with food waste collection

Bar chart 4.1 clearly shows there is no relationship between perceived problems prior to the implementation of the scheme and actual experienced problems. The small number of “other” problems highlighted by 2 respondents were problems with ants. This has however been attributed to incorrect use of the liners and storage bins, allowing ants access to the food waste. A Paired t test was carried out to determine whether there was a difference in perceived and experienced problems. This revealed a significant difference (t=-30.86, p=0.00) Therefore that the hypothesis that perceived problems are not related to experienced problems can be accepted.

4.3.3 Issues with Liners

When conducting the study it was clear that a major area of contention was the use of the biodegradable starch liners. Pie chart 4.5 demonstrates how people felt the starch liners.
Responses to how useful people found the biodegradable starch liners provided with the bins

Of the 147 respondents, 18 did not respond making N=129. The reason for this relatively high no response rate was due to these 18 people not participating in the scheme. Therefore they did not use the starch liners provided. Of the 129 people who did respond, 31% (40) stated that the starch liners were not useful. This is a considerable number of people and therefore required further analysis.

Bar chart 4.2 Problems experienced by those who felt that the starch liners were not useful

The most common problem experienced with the starch liners was their size. 38 people felt that they were not big enough to be fit for purpose. During the pilot study several residents
stated that they were not big enough for the bins. Several respondents gave “other” reasons. These were the lack of ties, making the bags difficult to grip and put in the external caddy.

4.4 Results for Objective 3

Objective 3 was focused around identifying the effectiveness of the communication strategy implemented by Broadland District Council in order to inform and advise residents on the food waste collection scheme. As mentioned the methods used are sourced mainly from the WRAP guidance. To achieve objective 3, questions such as; was there sufficient information? What methods can you remember? What could be improved? Etc.

4.4.1 Testing hypothesis 5

Leaflets through the door are the most effective method of communication

To gauge how effective different communication techniques were, it was decided that those that were most effective were the ones that people used and/or remembered using. Those that were not remembered/used can be deemed ineffective.

![Effectiveness of Communication Strategy]

Bar chart 4.3 Effectiveness of different communication methods

Out of 147 respondents, there were 3 omissions therefore N=144. 130 (90.2%) stated that there had been adequate provision of information. Bar chart 4.2 shows that the majority of respondents remember receiving a leaflet through the door (134)/with the bin (136). This method of communication is advised by WRAP as the most effective medium to provide information. The website is not used as extensively as expected, and the council meetings
appear to be largely ignored. Another method that can be deemed successful is the use of printing information on top of the bins (100 responses). Since it is clear which method of communication is most effective, no test of significance is required. From the above comparison we can say that the hypothesis that the use of leaflets is the most effective method of communication is correct.

4.4.2 Testing hypothesis 6

*Those who read newspapers criticising current waste management strategy are less satisfied with the scheme*

To test this hypothesis the first stage required was to identify how each newspaper reported on food waste collection. Each paper was given a score. The results are outlined in table 4.5. All participated therefore N=147.

<table>
<thead>
<tr>
<th>Newspaper</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Mail</td>
<td>-2</td>
</tr>
<tr>
<td>The Express</td>
<td>-2</td>
</tr>
<tr>
<td>The Mirror</td>
<td>-2</td>
</tr>
<tr>
<td>The Sun</td>
<td>-1</td>
</tr>
<tr>
<td>The Times</td>
<td>-1</td>
</tr>
<tr>
<td>News of the world</td>
<td>0</td>
</tr>
<tr>
<td>The Observer</td>
<td>0</td>
</tr>
<tr>
<td>The Daily Sport</td>
<td>0</td>
</tr>
<tr>
<td>The Guardian</td>
<td>+1</td>
</tr>
<tr>
<td>The Star</td>
<td>+1</td>
</tr>
<tr>
<td>The Independent</td>
<td>+1</td>
</tr>
</tbody>
</table>

**Key**

-2  Strongly disagree  
-1  Disagree  
0    No opinion/Neutral  
+1  Agree

Table 4.5 Scoring of support national newspapers give to government waste management strategy
The Mail, Express and Mirror all strongly disagree with how the government manages waste. The Guardian, Star and Independent are all in support. In these papers, there are sections given on how to make your home greener, by improving energy efficiency and improving waste management.

<table>
<thead>
<tr>
<th>Excellent</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>good</td>
<td>46</td>
<td>-0.652</td>
<td>1.10357</td>
<td>16271</td>
<td>-3020</td>
<td>2625</td>
<td>2.00</td>
<td>1.00</td>
</tr>
<tr>
<td>satisfactory</td>
<td>25</td>
<td>-2.400</td>
<td>1.09087</td>
<td>21817</td>
<td>-6903</td>
<td>2103</td>
<td>2.00</td>
<td>1.00</td>
</tr>
<tr>
<td>poor</td>
<td>5</td>
<td>-1.800</td>
<td>0.44721</td>
<td>20000</td>
<td>-23553</td>
<td>-12447</td>
<td>2.00</td>
<td>-1.00</td>
</tr>
<tr>
<td>Very poor</td>
<td>2</td>
<td>-2.000</td>
<td>0.00000</td>
<td>00000</td>
<td>-20000</td>
<td>-20000</td>
<td>2.00</td>
<td>-2.00</td>
</tr>
</tbody>
</table>

Table 4.6 Descriptive ANOVA between satisfaction with food waste scheme and news paper read

A one way ANOVA was carried out to assess if there was significant difference between satisfaction and paper read. At critical alpha 0.05 F=4.947, p=0.01, therefore there is significant variation between the mean score of news paper opinion. It is clear to see when examining the means that there is negative correlation between how a negative a news paper is toward government policy on waste management and satisfaction in the scheme. Therefore the hypothesis that newspapers criticising food waste collection have an impact on public attitude can be accepted.

4.5 Results for objective 4

Objective 4 was based around gauging public knowledge on food waste collection scheme. As mentioned, composting food waste serves a number of purposes; reducing volume of waste going to landfill (an unsustainable method of waste disposal), reducing the emission of greenhouse gasses, reducing the contamination of valuable recyclable products. In the pilot study, several respondents stated that they felt the scheme was valuable as it provided extra employment to local people. For a scheme to be truly successful, it is important that the majority of the population, if not all, understand and acknowledge the need for the scheme.
Bar chart 4.4 Public opinion on the need for food waste collection

4.5.2 Testing Hypothesis 7

Residents are aware of the reasons for implementing the scheme and agree with them

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Mean Response (number)</th>
<th>Mean Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduces Landfill</td>
<td>1.61</td>
<td>Agree</td>
</tr>
<tr>
<td>Reduces Greenhouse Gas</td>
<td>1.92</td>
<td>Agree</td>
</tr>
<tr>
<td>Reduces Contamination of recyclables</td>
<td>1.90</td>
<td>Agree</td>
</tr>
<tr>
<td>Provides Employment</td>
<td>2.04</td>
<td>Agree</td>
</tr>
</tbody>
</table>

Table 4.7 Average response to statements regarding the need for food waste collection

Of the 147 respondents to the survey, 4 failed to provide an answer to questions 20i, ii, iii and iv therefore for this section N=143. Bar chart 4.4 and table 4.7 show that the respondents feel that the most important role of separate food waste collection is reducing the volume of biodegradable municipal waste going to landfill. The area in which the highest proportion of people have replied “don’t know” is when asked how they felt the scheme would provide employment to the local area. This is encouraging in terms of the communication strategy.
used. In the literature distributed the focus was on reducing volume of waste going to landfill and reducing greenhouse gasses and not on the effect of the scheme on employment. All four statement had an average response of agree therefore the hypothesis that the population of Broadland are aware of the need for the scheme can be accepted.

4.5.1 Testing hypothesis 8

Level of education has an impact on how people perceive food waste collection

One aspect that may affect how someone perceives a scheme is the level of education that they have. Those with a higher level of education may be better informed about the need for a scheme, and therefore may have a more informed opinion. Hypothesis 7 aims to test this. 4 respondents failed to give level of education therefore N=143.

A one way ANOVA was done for each reason for implementing the scheme to identify if there was a relationship between response and level of education. Table 4.7 gives a summary of the results of the ANOVA.

<table>
<thead>
<tr>
<th>Reason for food waste collection</th>
<th>F value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill avoidance</td>
<td>0.592</td>
<td>0.669</td>
</tr>
<tr>
<td>GHG emission reduction</td>
<td>1.156</td>
<td>0.333</td>
</tr>
<tr>
<td>Reducing recyclable contamination</td>
<td>1.262</td>
<td>0.288</td>
</tr>
<tr>
<td>Providing local employment</td>
<td>2.045</td>
<td>0.091</td>
</tr>
</tbody>
</table>

Table 4.8 Summary of results from 1 way ANOVA conducted on the responses to questions 20i,ii,iii, iv and level of education

Using a critical alpha of 0.05 it can be concluded that level of education is not a significant factor in formulating opinion on the need for food waste collection. Therefore the hypothesis that attitude toward the need for food waste collection is associated with level of education can be rejected.
Chapter 5 Discussion

5.1 Introduction

The aim of this study is to assess the opinion of the residents of Broadland on the new food waste collection scheme that has been recently implemented in the area, as well as establishing how effective the communication strategy implemented by Broadland district council has been. In this chapter the result will be discussed. Where appropriate they will be linked with literature, to see if patterns observed are similar to those identified in other studies such as those done by WRAP. Each objective is referred to separately. Implications of any conclusions made will be discussed in the context of their impact on the waste management strategy used by Broadland district council.

5.2 Objective 1

Objective 1 aimed to identify how the scheme was used. Use of the food waste scheme is significant, as if it is not being utilised, then its effectiveness in reducing the volume of BMW going to landfill must be questioned. How effectively it is being used is also an issue which we must consider. If bins are being emptied half full, or there is a high level of contamination then the scheme is not economically viable. On the other hand if the bins are overflowing and the resources provided are insufficient, it is more likely that the residents will have a negative perception of the scheme and this will effect participation rates and increase drop off rates (Thomas, 2001). We must also examine how people managed their food waste prior to the implementation of the scheme. If a high percentage of the sample home composted, then we must question whether the scheme was necessary in the first place, as home composting when done correctly is a more environmentally sustainable method of disposing of food waste (Lundie and Peters, 2004).

5.2.1 Previous Methods of Food Waste Management

The results of this study show that prior to the implementation of the food waste collection scheme 55% of the sample stated that they disposed of all of their food waste in the residual bin, 30% stated that they composted it all, and 8% could not remember. It is unlikely that of the 7% of the sample that stated they recycle all of their food waste, 100% of the food waste they produce is composted. The figure of 37% of respondents who claim that they composted before the scheme is considerably higher that the figure of 24% provided by the WRAP study. This difference is due to the WRAP study being conducted over many areas, both
urban and rural. A higher percentage of the population compost in rural areas, therefore the figure for the area of Broadland is bound to be higher than in an area such as Belfast.

When considering composting food most people only consider pre cooked food such as peelings (Fehr et al. 2002). An advantage of centralised composting is it can accept all food waste, both pre and post consumption.

Key Findings

The findings of this study show that there is potential to remove a large quantity of BMW from the waste stream and therefore is worthwhile. This point is re enforced by a statement from Broadland district council until 12/07/2010 129.64 tonnes of food waste has been diverted from landfill, from round 2 of the food waste trial alone. Whether or not the scheme should continue will be addressed later.

5.2.2 Participation

Once the necessity of the scheme has been validated, the use of the scheme must be examined. The results of this study show that 88% of respondents use the food waste collection scheme. This conforms to the results obtained by study conducted by Broadland district council in which the state that 83% of the population utilise the food waste collection scheme (see Annex II). These figures are higher than the 72.74% that was found from the WRAP (2009) study. There are a number of reasons for the difference in these two figures. Firstly it is possible that those who did not participate in the scheme were less likely to return the postal questionnaire distributed for this study. Those who choose not to participate in the scheme as they do not agree with it are less likely to fill in a questionnaire on the subject as they are not interested in it. This would skew the data in favour of those who participate. The lower figure for the WRAP is more likely to be a more representative figure as in the WRAP study methods such as door stepping and telephone interviews were utilised to achieve a more representative sample. This was not feasible for this study due to financial resources and time constraints.

Key Findings

The results of this study concur with those in the literature that there is a high proportion of the population of Broadland that use the scheme. Therefore as long as yields remain sufficiently high and uncontaminated, Broadland district council should continue to use the scheme in the waste management strategy.
5.2.3 Reasons for Non-Participation

Now that it has been established that there was sufficient potential to implement the scheme and there is a high usage, reasons for not using the scheme were examined. Age was analysed in detail. It was thought that the majority of those who did not use the scheme would be elderly people. This hypothesis was formulated as it was thought that older people would be less likely to change the way in which they manage their waste as they are “set in their ways”. If a significant relationship was found then an implication of this would be to tailor future provision of information to age. The results show that there is no relationship between age and use of the scheme. Slightly more than expected in the over 45 category did not use the scheme, however this number was insignificant. It can be concluded then that age is not an issue when it comes to participation levels. The largest factor for non participation was that respondents already composted (55%, 10 respondents), therefore felt that had no use for the scheme. If this is the case then it is essential that the composting is done effectively, with the maximum amount of food waste possible diverted from the residual bin. Only 22% (4) of people who did not use the scheme stated that the scheme was unnecessary. This is an indication that the scheme has been well received. This is further enforced by the information shown on bar chart 4.4. In every case, the majority of respondents agree with statements relating to the need for the scheme, indicating that information provision on the need for the scheme has been adequate. Broadland district council and WRAP state that the most significant aspect affecting participating in the food waste trials is socio-demographics. In the Broadland study they cite the following roads for low participation:

Redcliffe Way, Brundall (45%), Eva Road, Rackheath (50%) and Buckthorn Close, Taverham (43%) All 3 have been given an ACORN 3 rating, indicating that they are less affluent areas than other areas displaying a high participation rate.

Variation can also be attributed to the WRAP study being conducted on the first trial area, where as the area for this study and the Broadland study were from the 2nd round of the trial.

Key Findings

The results show that age has no impact on non participation. The most significant reason given for non use was home composting, with only a very small proportion feeling the scheme was unnecessary. This shows that it is likely that the method of providing information on the need for the scheme has been successful. This is further enforced by the findings displayed on bar chart 4.4. Other studies indicate socio-demographics are the most significant factor in low participation.
5.2.4 Usage

As it has been established that the use of the scheme is high, we must examine how people use the scheme. The results show that 65% of bins were at least half full on collection, indicating a high yield of food waste. Only 3% were overflowing. This indicates that the bins are adequate in size. Of the 4 that stated their bins were overflowing, 1 missed a collection. It is likely that the other 3 have unsustainable purchasing habits and throw away too much food. The presence of a food waste bin could have the effect of showing the resident how much food they are throwing away and therefore reduce the amount of food waste produced.

The relationship between household size and food waste produced was examined. If it was found that food waste bins belonging to larger households were overflowing or full, then it could be argued that bin size should be tailored to household size. Not surprisingly it was found that there was a significant relationship between volume of food waste collected and household size. These findings did not concur with the study conducted by WRAP. They found that when using average household size and comparing different areas, there was no relationship. This difference can be explained as this study used volume of waste per person, whereas the WRAP study used volume of waste produced from an average household. This meant it used a much larger sample size and area and therefore is probably more representative. WRAP state that other factors such as socio-demographic and lifestyle influences have a much larger impact on volume of food waste produced (WRAP 2009).

Broadland district council state that the contamination of the food waste they collect is very low. They attribute this to the provision of free liners with the bins.

<table>
<thead>
<tr>
<th>Key Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is a relationship between household size and volume of food waste produced. As the number of bin overflowing was so small, it must be concluded that bin size is adequate and the additional cost of tailoring food waste bin size to household size could not be justified. Due to the low contamination levels and relatively high yields, the scheme is being used well.</td>
</tr>
</tbody>
</table>

5.2.5 Summary of Objective 1

In conclusion objective 1 has been achieved. The results proved:

- There was potential that a food waste collection scheme would reduce the amount of BMW going to landfill
• There is a sufficient proportion of the population participating in the scheme to make it a success
• The most significant reason for non participation is residents composting their food waste prior to the scheme therefore they feel they do not need the scheme. There is no relationship between age and participation, however other studies indicate socio-demographics is significant in non participation.
• The volume and quality of the food waste produced is sufficient to make the scheme an economically viable and environmentally sustainable alternative to landfilling food waste.

5.3 Objective 2

Objective 2 was concerned with gauging public opinion of the food waste collection scheme. Without public contribution, any recycling scheme is doomed to failure (McDonald and Ball 1998). If a population does not agree with a scheme, it is likely that participation rates will be low and drop off rates will be high. This objective aimed to assess how satisfied users were with the scheme, and identify any particular area of concern expressed by respondents.

5.3.1 Satisfaction

The results show that the majority of respondents felt that the scheme was excellent (48%). A further 29% felt that the scheme was good. As only a mere 6% of respondents felt that the scheme was poor or very poor, from the public view point, it must be concluded that the scheme has been well received and is successful. The WRAP study did not test for overall satisfaction with the scheme, however they did find that 95% of those surveyed were satisfied with the resources provided (bins, caddies etc) (WRAP, 2009). These figures correlate with the results from this study, as 94% of the study stated that they were satisfied with the scheme as a whole.

Key Findings

Overall the scheme has been very well received and embraced by the population of Broadland, therefore it is expected that drop off rates will be low as people continue to be enthusiastic about the scheme.
5.3.2 Reasons for Unsatisfaction

Once the number of people satisfied with the scheme had been established, although the number is very small, it is important that the reasons for respondents stating they are unsatisfied are identified. An analysis was done to test if there was a relationship between satisfaction and age. As with objective 1, if it was found that elderly people are more likely to be unhappy with the scheme, then a greater effort must be made by the council to rectify this issue. It was found that there is a significant relationship between satisfaction and age. It is more likely that elderly residents will be less satisfied with the scheme. These findings differ from those in the literature. Some authors find that there is not significant relationship (Derksen and Gartrell 1993; Aini et al. 2002). Others find a weak positive correlation between age and willingness to recycle waste (Shrum et al. 1994; Sterner and Bartelings 1999). The negative correlation between satisfaction and age from this study can be explained by more elderly people finding managing a number of different bins more difficult.

Of the 7 respondents who stated they were unsatisfied with the scheme, 3 stated that managing several bins was difficult. The other four stated that the liners provided were the main reason that they were unsatisfied with the scheme.

<table>
<thead>
<tr>
<th>Key Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is a negative correlation between satisfaction of the scheme and age. Of those who were unsatisfied with the scheme the most common reasons for this was the feeling that the liners were not fit for purpose, and the storage of multiple bins was difficult.</td>
</tr>
</tbody>
</table>

5.3.3 The Liner Issue

As stated previously, an area of contention in this study was the adequacy of the liners provided. WRAP report that providing liners improves tonnages of waste collected, as well as reducing the contamination of the food waste (see Table 1.2) (WRAP, 2009c). The results of this study show that 31% of those sampled felt that the liners provide were not fit for purpose. When asked why the majority of people stated that they were too small. Other concerns included their structural integrity and difficulty of tying the bags when full. These results do not concur with those published by WRAP. When asked “do you find the liners useful?” 97.9% said yes (WRAP, 2009a), compared to the 69% from this study. This difference is likely to be down to the fact that the WRAP study was conducted several months after the scheme had been implemented, therefore the residents had time to adjust to using the liners
appropriately. Although 69% of residents stated they did not find the liners useful, they should not be abandoned. Broadland district council attribute the low contamination of the food waste to the provision of these liners.

**Key Findings**

A significant number of the population of Broadland are unsatisfied with the liners provide by Broadland District Council. The most common reason for this is insufficient size. Suitability of linings was the main cited by those who were unsatisfied with the scheme.

### 5.3.4 Perceived and Observed Problems

An important aspect of public opinion of a scheme is the problems they perceive that may be associated with that scheme. A key role of the communication strategy for a separate food waste collection scheme is to dispel any myths that may be associated. The success of this part of the communication strategy can be gauged by examining the link between the perceived problems and the actual problems experienced. The results show that the perceived and observed problems are significantly different. The main perceived problem appears to be issues to do with odour and hygiene. These fears were proven to be unfounded. In pilot study interviews respondents stated that these fears originate from a mixture of what is printed in the national press, as well as people associating food waste with rotting smelly food. As only 4 people stated hygiene as a reason for unsatisfaction, it must be concluded that odour and hygiene in general is not a significant issue. The WRAP study found that 6% of respondents found odour and vermin to be an issue (WRAP, 2009a). This does not correlate with the 12% recorded for this study. This 6% difference can be attributed to the time of year each trial was conducted. The WRAP sample was taken later in the year (late September), therefore temperatures were cooler meaning odour was less of an issue.

**Key Findings**

The results show there is no link between perceived problems and observed problems. As perceived problems seem to have little impact on satisfaction or participation in the scheme, information that dispel myths about odour and vermin has been well received.
5.3.5 Summary of objective 2

In conclusion objective 2 to has been achieved, the results show:

- In general the scheme has been very well received by the population the population of Broadland
- Although there was little variation in satisfaction, there is a negative correlation between age and satisfaction
- A significant number of people feel the liners are not fit for purpose
- There are no similarities between perceived and observed problems with the scheme

5.4 Objective 3

Objective 3 was concerned with what medium of communication the general public respond best to. Once this has been identified, distribution of resources can be altered accordingly. Local authority communication is not the only source of information that the general public use to form opinion. They also use medium such as the national and local press, word of mouth and local and national news. Stories and articles published in papers such as the daily mail and the express are unmediated and ill informed. A negative story about food waste recycling can undo all the work that local authorities have done in educating the public. Therefore it is important that we attempt to gauge the effect the press and other medium of communication have on how the public formulate opinion.

5.4.1 Council Communication

The results of this study show that the most effective form of communication used by Broadland district council has been the distribution of leaflets with the bins and through the door. As mentioned in the literature review, WRAP recommend a 5 stage communication plan; introduction leaflet, instruction leaflet, sticker on caddy, tag notifying contamination and follow up study (WRAP, 2009b). Broadland district council are in the process of analysing data obtained from the follow up study.

The figure of 90.2% satisfaction with information correlates very well with other such studies. Mee et al. (2004) give a figure of 91% satisfaction with provided information and

The results clearly prove that the methods of communication advised by WRAP are the most effective, as they are the ones most commonly remembered. It was expected that printing of information on the top of the bin would prove to be more effective than observed. There low
response is likely to be due to the respondents not realising that the information on top of the bin was part of the communication strategy.

**Key findings**

WRAP advised communication methods are by far the most effective method of communication, especially the distribution of leaflets. The lack of usage of the website is due to the elderly demographic of the sample. Although proved ineffective by this study, the road shows and meetings are essential in providing an outlet for public opinion, providing 2 way communications between local authority and public, therefore improving trust between the two.

5.4.2 Effect of the Press on Opinion

After conducting a one way ANOVA, the results show that there is a negative correlation between opinion on the need for food waste collection and the type of paper that a person reads. That is to say that those who read a paper which publishes negative stories on the UK waste management strategy and more specifically food waste, are more likely to have a negative opinion on food waste themselves. Therefore it can be stated with some confidence that the uncensored media has a significant role to play in formulating public opinion (Mikami *et al.* 1995; Robinson 2001) As segregated food waste collection is a relatively new concept, there has been very little work done on how negative press effect participation and attitude. In order to minimise the impact that negative press has on the success of the scheme, it is essential that there are constant reminders that the scheme is successful, and it is fulfilling its role. It is also suggested that liaising with the editors of those publications that disagree with the scheme could be beneficial. This may however prove futile, as there tends to be much greater public interest on controversial issues (Perse 2001).

**Key Findings**

It was found that negative press can have a profound effect on the formulation of public opinion, those who regularly read negative press about issues surrounding food waste tend to have a negative view on food waste recycling. To minimise this effect regular publications should be issued confirming the effectiveness of the study.
5.4.3 Summary of objective 3

In summary objective 3 has been achieved, the results prove:

- The most effective method of communication employed by the council was those methods recommended by WRAP, especially the distribution of leaflets
- There is a significant negative correlation between negative press read and negative views on the need for food waste collection
- There is a great need for constant communication of the success of the scheme in order to maintain and improve participation rate, and keep attitude toward the scheme good.

5.5 Objective 4

Objective 4 is concerned with gauging public opinion on food waste collection. The most effective way of achieving a high participation rate and low drop off rate is to educate the public on the need for the scheme, ensuring that they realise how vital it is that they play their part in the scheme. As objective 3 established, sources of information exist outside the official literature distributed by the council. Objective 4 therefore aims to assess how effective the communication strategy has been.

5.5.1 Public Opinion on the need for Food Waste Collection

The results clearly show that the population of Broadland agree with the need for the scheme. Not only that but they also agree with the statements that the introduction of a food waste collection scheme will reduce volume of waste to landfill, reduce GHG emission, reduce contamination of recyclables and to a lesser extent provide employment the local area.

Respondents most agreed with the comment about reducing landfill. Reducing volume of waste going to landfill has been covered comprehensively in the media, with very little opposition or controversy surrounding it. This further confirms the impact the media can have on opinion. Meeting EU landfill targets also features heavily in the introductory leaflet provided by the council. The fact that a high majority of the population agree with statements such as landfill reduction and GHG emission reduction goes to prove that the communication provided by the council has been well received.

As mentioned in the literature review, a major concern of alternate weekly collections of recyclables is odour from decomposing food waste in both recyclable and residual bins (Woodward et al 2001). Broadland district council show a reduction of the volume of food
waste in recyclable bins. As the residents agree with this statement then the food waste collection scheme is achieving its aim of reducing the volume of waste in the other bins.

It was thought that awareness of need and level of education would have a positive correlation. This however was proved incorrect as there is no significant difference in level of education and knowledge of the scheme. This proves that the information provided by the council is adequate, and no further reading or research is required to formulate an informed opinion.

Key findings
In general people are aware and agree with the need for food waste collection as part of their waste collection strategy. GHG prevention and Landfill reduction are the factors that people see as most important, which is to be expected as the 2 are intrinsically linked. There is no link between education and knowledge, therefore the provision of information on the need for the scheme is adequate.

5.5.2 Summary of Objective 4
In summary objective 4 has been achieved, the results prove:

- Public knowledge of the scheme is good, the majority of respondents acknowledge and agree with the scheme
- Level of education plays no significant role in attitude toward the scheme
- Information provided by the council is adequate to formulate an informed opinion.
Chapter 6 Conclusions/Recommendation

6.1 Conclusions

In response to the original question “how effective is food waste collection” it can be concluded that in the district of Broadland, the scheme has been very successful. The results show that the scheme is has a very high participation rate, is being well used, the public are generally very satisfied with it, on the whole the resources provided are adequate in terms of the bin and caddy system, it is fulfilling its role in reducing the volume of BMW being disposed of in landfill and the public report very few problems associated with the scheme. In terms of the communication strategy respondents of the survey felt that they had been provided with adequate information and they were knowledgeable on the need for the scheme. These results concur with both the WRAP evaluation study (WRAP 2009a) and the follow up study recently conducted by Broadland district council (unpublished).

Although overall the scheme can be deemed a success and should become a long term fixture in the waste management strategy imposed by Broadland district council, there are certain measures that should be undertaken to increase the effectiveness of the scheme, increase participation rate and increase satisfaction.

Firstly in order to minimise the effect of negative press, it is essential that there is a regular release of information detailing success of the scheme so far and outlining future developments. This should be conducted using a range of methods. As WRAP suggest, a follow up leaflet should be distributed to each household. However to really enforce the message of success, regular press releases should be made in local magazines such as the eastern daily press, as this is likely to reach a wider audience (Altman and Petkus 1994). Evison and Read (2001) claim that a regular local authority environmental newspaper would be effective in raising awareness to waste management issues. This regular provision of information would serve to ensure knowledge of issues surrounding food waste management remained high. The “love food hate waste” campaign should also expand into school visits in order it educate the next generation in sustainable waste management, with the use of recycling themed days and provision of information packs.

Although the numbers were low, the negative relationship between satisfaction and age needs to be taken into account. To increase satisfaction amongst the elderly a more personal method of communication may be required. Broadland district council provide a service for the elderly who struggle to manage multiple bins (Broadland District Council 2008), however this is not mentioned in the introductory and instructional leaflets. In order to help elderly
residents adapt to the scheme, this service should be utilised more. To do this a section needs to be placed in the leaflets on how to use it. Although it has proven unsuccessful it is recommended that any future waste schemes should include a forum or road show so that local residents can air their views or ask questions.

A significant area of contention identified by this study is the adequacy of the liners provided. It is essential that the provision of liners with the bins continues, and the system of replenishment appears to be successful. The provision of liners increases participation and reduces contamination of the waste collected. However a large number of respondents stated the liners were not large enough and were difficult to tie. Therefore it is recommended that the size of the liners is increased. It is hoped that increasing the size will not only alleviate problems of size, but will reduce issues with tying when full and bags splitting from becoming over full.

The WRAP and Broadland studies have both found that the main reason for non participation and low satisfaction is due to socio-demographics. Therefore on roads of low participation it is recommended that door stepping is employed, in order to explain the importance of the scheme, and to dispel an misconceptions an individual may have about the scheme.

Finally in order to assess how effective the scheme really is, a full waste audit is required. Although controversial, especially in areas of the press, conducting a full waste audit on the residual and recycle bin will enable the local authority to assess what percentage of food waste a household produces is actually being composted. Findings that people are satisfied and using the scheme are encouraging, however they will count for nothing if households are still throwing a large percentage of the food waste they produce into the residual bin.

6.2 Limitations

The author would now like to discuss some limitations of the study. First of all time and finance was an issue. Ideally all 10,000 participants in the scheme would be sampled, providing a truly representative sample. The cost of a postal survey coupled with the time to process such a number would have been impossible to complete, therefore a representative small sample was the only solution.

There was a certain degree of bias toward those participating in the scheme. It is likely that those who were unsatisfied or those who did not use the scheme did not respond to the questionnaire. This created an issue with analysis due to limited variability within the data.
As the study was conducted over 1 week in May 2010, it provides information on public attitude only for a snapshot in time. There is no guarantee that the opinions provided in this study will not change over time.

Finally as food waste collection is a relatively new concept there is very little peer reviewed literature, or previous studies undertaken from which a comparison to validate results can be made. It is hoped that as meeting landfill targets becomes a more prominent issue in the coming years, an increase in the number of studies will enable researchers to establish much stronger trends in attitude and behaviour associated with recycling food waste.

6.3 Recommendations

In this section the author will discuss scope for further work in order to enhance knowledge or the success of separate food waste collection. Firstly a second study should be undertaken a year after the implementation of the scheme. Although the scheme had been in place for 1 month when this study was undertaken, conducting a follow up study a year later would remove any “teething” issues that the scheme experienced. It would also negate the “honeymoon effect”, where residents may have a better attitude toward the scheme due to its novelty, rather than its actual use in achieving its targets. The follow up study should be conducted during mid-summer (July-August) so the effect of heat on the food waste can be identified.

As the WRAP and Broadland study state that the main reason for non participation is socio-demographics, a more detailed study focused on this area should be conducted. Broadland use the ACORN to identify social depravation. Using this method of identifying problem streets, there is scope for further work to be done as to why those in less affluent area are less likely to participate.

As home composting is cited by the majority of non-participants as the main reason for non use of the scheme, there is potential for study into how effective they are in composting their food waste. Studies show that those who home compost can sometimes be inefficient (Illmer and Schinner 1998), therefore a waste audit on the volume of food waste they compost, and if they are doing it in an effective sustainable way would identify whether the way in which they dispose of their food waste is indeed more environmentally sustainable than centralised composting.

Finally if food waste collection becomes common place in local authorities waste management strategies, then the next step is to focus on waste reduction, rather than recycling. Only then will the strategy be truly sustainable.
7.0 References


Broadland district council (2010). Food waste recycling- your new food waste collection service.


Appendix 1

Food Waste Questionnaire

Dear Sir/Madam,

My name is Ben Jones and I am a master student at the University of East Anglia studying environmental management and assessment. As part of my course I am undertaking research into the success of the food waste collection scheme recently implemented in your area. The core of my work revolves around collecting the views of the local residents via the following questionnaire, without it I can’t complete my study. The work is being done entirely for my dissertation.

It would be really helpful if you could fill out the short questionnaire I have designed. It will take no more than 5 minutes. If you could post it back to me with the stamped addressed envelope provided by Monday the 1st of June that would be great. Any information you provide me with will be treated in the strictest confidence.

Thank you in advance.

Ben Jones, MSc student, UEA

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First of all I am going to ask you a few questions on what you think of the new food waste collection scheme implemented in your area.

1) **Do you use the food waste bins provided?**
   - □ Yes *(skip to Q3)*
   - □ No
   - □ Don’t know

2) **If not why not?**
   *Tick the most appropriate option*
   
   □ I think it is unnecessary
   □ I already compost at home
   □ I do not understand why it is needed
   □ I do not produce any food waste
   □ Can’t be bothered
3) Are you satisfied with the new food waste collection scheme?
   □ Yes (skip to Q6)
   □ No

4) If you are unsatisfied with the new food waste collection scheme, what are your reasons?
   *Tick all the apply*
   □ It is unhygienic
   □ The bins are too big
   □ The bins are too small
   □ The caddy system is too much of a hassle
   □ I find it difficult to store multiple bins
   □ The separation of food waste is inconvenient
   □ Other (Please specify) __________________________

I am now going to ask you a few questions on your usage of the food waste collection scheme

5) How did you manage your food waste prior to the implementation of the food waste collection scheme?
   □ I composted it all
   □ I composted some and threw the rest in the bin
   □ I threw it all in the bin
   □ I can’t remember

6) If you do not currently use your food waste bin, which incentives would encourage you to do so?
   *Tick all that apply*
   □ More information/better communication on collection times and what to put out
   □ More information on why the scheme is necessary and why it is being implemented
   □ If by using the food waste collection scheme you were given a small discount on your council tax bill
   □ If your general waste bin was not collected unless you participated

7) How easy have you found it to implement the new food waste collection scheme?
   *Tick the most appropriate option*
   □ Very easy
   □ Easy
   □ Mildly difficult
   □ Difficult
   □ Very difficult
   Comments __________________________

8) Before the scheme was implemented, which of the following problems did you think would be associated with the collection of food waste?
   *Tick all that apply*
   □ Odour
   □ Rodents
   □ Flies/maggots
   □ Not experienced any problems
9) In the past 4 weeks, how often have you put your food waste bin out for collection?

Tick the most appropriate option

- Once
- Twice
- Three times
- Every week
- Never

10) Last time your food waste bin was emptied, could you please estimate how full it was

Tick the most appropriate option

- Overflowing
- Full
- ¾ full
- Half full
- ¼ full
- Little waste at the bottom
- Empty

11) Do you find the starch bags provided useful?

- Yes (if yes skip to question 13)
- No

12) If you do not find the starch bags useful, why are they not useful?

Tick most appropriate option

- They are too small
- They break
- They do not contain odour well
- Other ___________________________________________________________________

13) Since the implementation of the scheme, which (if any) of the following problems have you encountered due to the introduction of the food waste collection scheme?

Tick all that apply

- Odour
- Rodents
- Flies/Maggots
- Not experienced any problems
- Comments____________________________________

I would now like to ask you a few questions on the information you were provided about the new food waste collection scheme by the council

14) Was there adequate time between being provided with information about the scheme and its introduction in your area?

- Yes
- No

15) Have you had sufficient information about the new food waste collection scheme?

- Yes
- No
- Don’t know

16) Can you remember which methods of communication were used by the council?

Tick all that apply

- Leaflet through the door
- Leaflet with the bin
- Website
□ Meeting
□ Local Press
□ Instruction on bin
□ Word of mouth
Other ______________________________________________________________________

17) What aspects of the information provided about the food waste collection scheme could have been improved?
Tick all that apply

□ Did not know about the scheme until the bins were delivered
□ Was aware of the scheme but detail on collection and what to do was lacking
□ Was aware of details of scheme but was unaware of the need for the scheme
Other ______________________________________________________________________

18) What possible alternative communication methods (if any) do you feel could be effective in improving your knowledge of food waste collection in your area?
Tick all that apply

□ Local radio announcements
□ Better website coverage
□ Increased local media coverage
□ Provision of information to children in school
Other ______________________________________________________________________

Finally I would like to ask you what you now think of separated food waste collection

19) Has the new food waste collection scheme made you think about how you manage your waste?
□ Yes, I have radically changed how I think about and manage my waste
□ Yes a little
□ Not really, I just put my bins out on collection and forget about it

20) Broadland District council had many reasons for implementing a food waste collection scheme, how far do you agree with the statements below; Food waste collection:

i. Reduces the volume of waste going to landfill
   □ Strongly agree □ agree □ neither agree nor disagree □ Disagree □ Strongly disagree □
   don’t know

ii. Reduces greenhouse gas emission
   □ Strongly agree □ agree □ neither agree nor disagree □ Disagree □ Strongly disagree □
   don’t know

iii. Reduces contamination of recyclable material
   □ Strongly agree □ agree □ neither agree nor disagree □ Disagree □ Strongly disagree □
   don’t know

iv. Provides jobs in the local area
   □ Strongly agree □ agree □ neither agree nor disagree □ Disagree □ Strongly disagree □
   don’t know

21) Which paper do you read most often?
22) How would you rate the scheme overall

Tick the most appropriate option

☐ Excellent
☐ Good
☐ Satisfactory
☐ Poor
☐ Very poor

Finally I would like to know a little about you. This is to ensure that I have a representative cross section of the population. I would like to stress again that all the information you provide is strictly confidential.

☐ Male
☐ Female

23) Age

☐ 16-25
☐ 26-40
☐ 41-60
☐ Over 60

24) Of the following, which is the highest qualification that you hold

☐ Completed secondary school
☐ GCSE/O level/NVQ level 1 or 2
☐ A level/B tec/NVQ level 3/foundation degree
☐ Undergraduate degree (BSc, BA etc)
☐ Post graduate degree (phD, MSc, MA etc)
☐ Other (specify)

25) Type of house you live in

☐ Flat
☐ Terraced
☐ Semi detached
☐ Detached
☐ Bungalow
☐ Other

26) How many people live in your house

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ >5

Finished! Thank you so much for taking the time to fill in my questionnaire. Your input is essential to the success of my research. If you have any questions do not hesitate to contact me via email.

Ben.jones@uea.ac.uk
Appendix 2

Questions for Pilot Study

1. Do you use the new food waste scheme provided?
2. Overall what is your opinion on the new food waste collection scheme?
3. Are you worried about any aspects of the scheme that may affect your quality of life?
4. Do you feel the scheme works well with the other waste collections?
5. Do you feel you use the scheme often enough to make it worthwhile?
6. In general where do you obtain your information about the scheme?
7. Are the materials provided for the scheme adequate?
8. Has the introduction of this scheme made you change your attitude to the food waste you generate?
9. Why do you think that the scheme has been implemented and do you agree with these points?
10. Do you think there are any ways in which the scheme could be improved?
## Appendix 6

### Results

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Appendix 7

Pie charts and Bar Graphs

Question 1

**Do you participate in the scheme?**

- Yes: 88%
- No: 12%

Question 2

**If not why not?**

- It's unnecessary: 56%
- I already compost: 22%
- I don't produce food waste: 11%
- Other: 11%

Question 3

**Are you satisfied with the scheme?**

- Yes: 86%
- No: 13%
- Did not answer: 1%
Question 4

What are your reasons?

- 24%: Its unhygienic
- 19%: The bins are too small
- 14%: The caddy system is a hassle
- 14%: Storage of multiple bins difficult
- 10%: Other reasons

Question 5

How did you manage your food waste prior to implementation?

- 55%: Composted it all
- 30%: Composted and threw away
- 7%: Threw all away
- 8%: Other reasons

Question 6

What incentives would encourage you to use the scheme?

- 50%: Better communication
- 22%: Other incentives
- 17%: Higher incentives
- 11%: Other reasons
Question 7

How easy have you found it to implement the scheme?

- Very easy: 74%
- Easy: 17%
- Mildly difficult: 6%
- Difficult: 1%
- Very difficult: 2%

Question 8

Perceived problems

- Odour: 39%
- Rodents: 29%
- Flies/maggots: 16%
- No problems: 16%
- Other: 3%

Question 9

In the past 4 weeks, how many times have you put your bins out?

- Once: 11%
- Twice: 3%
- Three times: 5%
- Every week: 4%
- Other: 77%
Question 10

**Volume of waste on collection**

- Overflowing: 2%
- Full: 14%
- 3/4: 20%
- 7%
- 12%

Question 11

**Do you find the bags useful?**

- Yes: 69%
- No: 31%

Question 12

**What are your concerns?**

- Too small: 84%
- They break: 7%
- Don't contain odour: 2%
- Other: 7%
Question 13

Experienced problems

- Odour: 3%
- Rodents: 5%
- Flies/maggots: 2%
- No problems: 88%
- Other: 2%

Question 14

Adequate time between provision and introduction

- Yes: 94%
- No: 6%

Question 15

Have you had sufficient information?

- Yes: 90%
- No: 5%
- Don't know: 5%
Question 16

Effectiveness of Communication Strategy

- Leaflets through the door
- Leaflets with the bin
- Website
- Council Meeting
- Local press
- Instruction on the bin
- Word of mouth

Number of Respondents

Question 17

How could aspects could have been improved?

- Knowledge on provision of equipment: 46%
- Knowledge on implementation: 23%
- Knowledge on need: 17%
- Possible alternative methods: 14%

Question 18

Possible alternative methods

- Radio: 28%
- Better website: 12%
- Local news coverage: 20%
- Schools: 31%
- Coverage: 9%

74
Question 20

Public Opinion on Need for the Scheme

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduces landfill</td>
<td>60%</td>
<td>45%</td>
<td>18%</td>
<td>4%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Reduces greenhouse gas</td>
<td>50%</td>
<td>32%</td>
<td>18%</td>
<td>4%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Reduces contaminants in recycling</td>
<td>40%</td>
<td>32%</td>
<td>18%</td>
<td>4%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Provides employment</td>
<td>30%</td>
<td>25%</td>
<td>20%</td>
<td>15%</td>
<td>10%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Question 22

Overall rating

- Excellent: 45%
- Good: 32%
- Satisfactory: 18%
- Poor: 4%
- Very poor: 1%