

A REVIEW OF BARRIERS TO KERBSIDE RECYCLING HOUSEHOLD WASTE IN THE UK.

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ABSTRACT

The aim of this work is to use systematic review methodology to answer the question “*What are the current barriers to kerbside recycling of household waste in the UK?*” A systematic search of electronic databases and journals was undertaken to identify academic published work. A critical scoping review of research published between 2000 – 2008 profiles theory and research design. The systematic review identified twelve relevant papers, of which seven contain original data. To define the current barriers the explanations of barriers were systematically aggregated into four main categories: household / individual behaviour; services / local situation; attitudes / motivation; information and knowledge. The purpose of the work is to inform future marketing campaigns which will assist the UK to reach the statutory targets of waste diversion. The synthesis will be useful to environmental professionals working in waste authorities and researchers and students. The framework offers an opportunity to develop better marketing and communications strategies to help more people recycle more things more often and will inform future recycling policy development.

Keywords: Kerbside recycling, household waste, scoping and systematic literature review

A REVIEW OF BARRIERS TO KERBSIDE RECYCLING HOUSEHOLD WASTE IN THE UK.

1. Introduction

The recycling of household waste material as a public policy and political issue has become increasingly important following the introduction of European and UK legislation. European Union (EU) Directives establish the framework for national and local waste management policy. In the UK the Department for Environment, Food and Agriculture (Defra) is responsible for implementing EU Directives, such as the 1999 Landfill Directive, through local authorities. The current Waste Strategy for England (Defra 2007) sets out new targets to reduce the amount of waste not reused, recycled or composted by 29% by 2010, placing more emphasis on reducing waste through prevention. Defra provides funding for the Waste and Resources Action Programme (WRAP), a not for profit company set up in 2000, which makes market interventions and supports campaigns to stimulate more recycling and less landfill (WRAP 2006).

It is likely that the current emphasis on global warming and climate change has helped to raise public awareness and consciousness about the use and disposal of waste resources. Waste is increasingly seen as a commodity to be traded on the international market, although there have been concerns about viability in the economic downturn since 2008.

Enormous strides have been made in encouraging the public to separate their domestic waste for recycling. In 1999 Parfitt et al (2001) noted that 40% of UK households had kerbside collection of paper and cardboard. There has been a shift in language from a voluntary approach to a mandatory compliance model, a compulsory requirement in some London areas for householders to recycle and an increasing complexity in the range of materials targeted. By 2005, 86% of households had a kerbside service, due mainly to the Household Recycling Act 2003, which requires that all households should have access to a kerbside recycling scheme of at least two recyclable materials by 2010 (Harder et al 2007).

Early publicity campaigns and national awareness initiatives since 2000 such as '*slim your bin*' and '*doing your bit*'; have pushed recycling higher up the public agenda (Coggins 2001). More recently the WRAP campaigns, *Recycle Now* in England, *Waste Aware* Scotland, and *Waste Awareness* Wales have continued that success to the extent that nearly two thirds of people have been classified as committed recyclers (by the use of a three question metric), an increase from 45% in 2004 to 61% in 2008. Home composting is undertaken by one third of households in England and Scotland and since 2007 there is a Committed Food Waste Reducer metric. (WRAP 2008). As a result of these campaigns over the past decade there has been a corresponding three fold increase in municipal recycling rates helping to direct waste from landfill sites.

The media is used by Defra and WRAP to inform and shape public knowledge and behaviour about recycling, but at the same time recycling is frequently front line news for negative reasons, when some authorities are perceived by residents to act in a punitive way against households who have not followed the rules. That waste collection itself has become more controversial is illustrated in a four page Guardian supplement (the Guardian is a quality broadsheet newspaper) headlined "*Battle of the bins. How rubbish became a hot political issue*" and a sub headline "*Britain is at war over rubbish. Exasperated households are attacking refuse collectors and stealing their neighbour's bins. What's going on? Why can't we change our dirty habits? And since when was waste such an emotive issue?*" (Henley 2008)

The Guardian article illustrates that the whole basis of the waste hierarchy of waste prevention, reuse / recycle or compost, recover energy and disposal, demands complex behaviour change of the public, which many struggle with (Bulkeley et al 2005). Kerbside collection is where householders are expected to sort their own waste into boxes and the refuse collectors load the material into separate vehicles. To do this successfully 'someone' in the household has to assume responsibility to take an active role to separate and distribute the waste in different ways, in several containers on different days.

The main aim of this review is

i) to use a systematic approach, which is a question driven methodology, to bring together what is known about household recycling behaviour into a coherent framework.

ii) The practical purpose prompting the review is to establish the current state of knowledge in order to strengthen the conceptual and theoretical base of research and to inform future marketing campaigns to encourage more household recycling. This is in the context of a new wave of recycling initiatives on food and batteries.

The paper is set out as follows; section two provides a methodology report of the search, the inclusion and exclusion criteria and a comment about quality. Section three gives an overview of the recycling literature, the scoping phase. Section four contains the case studies, summarised in tabular format, followed by the analysis and synthesis of evidence of current barriers. Two summary tables are presented a) seven papers in scope, b) five papers possibly relevant but ruled out of scope because they did not contain empirical data of current barriers. .

2. Method.

2.1. A systematic search and review.

A systematic review should be replicable and transparent, so that it is clear to the reader what material exists, what material was selected and what material was rejected (Tranfield et al 2003). The process begins with a systematic search,

then reading and familiarising oneself with the literature - in effect doing a scoping study, mapping the available evidence – prior to drawing up the specific inclusion and exclusion criteria to answer the stated question.

2.2. The search

The search began in October 2007 and continued until May 2008. A systematic search was undertaken of the electronic databases Metalib ®, ABI/INFORMS EBSCO, and SWETSWISE. Individual electronic journal databases searched were: Sage, Wiley Interscience online, Oxford, Taylor and Francis Informaworld. Links within these databases to similar journal pages were followed up, as were citations and references at the end of each relevant article. Every issue of *Resources, Conservation and Recycling* was scanned for the years 2001-2008 (vols 32-52). A starting date of 2001 was deliberately chosen to reflect changes in legislation, behaviour and knowledge about recycling.

The initial electronic search identified 522 papers which contained the words 'barriers to recycling UK'. Titles and abstracts were screened for relevance, where relevance was uncertain from the abstract a full copy of the paper was retrieved. Further candidate articles were identified from citations. Each title and abstract was screened using the pre-determined criteria listed later in section 2.3. Then paper copies were retrieved and read more closely. The final number of papers downloaded as potentially in scope was 27 having something interesting to say about current barriers to recycling. (see fig 1)

Fig 1 search report HERE

The final second Google Scholar search in May 2008 listed over 7,000 items using the word string 'barriers to recycling household waste in the UK'; from the first 120 scanned five new sources were identified, including two conference papers.

2.3. Key words, inclusion and exclusion criteria

The strings and combinations of key words included:

'household waste recycling'

'barriers / constraints and recycling',

'marketing and recycling',

'recycling and attitudes / motivation / behaviour and kerbside'.

Inclusion: English language, UK, domestic waste, household and on street / kerbside studies, empirical evidence of barriers. The focus is only on kerbside because this service provided by local authorities makes it easier for households; all they have to do is separate waste into different containers, so the effort required to go to CA or drop off sites is reduced. The inclusive time scale was 2001 - 2008. Grey literature, such as reports and non academic research which were identified from reference lists, and Google Scholar were included if easily available.

Exclusion: outside UK, papers which measured behaviour around Civic Amenity (CA) and bring sites only, other aspects of the waste hierarchy - re-use and reduce, measuring participation and set out rates, volumes of waste, and papers pre 2001.

2.4. The data extraction form documented the following information from all 12 in scope papers:

- (a) Author and publication details
- (b) Paradigm (academic discipline and institution)
- (c) Aim and focus of the paper
- (d) Method details (sample selection, population and sub groups, size, method design, response rate, location of the study)
- (e) Theory or models
- (f) Data about barriers to recycling (either as a literature review / summary; or numbers of non recyclers; or listing new reasons or barriers)
- (g) Segmentation
- (h) Other relevant or useful information

2.5. Quality appraisal

One standard feature of systematic review methodology is the approach to quality. Quality assessment is based on the 'hierarchy of research evidence', but it is increasingly recognised that this approach, which derives from clinical and biological research, "may rely too heavily on study design as a marker of validity

and reliability” (Ogilvie et al 2008: 886). In our search no Random Controlled Trials (RCT) were located, most studies are cross section observational surveys, although some studies have attempted to do comparative analysis or time series analysis. Some of the articles contain poor methodological descriptions which are too short, or have a project design which is weak and therefore of questionable quality. But to exclude them would limit the number of usable articles. Studies are not directly comparable, so Meta analysis is not possible. Some give percentages but no respondent numbers, other authors give respondent numbers but no percentage response rate. Quality appraisal involves judgement and an interpretation of the credibility and contribution of the work. The aim then was to priorities articles that appeared to be relevant rather than based on a study design that met abstract methodological standards. Authors were given the benefit of the doubt and we assumed studies were robust but that the methodology report did not give sufficient information.

2.6. Bias

There is an implicit claim in the systematic review methodology that the search and review ensures that the review is based on peer reviewed work, the published evidence, which is available to any reader, and not just an ad-hoc selection of papers, or a selection of evidence which proves a particular standpoint (Petticrew and Roberts 2006).

This means that unpublished work, known as 'grey literature' is treated with a great deal of caution. In academia students are taught to avoid citing non academic publications which are not peer reviewed or published in highly rated journals. Grey literature by definition is documents with limited circulation, which are difficult to obtain through the usual book selling or bibliographical channels. In the recycling context this covers research commissioned by local authorities, by government bodies and independent research companies. Such commissioned research is the property of the funder, which is then subject to confidentiality and the commissioners have the right to prevent publication. Some academic journals are reluctant to accept citations from such work.

The methodology is also a means to eliminate some of the bias caused by an ideological or expert knowledge review of a subject. Thus it is generally agreed that systematic reviews are best carried out by someone who is not themselves an expert in that topic. The search and preliminary review was carried out by one author (JJ) a social scientist with only a householder experience, but no previous technical knowledge of recycling. The collaborating author (I.S.), an expert in environmental studies, worked on the synthesis and provided insights and relevant policy information; I.S. independently checked the search and inclusion and exclusion phases.

3. The scoping overview: *“What do we currently know about barriers to kerbside recycling household waste in the UK”?*

This section presents a summary profile of the recycling household waste literature, later in section four we focus down onto the key question and the current barriers to recycling studies. In general we located two types of material: several survey based case studies, which are published in academic journals and the larger national scale studies carried out by market research companies such as MORI. MORI published a summary review for the UK Cabinet Office, based on more than twenty public opinion surveys undertaken by them over the previous ten years (MORI 2002).

The waste management / recycling literature is embedded in several academic disciplines, with contributions to be found in combinations of psychology, environmental and civil engineering, or business and management with a focus on marketing. Recycling tends to be covered by a small number of environmental academic journals. No papers were identified in public policy journals. The terminology used tends to mirror a technical engineering mindset, where the household is seen as the operational unit, the kitchen is the waste transfer station and waste is diversion from the conventional dustbin (Coggins 2001).

Fig 2 journals HERE

3.1. Intellectual frameworks and previous reviews

Researchers have been writing about recycling since the 1970s, but as many subsequent authors note, results are frequently contradictory and complicated by differences in waste collection schemes. In 1995 Hornik et al published a synthesis of the determinants of recycling behaviour in the *Journal of Socio-economics*, drawing on international material mainly from the USA covering the years 1970-82. A similar collation of current knowledge is to be found in Tucker's (2003) *Understanding Recycling Behaviour Technical monographs*, which also incorporates international knowledge. Nearly all the papers reviewed for this study contain a literature overview section, which uncritically summarises selected but similar sources covering 1970 to 2000. This early material is descriptive and focuses on the why, what and how questions. Several studies continue to conclude by arguing the case for more research into barriers and how they might be overcome (for example McDonald & Oates 2003; Thomas et al 2004; Martin et al 2006). As one study concluded, more research is required on how such barriers may be overcome (Robinson and Read 2005:81).

3.2. Theoretical approaches

Several studies set out to test and refine social psychology theory, typically the Theory of Reasoned Action (TRA) or Theory of Planned Behaviour (TPB) first developed by Ajzen and Fishbein (1977) (see Davis et al 2006 for a detailed critical testing and overview). Although it should be noted that Smallbone (2005) has argued that neither TRA nor TPB have proved to be good predictors of recycling behaviour. In the same mindset Barr (2007) tested a comprehensive

environmental conceptual model of motivation, attitudes, behaviour and barriers, covering *Recycling, Reduce and Reuse*. The model informs the structure of the categorisation which we use later to answer our review question, “*What are the current barriers to kerbside recycling household waste in the UK?*” One exception to this trend in theoretical terms is the work of Oates and McDonald (2006) who explore the usefulness of sociological theories of gender and domestic labour.

3.3. Methodological design

What we know depends on how the information was produced, whether the social science research methods were rigorously applied or whether the evidence is opinion based. The review shows the use of observational rather than experimental methodological designs, mostly quantitative using self completion postal surveys, and some face to face interviews. The design of research instruments is less easy to describe. We assume most are based on structured, closed questionnaires; thus the answers are generally pre-determined and normative.

There is little qualitative research published. The one exception being McDonald and Oates (2003), who undertook content analysis of open ended questions obtained through a three question postcard to residents who did not want to participate in a new kerbside scheme in Sheffield. In London Boroughs Thomas et al (2003; 2004) supplemented a large scale survey with 13 focus groups. But in a study of so called ‘hard to access or engage groups’ Perry and Williams

(2007) were unsuccessful in recruiting ethnic minority residents to their focus group, so they supplemented a low response survey with face to face interviews. (IS has undertaken several commissioned qualitative studies which remain unpublished, due to copyright agreements). Other approaches were a nationally representative survey by telephone (Smallbone 2005) and an on- street survey with passing members of the public (Karousakis & Birol 2008).

Finally it is notable that the selection of case studies and sampling areas is limited, based on research linked to local authority pilot studies, notably around a few London Boroughs or academic institutions, such as the University of Paisley in Scotland, Northampton and Lancashire in England.

3.4. Unit of analysis

The unit of analysis is always the same – the householder. Some empirical studies provide a recycler profile which does help develop greater insights and understanding about the socio-demographic dimensions of barriers to recycling activity. Empirical studies mostly rely on self reported behaviour where one respondent in a household, responds on behalf of the other members (Perrin & Barton 2001; Tucker & Spiers 2003; McDonald & Oates 2003; Williams & Kelly 2003; Darby & Obara 2005; Robinson & Read 2005; Davis et al 2006; Oates & McDonald 2006; Martin et al 2006; Shaw et al 2007; Barr 2007; Perry & Williams 2007).

3.5. Service innovation and evaluation

It is notable that several papers which might be relevant were excluded because they were predominantly evaluation studies assessing innovation in kerbside services or as follow up studies following publicity and communications campaigns. Some of this work is to be found in marketing and communications journals (Evison & Read 2001; Mee et al 2004; Mee & Clewes 2004; Timlett & Williams 2008; Harder & Woodward 2007). Kerbside collections have been studied by (Perrin & Barton 2001; Thomas et al 2003; 2004; McDonald & Oates 2003; Robinson & Read 2005; Shaw et al 2007; Perry & Williams 2007; McDonald & Oates 2003; Oates and McDonald 2006). Green waste and composting by (Tucker & Spiers 2003; Williams & Kelly 2003). The focus of this group of studies has shifted away from exploring motivation and attitudes to measuring actual behaviour within the household, documenting knowledge gaps or situational barriers which prevent more people recycling more. Knowledge gaps and situational barriers are important features of recent research.

3.6. Knowledge about non-recyclers

Studies tend to divide respondents into recyclers or non-recyclers. Two exceptions are the work of Thomas (2003; 2004) where segmentation based on attitudes and recycling behaviour divides respondents as high/medium/or low-non-recyclers. Just one paper addresses the barriers for non-recyclers (McDonald and Oates 2003). This gap is probably due to methodological

problems for researchers of how to identify a non – recycler sample as they become a smaller proportion of households.

As noted, studies claim to represent ‘household’ behaviour, but it is possible that with a little unpicking of responsibilities within a household we might begin to identify who is a reluctant recycler. A start has been made on this by Oates and McDonald (2006) who bring a fresh perspective to the debate by considering recycling as a domestic gendered activity. They differentiate between the ‘initiator’ and the ‘sustainer’, finding that women are more likely to be recycling initiators and sustainers than men, which confirms MORI assessments. So presumably more men than women are hard to engage?

3.7. Socio-demographic profiles

Social, economic and environmental factors shape the context from which the public think about recycling. They are therefore one dimension of the barriers framework. The socio-demographic characteristics of recyclers are well rehearsed. In the UK they are said to be older people, better off, home owners, probably not working, and many retired. A literature summary by Davies et al (2006) suggested they tend to be better educated and married. Confirming this profile Martin et al (2008) found there is a tendency for full recyclers to come from retired households and those in higher Council Tax bands, reflecting ownership of semi-detached and detached properties.

So conversely, non recyclers tend towards the households in lower tax bands and living in rented terraced properties, with a disproportionate number from households with children. A national telephone survey of 1000 respondents in England, Wales and Scotland noted that non recyclers tend to be in the age bands 16-34, 35-54, social class C2DE and not worried about the environment (Smallbone 2005). Only one study is based on ACORN classification of households (Davis et al 2006). MORI (2002) evidence tends to support these profiles and adds further categories with residents of council estates, flats and high rise accommodation. Socially mobile (frequent movers) have particular difficulty in participating in recycling.

More attention has been paid to housing and tenure as an important contextual factor. Thomas et al (2003; 2004) emphasised the lack of facilities for those living in London estates, the difficulties they face and how excluded they felt from kerbside activity. Recycler typology does indicate that people living in high rise estates are more likely to be low or non recyclers because they do not have door to door collection but have to use bring facilities. Whether it is housing type, social or ethnic group these are variables that suggest further research.

There is not much use made of social deprivation indicators, only two studies refer to a deprivation index in the reported rationale for sample selection (McDonald & Oates 2003; Davis et al 2006). So, the demographic profiles within different localities chosen for recycling studies may be producing bias in the

findings. For instance, whilst Oates & McDonald (2003) study is based on a 'mix of public & private housing stock', Davis et al (2006) cover an affluent area, where 72.6% of houses were owner occupied. Interestingly, Robinson & Read (2005) deliberately omitted large multiple dwelling buildings (which are known to present recycling problems) from their study.

A further limitation of the academic research lies in the vague descriptions of communities, rendering them colour blind. Little information is published about black and minority ethnic or multi-ethnic communities. MORI (2002:20) noted that "black and minority ethnic residents appear less likely to recycle, although this is partly a function of tenure". Only one journal paper title contains the words ethnic minority (Perry & Williams 2007). This case study examined an area in Preston, Lancashire, selected specifically because there was a lower level of participation in recycling. The authors concluded that there is a difference in the waste management behaviours of different ethnic groups, in their attitude to the environment, and in their reuse and recycling behaviour. Moreover the patterns can differ across generations. But this study is limited by the small proportion of survey respondents from an ethnic minority background. The report concluded that where there are barriers they are similar to other survey findings.

Further insights into this issue come from another study which examined an area with known low recycling figures. Martin et al (2006) in Burnley explored the social, cultural and structural influences on household waste recycling. Burnley

has a large British – Asian population concentrated in two deprived wards, where the waste management department reported low recycling rates. Unfortunately there is no definition of ethnicity. From group interviews we learn of positive attitudes towards recycling, but that it is not a priority. Many people were unaware of recycling facilities, found it difficult to obtain new bags and were critical of the reliability of the scheme. Residents reported that collections could be abandoned by the crews if the narrow streets were unpassable because of parked cars. Storage inside and outside the home was also described as a problem. Differences in lifestyle and consumption patterns meant fewer tin cans and jars were used. So there appeared to be a contextual service gap, a knowledge gap and situational / structural barriers that were more important and relevant here than psycho demographics and attitudes.

This scoping review summarises the general recycling literature from 2001 to 2008. The next section focuses down onto current barriers.

4. The systematic review: *“What are the current barriers to kerbside recycling household waste in the UK?”*

Of twenty seven original papers identified, twelve were screened in detail, of which seven papers, all case studies, are covered in the systematic review section answering our research question *“What are the current barriers to kerbside recycling household waste in the UK”*. The results are presented in a

tabular chronological order format of two results tables. For each study we show the main aim of the research, the focus and location of the study, the research method including sample selection, size and response rate and in the final column the quantitative measure of non-recycling and what evidence there is of barriers to recycling. Table 1 shows the in scope studies, table 2 those deemed out of scope.

Table 1 studies exploring barriers to recycling HERE

Table 2 – studies deemed outside the scope. HERE

4.1. Results synthesis on current barriers

The notable limitation of all studies is the small number of the claimed non recyclers involved and the tendency within studies to reproduce from earlier studies, but not analyse, explanations for barriers. So, for this review we carried out secondary analysis of the qualitative comments listed in the seven in-scope studies in Table 1. It should be noted that by doing the analysis purely on the barriers listed does take them out of context, but we believe that the similarities of barriers across studies makes this permissible.

The reasons why respondents did not want to participate – for example by accepting a new container such as a new compost bin or a kerbside bin scheme - have been aggregated. The reader should be aware that it is not always clear in

the original papers whether the words are those of the authors (from the design and summaries) or the open text of respondents. To arrive at this list we went through a series of steps. First explanations or reasons were extracted from articles and obvious duplicates removed. Second, the unsorted data were allocated into four core categories, shown in table 3.

1. Household /individual behaviour;
2. Services / local situation;
3. Attitudes / motivation;
4. Information / knowledge.

A category of respondents were also identified who may appear to be non participant or non recyclers who actually do recycle – but they include other materials which they recycle by other means.

4.2. So what are the barriers?

4.2.1. Household issues / individual behaviour

Many reasons, or explanations given by respondents, or what the literature describes variously as obstacles or barriers, are based on personal cost and inconvenience. Sometimes people acknowledge that recycling their household waste material has not become regularised into daily household routines – so it is not carried out automatically and some people forget to sort at source. Other comments are concerned with practicality; in many cases houses are not big enough to introduce several waste storage containers, so there may be storage

problems within and outside the house for the boxes or wheelie bin containers. Several of the in-scope studies were about specific waste materials, such as garden waste, so respondents explain that they do not have enough of this type of material to participate. And finally some people, because of age or infirmity are not able to handle the containers – which have to be moved from the house to the kerbside.

4.2.2. Services / local situation

The category of explanation compiled under the situational / services heading varies by locality. Those barriers listed in table 3 are a mixture of comments about bring sites and kerbside schemes. The final three comments about housing, where flat dwellers are left out of the scheme; the respondent is a new tenant or owner and has no containers; or the Council took the bin away, are the individual problems that illustrate our earlier observation in section 3.7. about the lack of services to some type of households, in flats or high turnover property.

4.2.3. Attitudes /motivation

Most studies have been based on developing theoretical models to show how motivation and attitudes can predict behaviour. The attitudes / motivations explanations listed in table 3 reflect two types of barrier. First there is some scepticism about the local authority role in recycling, some people hear half truths (for example from the media or neighbours) about what happens to the waste and this has a negative impact on their motivation and attitude. Then there

are others who are not interested in recycling at all or who believe that they personally will not benefit, which is another dimension of the cost hypothesis we described as a household and individual barrier.

4.2.4. Information and knowledge

The information and knowledge barriers are closely linked in with the section on services, since it could be argued that the waste collection authority has a responsibility to inform and communicate with its residents and households on the local recycling programme. Sometimes people are unsure what exactly they are expected to do and what exactly which materials are to go in which receptacle. This may be a consequence of the evolution of complex recycling campaigns. Local authorities have experimented with providing a range of collection receptacles over the past ten years, and the type of receptacle has also changed as the range of materials to be sorted has grown. The recycle logos on household products, for example on different types of plastic container, may also add to confusion if the relevant authority states that it does not want certain plastics to be placed in their recycle container.

4.2.5. Using alternative recycling

Finally, there is a small sub group of explanations which show that some people have not used their kerbside scheme, or due to situational circumstances have no access to kerbside schemes, but are nevertheless actively recycling by

another means. Sometimes householders are reluctant to put waste, such as alcohol containers, for all their neighbours to see.

Bring schemes used

Charity schemes, already collected

Different uses for paper (reuse e.g. rabbit hutch)

I already recycle green waste in my home composter

I prefer to take green waste to a council disposal site myself

Table 3 list of barriers HERE

To recap, what we have tried to do in this section is to take the qualitative data, explanations of barriers and comments from the literature, an unsorted list of raw data and locate them into a clear conceptual framework.

5. Conclusions and discussion

5.1. Results of the reviews

Our main contribution to the field is the systematic review to answer the question

“What are the current barriers to kerbside recycling household waste in the UK?”

Prior to this review information about barriers has been piecemeal, scattered throughout the literature in several journals, often as raw qualitative data, with a call for more research into those who are ‘not compliant’, who refuse to recycle.

First the scoping review has brought together for the first time what is known about household waste recycling research in the UK in terms of the conceptual, theoretical and intellectual frameworks which underpin the research. We have shown who is doing the research and where. The Theory of Planned Behaviour and various adaptations of that theory underpin most studies, yet recent work suggests that there are limitations to using this model of behaviour change further. Most studies focus on attitudes and motivations to describe the demographics and psychographics of recyclers but to a lesser extent of non – recyclers, possible because they now constitute a relatively small diminishing proportion of the population.

Second, by using a systematic literature review methodology and undertaking a comprehensive search of all the research published in academic journals which cover household waste recycling in the UK since 2001, we have identified seven articles which were deemed to be in scope after applying the pre-determined inclusion and exclusion criteria. It could be argued that seven is a relatively small number of articles, but this is not an unusual occurrence in systematic review because the terms of reference and inclusion / exclusion define the parameters. The information contained in these seven papers does give sufficient information on the common barriers to recycling at a given moment in time.

Third we have highlighted some limitations in the scientific rigour of the research reports themselves. For example, tables 1 and 2, which collate the key points from case studies, show that most are based on observational structured self completion survey questionnaires, often on small local samples with low response rates or where the reader is left to calculate the response rate. This raises issues of validity and reliability but mostly of danger of generalisation from small case studies. The range of methods used is narrow, with very little qualitative research using in-depth interviews, focus group techniques or triangulation. There is very little national scale research published in academic journals and this is an issue for future researchers to take up.

5.2. The synthesis framework

We have collated and categorised – transformed - the raw data from seven relevant papers explaining why people do not recycle into a four theme conceptual framework, covering household issues and individual behaviour; services and local situation, attitudes and motivation, information and knowledge. This conceptualisation is moving towards a segmentation approach that should help future service managers to communicate and work with households, since many of the barriers are fairly easily resolved and not entirely based on attitude or motivation. By adopting a consumer perspective, to obtain customer behaviour insights, rather than an engineering or waste disposal perspective, we can attempt to understand the rationale behind what people are saying in recycling surveys and treat their comments as rational and context specific and make

recycling easier for them. Recycling schemes have to be easier, more convenient, less time consuming, less effort but at the same time more enjoyable and rewarding.

5.3. Limitations to the study and the systematic methodology

There are many internet resources and text books which offer guidance on doing systematic literature review, which first began with the Cochrane Collaboration assessing clinical and biomedical research. There is no specific guidance on transferring the methodology to environmental studies, so we have adapted the protocol accordingly. As a result we have learned that the 'hierarchy of evidence' is not an appropriate quality scale to apply to the current published academic environmental community based research.

We have not drawn from grey literature. Only one type of research, - that published in the academic journals - is covered in this paper. This is the range of information that research students and academics have easy access to. This raises a methodological issue. A key facet of the systematic review methodology and its protocol privileges academic research because it is peer reviewed and published in rated journals over other types of research reports. This might be thought of as publication bias issues, work not submitted rather than work rejected by journals. .

5.4. Implications for policy, practice and future research

This review provides evidence to underpin the work of Defra and WRAP in their objective to increase the number of people recycling and the amount of household waste that they recycle. The work fits in with current Defra Waste and Resources Evidence Strategy 2007-11 (Defra 2007) which marks a shift from pure scientific research to embrace a wider evidence based approach. This approach is multi-disciplinary and willing to consider the wider range of knowledge that is required to deliver a sustainable waste and resources policy in the UK. In particular it welcomes secondary research which assembles existing social and scientific evidence. To aid their objectives Defra have set up a new website, www.wastenet.defra.gov.uk which will provide an easily accessible resource for researchers and practitioners of relevant up to date information about waste and resources research.

Finally, the preliminary findings of the barriers to kerbside recycling literature review (which was an academic exercise by one author JJ, and not part of a contract) were fed into a national empirical study commissioned by WRAP into the current barriers to household recycling (Pocock et al 2008). As for future research, reference to the 'hierarchy of research methods' suggests more robust methodology reporting is required to ensure transparency and reliability; more work on housing tenure and type analysed by the range of available council services; minority ethnic household behaviour; and work on a larger national

scale is needed. This review will be of use to new research students who study recycling as part of an academic environmental course. Moreover, it provides a starting point for new research on food waste and waste prevention behaviour; learning about the different barriers and the context can help put policy into action. .

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Fig 1. Search report

e-library electronic databases	522
Google Scholar	7,090
Potentially in scope and potentially relevant	27
In scope after reading	12
Data on current barriers	7
No data on current barriers	5

Fig 2: The Journal sources of recycling barriers literature

Business strategy and environment

Environment and Behaviour

Journal of Environmental Planning and Management;

Journal of Environmental Management

Resources, Conservation and Recycling

Sociology

Table 1: studies included in the systematic review on current barriers to recycling domestic waste.

Reference	Aim of research	Focus Location	Method	Non recyclers Numbers, reasons given
Perrin, D & Barton, J. (2001) <i>Resources, Conservation and Recycling</i> 33: 61-74	To assess issues associated with transforming household attitudes and opinions into material recovery.	Comparison of two different kerbside schemes. Leeds Bradford	Comparative case study. Door to door delivery pre intervention and follow up postal self completion survey. Total sample 763	Leeds 79 Bradford 14 Barriers listed
Tucker, P. Spiers, D. (2003)	Attitudes and behaviour change in	Home composting.	Longitudinal case study.	Non composters not counted.

<i>Journal of Environmental Planning and Management</i> , 46(2) 289- 307.	household waste management.	Scotland	Postal survey and deliver /collect. Two samples: those taking up a bin, those not taking a bin. Total sample 412/755	Barriers based on the literature and this study. Barriers listed
McDonald, S. Oates, C. (2003) <i>Resources, Conservation, and Recycling</i> 39:369-385.	To understand the non recycler better.	Reasons for not opting-in to take a kerbside container. Sheffield	Case study. Postal survey non participants only. Sample 714 /1690 responded, 43% response rate.	Content analysis. Coded barriers into 12 categories. Barriers listed

Thomas, C. Slater, R. Yoxon, M. Leaman J. Downing, P. ISWA World Congress 2003	To explore reasons why people recycle linked to a public communications and education campaign.	Kerbside provision. London Boroughs Western Riverside	Longitudinal case study. Part one. MORI face to face interview survey of 2023 and 13 focus groups.	Segments: medium, high, low and non recyclers. Barriers listed.
Williams, I.D. Kelly, J. (2003), <i>Resources, Conservation and Recycling</i> 38: 139-159.	To identify reasons for non-participation in green waste collection.	Green waste opt in or out of a taking a container. Wyre, Lancashire.	Case study Two stages and two samples. Opt in participants response rate 72.5% Opt out response rate 49%.	Non participators n=611, Barriers listed.
Robinson,	To assess	Measuring	Longitudinal	Percentage

G.M. Read, A.D. (2005) <i>Resources, Conservation and Recycling</i> 45: 70-83	kerbside and bring site behaviour and promotional activity.	changes over time. 2000 -2004 Royal Borough of Kensington and Chelsea.	case study. One in four household sample, face to face interviews Samples: 2000 - n= 8066 2004 - n= 3367	Non recyclers drops from 51% to 27%. Barriers listed
Smallbone, T. (2005) <i>Business Strategy and the Environment</i> 14:110-122	To measure consumer views on household waste and test assumptions underlying policy approach.	Recycling behaviour England, Scotland, Wales.	Includes a NOP national telephone survey Sample – n=1000	Non recyclers 21%. Barriers listed

Table 2: Papers excluded from the systematic review and reasons.

Reference	Aim of Research	Focus, location	Method	Reason for exclusion
Davis, G. Phillips, P.S. Read, A.D. Lida, Y. (2006) <i>Resources, Conservation & Recycling</i> 46: 115-127.	Understanding recycling participation using the Theory of Planned Behaviour.	Testing theory to create effective targeting material West Oxfordshire	Survey hand delivered to 334 houses. Sampling: ACORN A, DEF, part of B. Response rate 22%	Excluded non recyclers from analysis (n=2). Not about barriers
Shaw P.J. Maynard, J.K. van Vugy, S.J. (2007) <i>Journal of Environmental Management</i> 83: 34-43.	To assess kerbside schemes using a mathematical model based on SOR and PR	To prioritize campaigning London Borough Havering	Street observation and Survey sample 4085.	Lit review only

Oates, C.J. & McDonald, S. (2006) <i>Sociology</i> 40 (3):417-433.	To investigate recycling as domestic labour	Gendered division of labour – Sheffield	Postal self completion survey Sample 469/1532 31% response rate	Not about barriers
Karousakis, K. & Birol, E. (2008) <i>Journal of Environmental Management</i> internet version	To examine the determinants of household recycling behaviour, measure willingness to pay.	London Boroughs Kensington & Chelsea, Richmond Upon Thames and Westminster.	On street interviews Sample n=188.	Not about barriers
Barr, S. (2007) <i>Environment & Behaviour</i> 39, 4. (435-473.	To develop and test a conceptual framework (Phd study)	Exeter	Self completion survey. contact and collect	Lit review and theory, Not about barriers

			method	
			Sample	
			673/981	
			69%	
			response	
			rate	

Table 3: reasons for not recycling household waste

<i>Household issues / individual behaviour</i>	<i>Information and knowledge</i>
Inconvenient	Lack of information
No time	Ignorance about what can be recycled,
Too much effort involved, too difficult, too much organising, extra work, see it as a hassle,	Unaware of kerbside collection
Not a habit, recurrence of old habits, individual forgetfulness,	Low awareness of how to recycle
Storage is an issue, storage and handling problems, lack of space to locate bin, shared bins, no space in residence, a lack of storage space, not practical	Lack of information from the Council
Not enough materials to recycle	Need a clear understanding of HOW to do it, not so concerned about why's wherefores, what's and outcomes
Insufficient paper, do not purchase enough papers to warrant recycling them	Confusion over what services might be available and how to use them
Not having enough waste to make recycling worthwhile.	

<p>My household does not generate much green waste, not enough recyclable waste</p> <p>Unable to participate (elderly can't manage bin)</p>	
<p><i>Services / local situation</i></p> <p>Facilities too far away / inadequate, Banks too far away, can't carry, no car Appearance of bin (blue) disliked Physical location, street layout and type Competing and thus confusing outlets. Inadequate provision by council, lack of provision Wanted better and more convenient infrastructures for recycling Estate and flat dwellers left out New tenants /owners Participation disallowed (Council decided or took away bin)</p>	<p><i>Attitudes /motivation</i></p> <p>Never really thought about it Negative about the Council making money Perceived effectiveness of the activity, Thinks Council throws it away Didn't want it, I do not want a wheelie bin Not bothered, never considered, disinterested in recycling, unrewarded effort I do not want to participate in the scheme Not important enough issues, I prefer to place green waste in a regular dustbin</p>

