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Public understanding and its effect on recycling performance in Hampshire and Milton Keynes

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Abstract:

Improving the recycling rate might be the primary aim of ‘recycling targets’, but good diversion from disposal can be achieved in different ways. Public participation is obviously critical to success; however it is not just how many people participate, but how well they do so, that is important. Analysis of public attitude research gave insight into how effectively recyclers were participating, and examined levels of public understanding. These were correlated with design parameters and publicity and education strategies to try to identify aspects of successful schemes that led to high quality of participation.

Keywords: kerbside recycling; participation; public understanding; diversion rates

1. Introduction

The amount of waste diverted for subsequent recycling plays an important role in judging the effectiveness of any recycling scheme, and improving this is one of the primary aims of ‘recycling targets’. Whether this is called diversion rate, recycling or recovery rate will depend on what definitions of indicators are used. However a good recycling rate can be achieved in different ways, and hence other indicators are important to build a clearer picture of overall effectiveness. Diversion to recycling will depend not only on participation levels in the scheme (participation rate) but also on the maximum that can be potentially diverted according to the scheme’s design amongst other things. The level of participation in a scheme is obviously critical to success; however it is not just how many people participate but how *well* they do so, how effectively they participate, that is an important parameter. One useful indicator of this is the recognition ratio – defined by the UK Department of the Environment, Transport and the Regions (DETR) [1] as the quantity of targeted material set-out by the participating households divided by the total quantity of targeted material available in the waste stream of households served by the scheme. However the recognition ratio, although an indicator of understanding, is also in part dependant on the numbers who participate as well as how well those participating comply with the schemes requirements. It

doesn't tell us how well people understand what they should do or how motivated they are to do it. Another measure of the quality of public participation is the capture rate, defined by the European Recovery and Recycling Association [2] as the ratio of the recovery rate (the ERRA equivalent measure to the recognition ratio) to the participation rate. The performance indicators used in this paper follow the definitions suggested either by ERRA or those set out by the UK DETR in its guidance to local authorities on monitoring recycling schemes [1] and in its definitions of 'best value performance indicators' (BVPI) [3]. Table 1 shows how these indicators relate to each other. Diversion rate will be the same as the recycling rate (or recycling BVPI – best value performance indicator) where the whole area is covered by the kerbside scheme.

As defined by the ERRA:	As defined by the UK DETR:
<u>diversion rate</u> is the amount of material recovered from the generators served / total amount of available waste from the generators served x 100	<u>recycling rate</u> is the quantity of material from households sent for recycling (materials recycling and centralised composting) / total quantity of household waste available x 100
<u>participation rate</u> is the ratio of the number of generators participating at least once in a four week period to the total number of generators served by the programme in the same four week period x 100	<u>participation ratio</u> is the ratio of the number of households using the programme facilities at least once in a four week period / total number of households provided with the facilities during the same four week period x 100
<u>recovery rate</u> is the ratio of the amount of targeted material recovered from the generators served to the total amount of targeted material available in the waste stream from the generators served x 100	<u>recognition ratio</u> is the ratio of the quantity of target material set out by the participating households to the total quantity of targeted material available in the waste stream from the served households x 100
<u>capture rate</u> is the ratio of the recovery rate to the participation rate	

Table 1: Performance indicators

But if recognition and capture rates are low – then why? Does the scheme's design make it difficult for people to fully participate? Is the scheme demanding too much in terms of effort and time from participants – do people choose not to do everything asked of them? Or are participants willing but not understanding what is required?

In judging performance in source-separation recycling schemes focus has most often been on participation; on why people do or don't participate, on their motivation and attitudes towards recycling and other environmental issues. The extensive literature in this field is well summarised in [4-11]. Much of this research has tried to build up a profile of the recycler and non-recycler to relate behaviour to demographic variables; attitudes to and understanding of recycling and environmental issues; the influence of education and publicity materials; and the effect of design factors of the recycling schemes available. Studies have often tried to identify the influences on behaviour of psychological and socio-demographic variables. Many attempt to find links between attitudes to and awareness of environmental issues with willingness to participate in recycling [6,11-14], and to measure behavioural trends [8, 10,

15]. Recyclers were generally found to be more aware of publicity and more knowledgeable about recycling, with non-recyclers more concerned about incentives to recycle and convenience. However recyclers and non-recyclers were similar in their pro-recycling attitudes, but non-recyclers needed more information on how to participate. Negative influences (e.g. the amount of work and effort required to recycle, lack of storage space, inconvenience and distance to recycling facilities) were more often found to act as constraints and barriers to non-recyclers. Social pressure can be important factor in participation [15]. Examining whether a link exists between participation and socio-demographic factors [5, 6, 9,16] has occupied many studies, and from a range of perspectives including planning to target recycling schemes in areas where higher participation can be expected; devising programs to improve participation in areas where it is found to be low; and to discover a profile of 'who is a recycler'.

However this research does not distinguish differences between recyclers – from those marginally motivated to participate to those who fully comply with a schemes requirements. It mainly focuses on why and how many people participate, and attitudes as predictors of behaviour are important in determining how to motivate people to participate. How well they participate is no doubt related to this, but will also be dependent on another factor, understanding.

This paper looks at public attitude market research carried out with a view to investigating reasons for participation or non-participation, in a number of areas with kerbside schemes, including the town of Milton Keynes and several urban and rural Districts in Hampshire County, both in the UK. The author analysed this survey data to give insight into how effectively recyclers were participating in recycling, and examine levels of public understanding of the kerbside schemes.

Measuring the amount of what is collected can tell us how well people are separating their waste but not whether they understand what they should do and choose not to do it because it is too much trouble, or whether they are sufficiently motivated but don't fully understand what they should be doing. Public attitude survey research of the type described in this paper can be used to assess such levels of public understanding. Public understanding is measured by use of specific questions in the public attitude survey to explore the respondent's recognition of the schemes requirements. Knowing what and how well people understand how to participate in a scheme and what they choose to do about it is invaluable evidence for local authorities in identifying where and how to target public information campaigns and effectively improve quality of participation, and hence the quantity of material diverted cost effectively.

The case studies described in this paper look at the effect of these factors on kerbside scheme effectiveness in each area.

2. Kerbside Recycling in Milton Keynes

Milton Keynes is a Unitary Authority, some 50 miles north of London, having responsibility for both municipal waste collection and disposal. Milton Keynes Council operate a 'blue box' type kerbside collection scheme throughout its area of 80,000 households, collecting a wide range of dry recyclables weekly. It is a two box system, with materials sorted at the kerbside into a multi-compartment vehicle. The area consists mainly of low-density single household properties.

The research looked at the key indicators of performance for the scheme, which showed a recycling or diversion rate (as the whole area is included in the scheme) of 17.9% in 1998/9, with a potential diversion rate (if all the available recyclables were collected) of 53% and a participation rate of around 65% [17].

Participation rate had to be estimated, as directly measured data was not available, and was based on self-reported data, opt-in requests for participation and earlier measured participation. The scheme operates on an opt-in basis and currently 75% of properties in the area have requested recycling boxes. This figure is often quoted as the rate of participation in the scheme, however it is likely that the participation rate, as defined in Table 1, is actually less than this. Residents may have requested boxes but then fail to use them or stop using them, or they may have moved house and the new residents not continued to participate. Participation in the Milton Keynes scheme though has not been accurately measured since 1991 [18] when the pilot scheme, which ran prior to full implementation of the scheme, was evaluated and participation measured at 58%. This was considered though, at the time, to be an under-estimate [19]. The survey undertaken by Milton Keynes Council in 1995 [20] found the self-reported participation rate to be 71%, but which, due to the nature of self-reported behaviour, is probably an over-estimate. In the absence of more accurate data, and after the sensitivity to participation rate was considered and found not to be critical in this analysis, an assumed participation rate of 65% was used. This compares to figures quoted in the UK DETR Good Practice Guide [21] for 19 local authority kerbside schemes where the mean participation rate was found to be 63% in a range of 40-99%.

These indicators show how effective the Milton Keynes scheme was at recycling domestic waste, and demonstrate that it obtained a reasonable diversion rate through setting a high potential diversion rate (i.e. targeting an extensive range of materials for recycling) and achieving a low recovery or recognition ratio rate (i.e. only recovering a small proportion of them). With participation being reasonably good at 65%, this gives the scheme a fairly low capture rate of 52%. A low capture rate in a scheme with good participation points to the participants having inadequate understanding of what is required to participate. However poor motivation might also be expected to result in low recovery rates, although in voluntary schemes this would also most probably result in low rates of participation as well. To test whether the low capture rate found in Milton Keynes was due to poor motivation amongst residents or poor understanding of the schemes requirements the survey results were analysed to look at both the attitudinal outcomes and also specifically at how well participants understood the schemes requirements.

Most significant to this analysis was the finding amongst participants, when asked why they joined the scheme, 71% supported the idea of recycling, suggesting it was a 'good thing to do', with about 23% specifying environmental benefits as the reason to support it. Also interesting was the finding that around 30% participated just because 'it was there'; because the scheme existed, they were given the boxes, or thought you had to. In a previous survey undertaken in 1990 in the initial trial area for the scheme showed 70% of participants who were then collecting a smaller range of materials expressing a desire to collect more items – with card, plastics food containers and plastics bags being the most commonly cited [22]. Overall then motivation appeared good, with altruistic beliefs and values motivating many

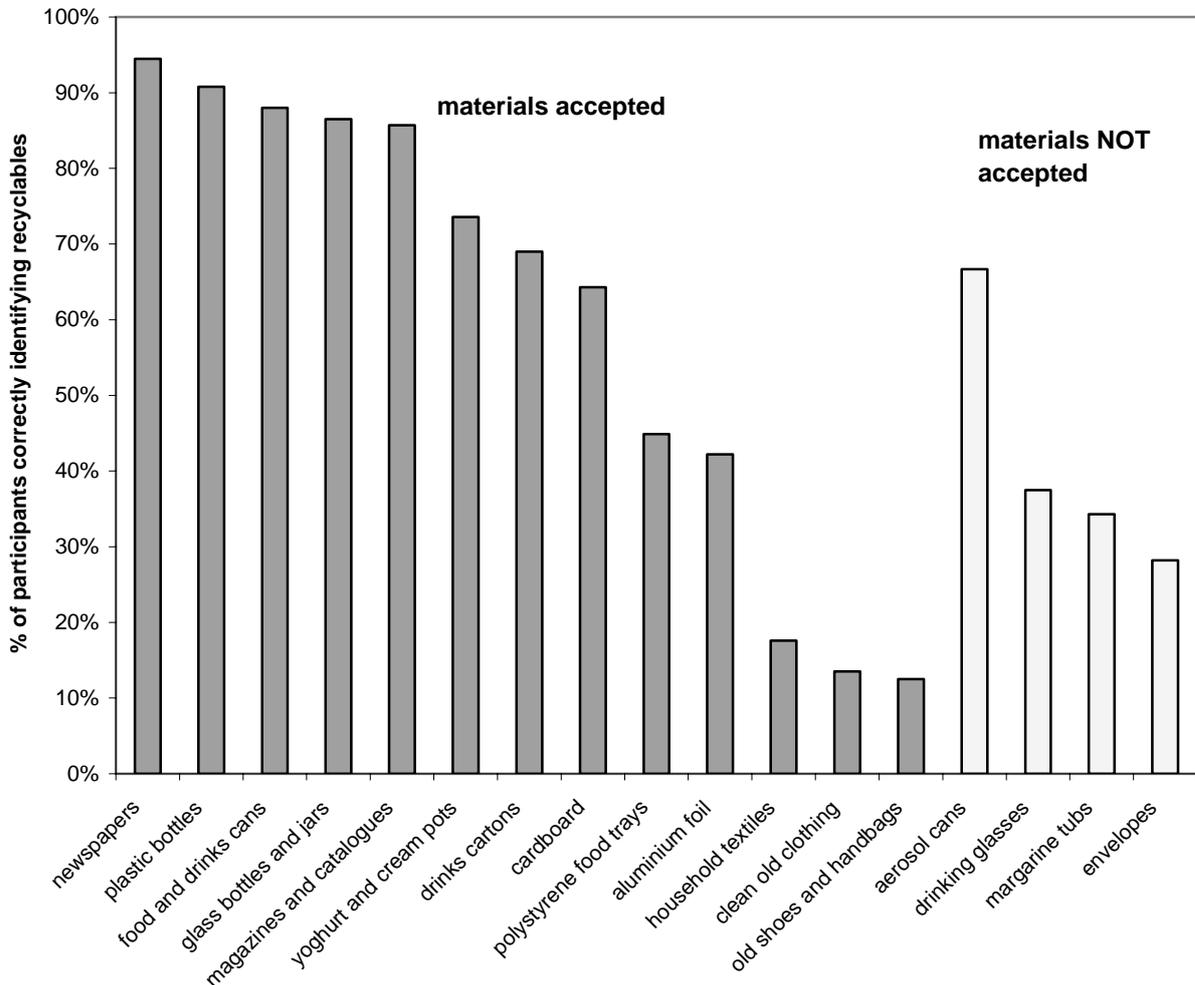


Figure 1: Recognition of recyclables accepted by the Milton Keynes recycling scheme

participants, but being sufficiently high for just under one third of participants to be motivated by just being provided with the means to participate [20].

The results were then analysed to find out what percentage of the participants in the kerbside scheme recognised that specific materials should or should not be saved and put out for collection, as well as determining how many participants recognised the full list of materials that should or should not be saved. In 1995 when the survey was carried out the list of targeted recyclables, as specified in leaflets to households, contained 22 acceptable items and 12 that were not. This was considerably more complicated than an earlier phase of the scheme (pre-1994) when the flier to households listed 5 recyclables accepted by the scheme and 4 items that are not accepted. Analysis of the survey results show that although 61% of

participants recognised the pre-94 list of materials for recycling, nobody could completely list what materials should or should not be separated for recycling at the time of the survey, thus indicating a low awareness of the schemes then current requirements amongst residents.

Given the extensive list provided to participants, lack of recognition of one of the less common categories of recyclable materials would tend to skew the results for overall recognition of all the schemes requirements. This can be balanced by looking at recognition levels material by material, which found that awareness ranged from 12.5% to 94.5% (see Figure 1). Materials that had the highest recognition were those accepted by the pre-94 list and all five of these showed recognition rates greater than 85%. These results imply that participants did not understand sufficiently what they should be doing to participate fully, rather than that they understood but did not wish to comply. But was this due to residents having insufficient information or related to the scheme being overly complex? It was concluded that the scheme might be made more effective in at least two ways:

1. improving participants understanding of the schemes requirements, by publicity and education and motivating them to improve how well they separate their recyclables and their understanding of which materials are accepted by the scheme;
2. reducing the range of targeted recyclables for collection, focusing publicity and education on these, to achieve similar diversion rates but at potentially reduced costs.

Comparisons made of the performance in 1995, with that in 1993 when the recycling scheme only accepted five targeted materials, indicated that the second strategy could be effective. In 1993, with a similar participation rate, a diversion rate of 19% was achieved. With a potential diversion rate of only 38%, the recovery or recognition rate was 50%, giving a capture rate of 77%. Thus increasing the range of targeted materials alone showed not only a small reduction in the overall diversion to recycling, but a significant decline in the capture rate achieved.

3. Kerbside Recycling in the County of Hampshire

If recycling schemes are to improve in effectiveness and meet the recycling targets being proposed by both government and local authorities, there will be a need to both collect a wide range of materials *and* achieve a good capture rate. What aspects of scheme design (in particular convenience and ease of participation) or communication strategies are most critical to achieving this? Further research and analysis was then carried out to look at this on the extensive public survey and waste composition data undertaken in the County of Hampshire, where eleven local District Councils operate multi-material kerbside collection schemes. Hampshire is a County in the south of England. The County Council, as Waste Disposal Authority, has responsibility for municipal waste disposal for eleven of its Districts, which are themselves Waste Collection Authorities. The County also includes two Unitary Authorities. This offered the opportunity to compare the influences on public understanding and participation in schemes with differing design parameters, levels of complexity, and in a range of socio-demographic contexts.

Scheme performance will be affected by many aspects of its history, design and communication strategy. Those factors that were considered most likely to affect public participation include ease of participation – such as type of container provided, frequency and convenience of collection, what materials are collected and hence perceived time and effort to

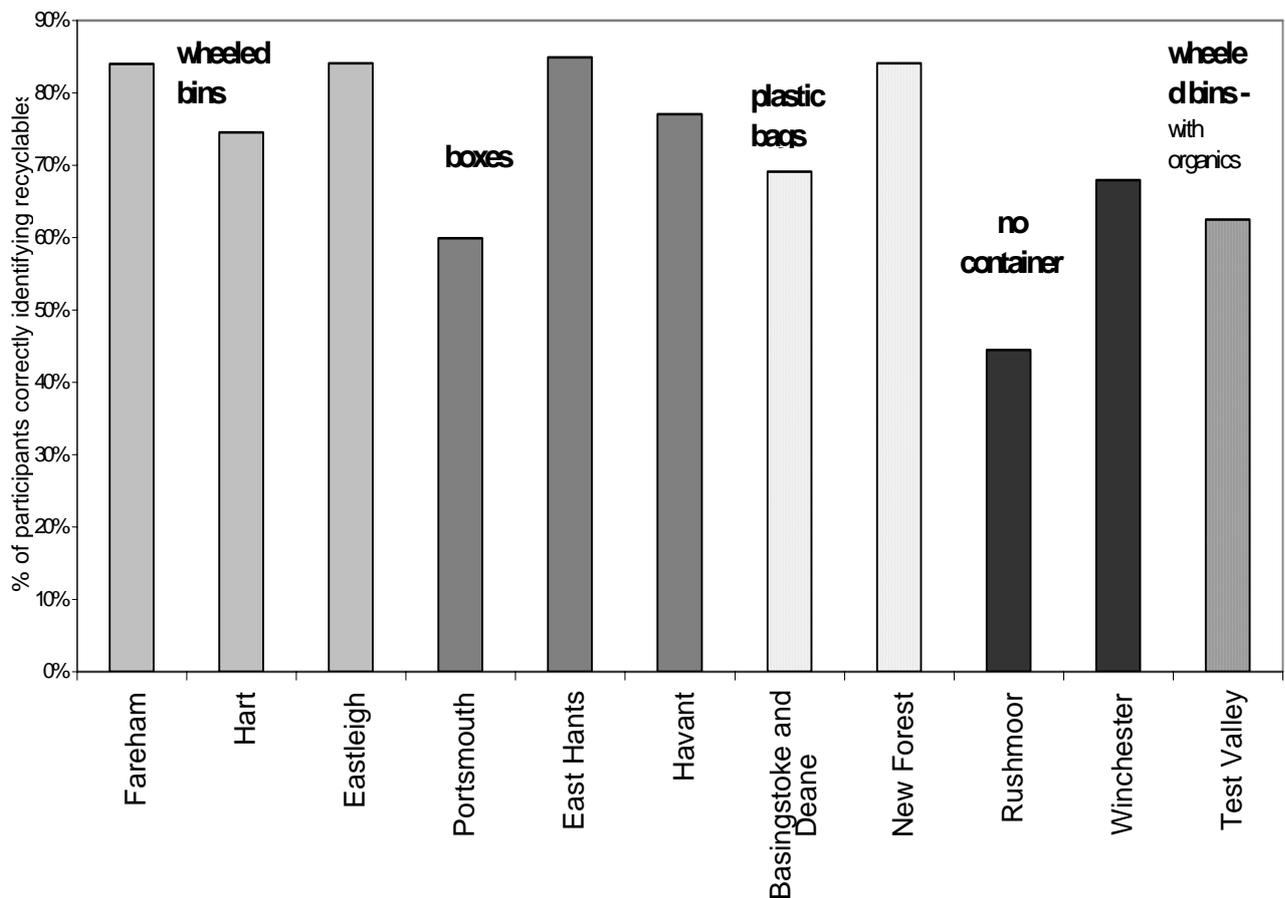
source separate the required recyclables; publicity and information provided; history and context of the scheme – whether it is newly introduced, established or undergone some recent significant changes, political factors that might influence local opinion; and socio-demographic influences.

The following brief description summarises the variations in these factors found within Hampshire; variations which were then examined in relation to the levels of public understanding found for each of the schemes:

- Type of container provided to participants: Of the eleven schemes in Hampshire, four were twin wheeled bin schemes – one with an optional 3rd wheeled bin to account for alternate collections of wet and dry waste; three used boxes; two distributed clear plastic sacks for recyclables; and two provided no container, expecting participants to use their own plastic carrier bags.
- Frequency of recyclables collection: Five of the schemes collected recyclables weekly, and the rest fortnightly;
One important design variation is that Eastleigh operates an alternate weekly collection of residual waste and recyclables, using 140litre bins as standard (with 240litre bins for larger families).
- Materials collected for recycling: There were no significant differences between schemes in the range of recyclables collected. All collected newspapers and magazines, plastic bottles, and food and drinks cans – and all except three Districts took mixed paper and card. What was collected was determined by the requirements of the Materials Recycling Facilities.
- History and context of scheme: Most of the schemes had been established for more than six months prior to the period when the survey was carried out, although some had had recent expansions to some areas. Only one District – Basingstoke – was undergoing significant changes in the design of their kerbside scheme, where their plastic sack scheme was in the process of being changed to a ‘piggy-back’ bin scheme during survey period. This might have had an unpredictable effect on public attitudes at this time.
- Socio-demographic factors: Socio-economic influences were not easy to identify between Districts as the data collected mostly involved samples which were too small to allow valid comparisons, although some trends across the county were examined.
- Publicity and information provided to residents: This is a difficult area to quantify but there are elements in the approaches taken that can be highlighted. Similar approaches are used by all Districts to publicising schemes and providing information to residents – focusing on packages of information to residents prior to or at the launch of a scheme in a new area; sometimes followed by a mixture of reminder leaflets, stickers as reminders on recycling containers, articles in council’s newsletter or magazine, publicity through logos displayed on containers and vehicles, and articles in local press;
Some areas provide reminders for participants to keep – these might be in the form of printed bags or stickers for recycling containers which provide a regular reminder each time the participant engages in recycling something, or as calendars or leaflets that can be kept (or lost);

Most Districts provide some educational visits to schools and community groups, some more intensively than others; whilst some focused more on providing a personal interface with the public – going out and talking to people, listening, being visible in their communities;

Some districts use more varied and innovative approaches – such as posters in public places including notices boards and information points, on public transport buses and



in bus shelters.

Figure 2: Understanding by type of container used in District kerbside schemes in Hampshire

The measure used to reflect the participants' level of understanding of the schemes requirements was calculated from the response to a question in the public attitude survey carried out in 1999 as part of a Project Integra Household Waste Research Programme [23]. This asked which of 24 types of waste material should be separated and put out for kerbside collection (between 7 and 13 of these were accepted by the various schemes). This measure of understanding was analysed in a variety of ways, and examined in relation to waste composition and collection data gathered as part of this research programme [24], in order to attempt to discover correlation or trends by each District, design features, socio-economic

information, and some aspects of communication strategies. The results indicate a number of areas where recognition differs between schemes. However the interactions between the many influencing factors on participation are complex and do not indicate simple cause and effect relationships. For this reason it is not possible to draw from this research an overall process for evaluating performance or effectiveness which brings together all these influencing factors. What the research has instead focused on is indicating where individual influences contribute to better public understanding.

What this measure of public understanding or recognition of materials for recycling shows is how well those already participating in a kerbside scheme do so; it does not show how many people participate (this is given by the participation rate) or what those not participating understand of the schemes.

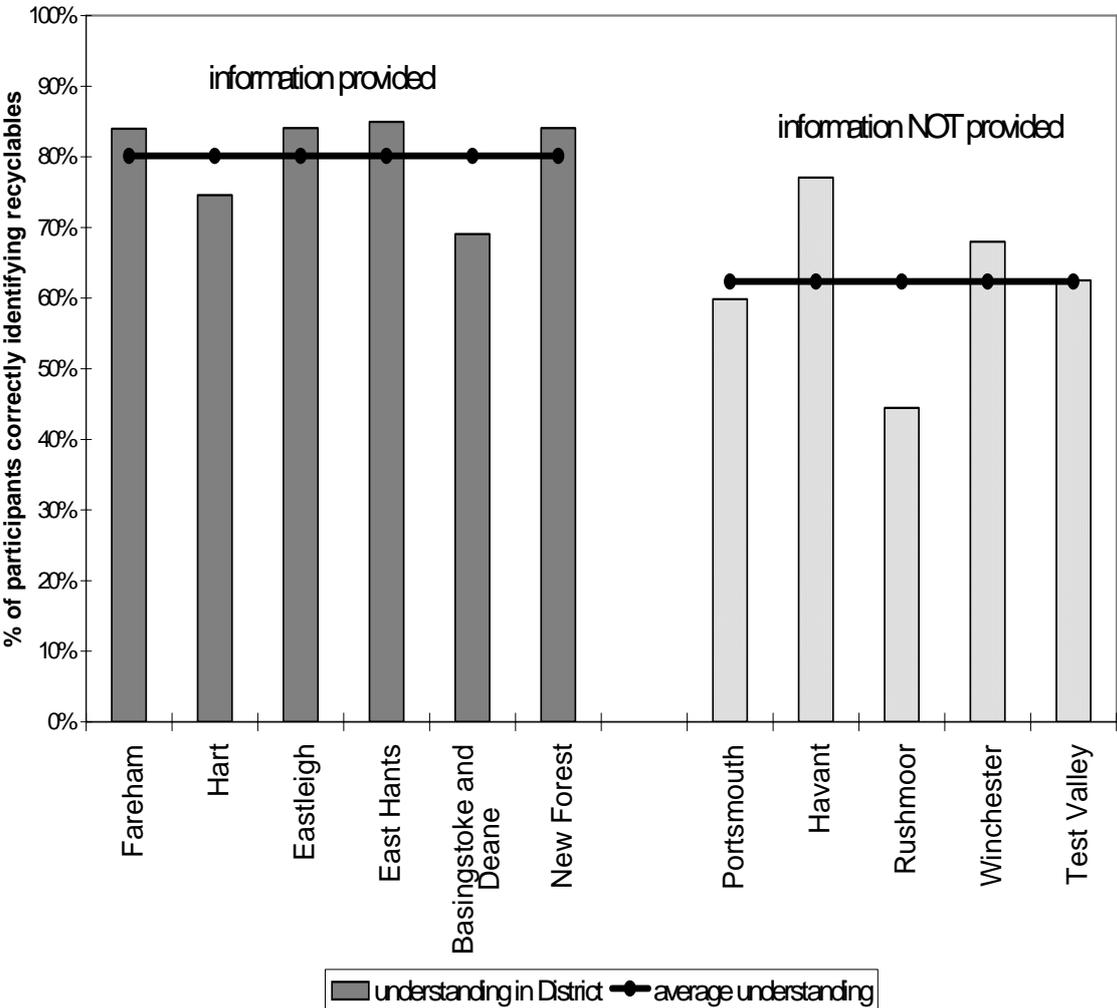


Figure 3: Understanding related to provision of information on the container about what can be recycled

There was no distinct or strong correlation found between container type and level of understanding amongst participants, as Figure 2 shows. However it appeared that the twin-bin schemes all performed well, and ‘no container’ schemes less well than others. Schemes

where participants had the highest overall grasp of requirements were Fareham (twin wheeled bins); Eastleigh (twin wheeled bins); East Hampshire (predominantly box, but offering other containers); and New Forest (plastic bag). Similarly other design factors showed little correlation with understanding, such as no significant differences were found between schemes having weekly or fortnightly collections, with both high and low performing schemes found amongst each group.

Regular reminders, provided by either printed bags or stickers to put on boxes or lids of wheelie bins, to prompt households about what materials to recycle, did show a correlation with higher levels of understanding, as shown in Figure 3. This was further emphasised in Rushmoor (which does not provide information on the container and has the lowest average recognition levels) where residents reported in the attitude survey to feeling less than other districts that the council reminds them what to put out for recycling [23].

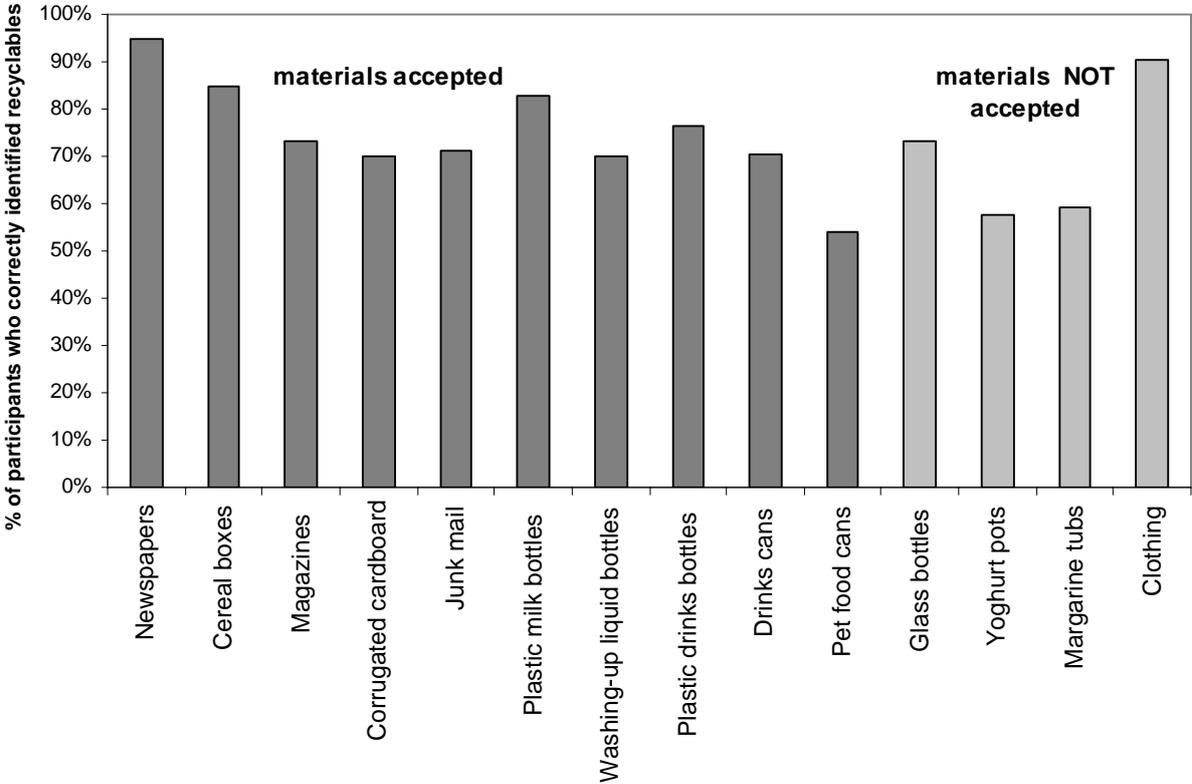


Figure 4: Recognition of recyclables for kerbside schemes in Hampshire

Test Valley was the only wheeled bin scheme not to provide information stickers for the bin lids, and also showed a lower average level of understanding than the others. This was in part brought lower by the very low understanding that food wastes could be recycled, although levels for other materials were generally on the low side. This is in line with the comment in the attitude survey responses about participants in Test Valley being “significantly more likely to be confused than others” and are more likely to “not be bothered to sort their waste

out” [23]. The scheme is one of the more complex to participate in, with a weekly collection of residual waste in a wheeled bin, and a second wheeled bin to be used on alternate weeks for wet and dry recyclables. This undoubtedly creates storage problems for participating households, which seems to be overcome either by requesting a third bin (about 25% of participants have done so) or in some cases choosing to recycle either compostable wastes or dry recyclables.

There was considerable variance in how well different recyclables were recognised as targeted by kerbside schemes, as shown in Figure 4. Newspapers and plastic bottles were identified most often. Magazines and cereal boxes were also well recognised in schemes which took mixed paper, but there was some confusion regarding the acceptability of magazines in those areas which didn't take mixed papers and card. There was a lower level of understanding that cans should be recycled; for drinks cans, and in particular pet food cans. Also the levels of understanding that glass was not accepted could lead to unacceptable contamination if participants were including these in the recyclables that they put out for collection.

Analysis by socio-economic group indicates that socio-economic differences between Districts would not explain differences in levels of understanding amongst participants in these Districts. Clustering Districts by the percentage of their populations in different social class groups shows no correspondence to levels of understanding in each area. Also looking at responses across the County analysed by different social class groups, there was found to be no significant differences in levels of understanding between those participating from different groups. However there are other aspects to participation that should be considered in looking at socio-economic profiles, in particular participation rates (i.e. how many people are participating, rather than how well they do so). The public attitude survey data shows some differences between socio-economic groups in both awareness of a kerbside schemes existence and in whether they participate, with more affluent groups being more likely to be aware and to participate. These factors both have implications to the local councils in targeting publicity information to improve overall participation.

4. Discussion

The research discussed in this paper looks at a variety of influences on public understanding, and hence quality of participation, in kerbside recycling schemes. It attempts to identify where relationships exist between public understanding and:

- the effects of targeting different materials for recycling (that is how many and which materials a scheme aims to recover);
- a variety of design parameters (for example: frequency of collection and the provision of containers); and
- the role played by publicity and education strategies in determining participation levels.

Whether achieving the same recycling rate by targeting a wide range of materials and recovering only a small percentage of them, or targeting a selected narrow range of recyclables and recovering a higher proportion of them, is more effective, and achieves 'Best

Value'¹, will depend on the cost implications and collection requirements, as well as the relative value in environmental and economic terms of the materials recovered. An ERRA study of the household waste recycling scheme in Barcelona found that by carefully targeting a smaller number of significant recyclables they were able to increase the diversion rate marginally whilst significantly reducing costs [25]. This issue was explored in Milton Keynes where the range of materials collected had changed over the period studied. The research found that, in Milton Keynes, increasing the complexity and scope of the range of materials targeted led to reduced effectiveness and lower diversion overall due to achieving a lower recognition ratio and level of understanding. Motivation, assessed by the public attitude survey, was not found to be a particular problem amongst participants. So this begs the question – was the scheme overly complex, or were residents not sufficiently informed? It was concluded that whilst the former may be a contributory factor, that the low levels of recognition of many of the materials targeted for recycling indicated that the message about how to properly participate had not been adequately communicated.

However focusing kerbside schemes on a limited range of recyclables will put limits on the potential recycling rate, which may conflict with the local authorities need to increase their diversion to recycling dramatically to meet government targets. For a discussion of what these targets mean for local authority recycling activity see the papers by Burnley and by Parfitt, Lovett and Sünnerberg in this issue. If recycling schemes are to improve in effectiveness and meet recycling targets set by both government and local authorities there will be a need to both collect a wide range of materials and capture a high proportion of them. Collecting and composting the biodegradable fraction of household waste must play some part in achieving these higher diversions from disposal – issues which are addressed by Slater and Frederickson in another paper in this issue. A balance therefore needs to be achieved between the increasing complexity of both the demands put on participants and the message to be communicated, and the need to target as wide a range of recyclables as practicable.

The study of public understanding of kerbside schemes in Hampshire allowed comparison of factors other than the range of materials collected. Average levels of understanding, varying from 44% to 85%, were found in the different Districts, but without showing any significant correlations with different design features such as container type or collection frequency. Indeed few correlations showed up in the analysis. Some individual actions such as reminders on containers appeared to work to increase levels of understanding; also the results indicated that the complexity of a scheme can affect understanding.

Complexity doesn't necessarily equate to the range of materials targeted – this wasn't a major issue in Hampshire, where differences in materials collected were small. However schemes collecting mixed paper in addition to the standard range of dry recyclables collected by all the schemes (newspapers, magazines, plastic bottles and cans) tended to have higher levels of understanding. So increasing the range of materials targeted can in some cases simplify what the householder needs to do – and it is this relationship between complexity and what is demanded of participants that is important. On the other hand, Test Valley which collected the widest range of recyclables in Hampshire, including compostable wastes, had

¹ 'Best Value' is a duty placed on local authorities by the Local Government Act 1999 to deliver services to clear standards - covering both cost and quality - by the most effective, economic and efficient means available. In carrying out this duty local authorities will be accountable to local people and have a responsibility to central government; they will need to provide an assessment of their performance by reference to national performance indicators and standards, and also to indicators and targets that reflect local priorities.

lower levels of understanding than many other Districts. The Test Valley scheme is though one of the more complex for residents to participate in, with its weekly collection of residual waste in a wheeled bin, and a second wheeled bin to be used on alternate weeks for wet and dry recyclables. A factor supported by the comment in the public attitude survey report that “those participating in Test Valley were significantly more likely to be confused than others” [23]. Whether, the complexity inherent in the schemes design or a lack of communication about what to do, has resulted in the low levels of understanding is something that needs to be further explored.

5. Conclusion

This paper examines potential links, in kerbside recycling, between design parameters and some aspects of communication strategies, and the levels of understanding shown of their schemes by participants. The results demonstrate the complex interactive nature of the multiple variables involved and the difficulties of isolating individual relationships. Overall though a positive correlation was found between how well the schemes requirements were recognised and the diversion rates achieved in the different Districts in Hampshire, showing that improving understanding should bring benefits in overall recycling performance.

Several issues emerged from the research concerning the relationship between ease of participation, the range of materials targeted and degree of separation required by participants, and how well the message is communicated, and the quality of participation achieved. Experience from the Milton Keynes study showed that increasing the range of recyclables collected by a scheme without achieving a good level of understanding amongst participants of what they are being asked to do will not lead to improved diversion. The results from the study of kerbside recycling in Hampshire indicated that how complicated a the scheme is and how well the message is communicated were important factors in determining understanding.

But how can we best improve understanding, and hence the quality of participation? Publicity, information and education will no doubt affect public understanding of participating in recycling schemes – but how does it do so, and what approaches are most effective? Further research is now needed to examine, compare and evaluate different communication strategies with a focus on how they impact on understanding and quality of participation, and to answering the question of whether communication, or making it easier for people to participate, is the key to improving understanding?

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