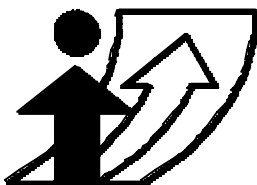# Encouraging Behavioural Change Through Marketing and Management: What can be achieved?

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Resource paper
Applied workshop 1

Moving through nets:
The physical and social dimensions of travel

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Encouraging Behavioural Change Through Marketing and Management: What can be achieved?

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Abstract

Marketing and management measures – often colloquially know as 'soft' measures – can encourage a shift from car travel to more sustainable transport modes, and may also increase public support for direct actions to limit car use. These measures are often effective because many people lack information about alternatives to the car, even for journeys where good alternatives already exist. Other people may have a general negative image of non-car modes. Better information and persuasive marketing can help shift both attitudes and behaviour. Use of such measures is comparatively new, and transport models to predict their impacts in different circumstances are not well developed. However, empirical evidence suggests that these measures may have significant impact. The potential impacts of workplace and school travel plans, personalised travel planning, bus information and marketing, and car clubs, if applied intensively and together, are such that 24 hour car travel demand in an urban conurbation could be cut by 9% – 22% under different scenarios. Synergistic effects could increase the impact. However, induced traffic could erode some of the benefit, if soft measures were implemented without complementary traffic restraint or road capacity re-allocation. Marketing and management measures should be attractive to policy makers and transport planners, because: they are politically less contentious than some other measures; offer high benefit-cost ratios; and increase the benefit of investment in new sustainable transport infrastructure.

Keywords

Information, marketing, travel plans, 'soft' policies, attitudes, travel behaviour, International Conference on Travel Behaviour Research, IATBR

Preferred citation

1. Introduction

This paper examines a broad set of policy instruments under the general headings of 'marketing' and 'management'. These include information provision and marketing initiatives, as well as small scale measures usually introduced at or in the vicinity of particular sites (workplaces, schools, leisure facilities, etc.) to increase the attractiveness of walking, cycling and public transport. Collectively, these are often referred to colloquially as 'soft' measures, in contrast to 'hard' measures such as major infrastructure improvements or significant service improvements.

It is only recently that transportation planners have started paying serious attention to employing 'soft' measures to help meet sustainable transport policy objectives, either directly (by seeking to influence travel behaviour and encourage a voluntary switch from car travel to more sustainable modes), or indirectly (by seeking to increase public support for more contentious policies, such as measures to discourage car use). In a policy context where there is pressure to contain traffic levels, yet a political nervousness to apply strong restraint measures, 'soft' measures potentially offer an attractive means of addressing the challenge.

This lack of familiarity with such approaches is in stark contrast to much of the commercial sector, where the techniques of customer marketing and management are regarded as an important means of achieving market share and maximising financial viability.

One reason for the slow take-up of 'soft' policy measures is a general lack of understanding of the ways in which marketing and management initiatives influence travel attitudes and behaviour. Most of the accumulated travel behaviour and modelling research – even in the area of activity-based analysis – is predicated on an explicit or implicit adoption of an economic paradigm in which travellers are generally assumed to be rational decision makers, who have perfect knowledge and take decisions that maximise their utility[1].

While stated preference and related techniques have been used to explore decision making structures (compensatory or non-compensatory, lexicographic, etc.), in the main they still operate on the basis of perfect information (as provided to respondents during the experiment),

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[1] Random utility models do recognise that choices are probabilistic and are taken in conditions of some uncertainty, but this is largely a statistical device that accommodates unexplained variation rather than explicitly analysing the causes of that variation. Much of the effect is captured in the model constant.

and there is an assumption that there is a constant relationship between perceived and objective measures of system performance. There is usually no consideration of the possibility that modifying the relationship between perceived and objective measures might itself be the purpose behind the policy intervention.

As a consequence, while travel demand models are generally very successful at predicting the influence of changes in travel times and travel costs on travel behaviour, and relatively successful in incorporating more subjective factors such as vehicle comfort, they cannot presently take account of initiatives to change perception. For example, they could not predict nor replicate the finding that a closely targeted marketing campaign can result in the doubling of the patronage of a new tram line, compared with a control area where conventional information was provided (Socialdata, 1999).

This issue was recognised at the last IATBR conference in the paper by Steg *et al.* (2001), who noted that (p. 832): "To the authors' knowledge, efforts for improving the current generation of transport forecasting models and efforts to develop state-of-the-art activity-based transport models do not yet include the explicit modelling of the influence of motivational factors on mode choice or car use."

The authors review a large number of empirical studies that demonstrate the importance of motivational factors in influencing travel behaviour. These factors include attitudes, emotions, social norms and comparisons, personal norms, awareness of problems caused by cars, and perceived responsibility and control; all can change over time, either 'autonomously' or in response to explicit policy interventions. They develop a regression model relating reported weekly car mileage to a range of socio-economic variables; adding in just one motivational variable (responses to a simple question on the extent to which car use contributes to environmental problems in the Netherlands) increases the R^2 value from 21.2% to 25.5%.

Recently, 'soft' policy measures have begun to be implemented and monitored on a growing scale, both in one-off, local initiatives and as part of national and trans-European trials. This growing body of data and experience is resulting in insights into new aspects of traveller attitude formation and behavioural response, and providing a challenge to modellers to incorporate soft measures in the policy packages for which they are able to predict impacts.

This paper draws on this recent evidence to explore what is now known about the impacts and effectiveness of soft measures, and to assess the implications both for policy and travel behaviour analysis. A number of issues for workshop discussion are identified. While studies from several countries are reviewed, the authors are most familiar with the UK experience, much of it in the form of 'grey' literature.

The next section sets out a basic framework for analysis that addresses two key issues. First, evidence that not all trips by car are 'car dependent', so there is a latent scope for voluntary modal shift. Second, it summarises some models of attitude and behaviour change that can help to explain the effectiveness of soft policies and guide their effective implementation.

The following section forms the core of the paper and summarises key empirical evidence on the effectiveness of various soft policy measures. This is followed by a discussion of issues relating to scalability and synergy: how much impact on car traffic levels could be achieved through the widespread introduction of such measures, and are they largely complementary (with cumulative impacts) or competitive? A number of implications for policy and research are identified, and the paper concludes with a set of suggested issues for workshop discussion.

2.   Framework for analysis

2.1 The extent of car dependency in daily travel

Although in most places in the developed world the car has the largest modal share of daily travel, this does not mean that all trips currently made by car are car dependent. Several UK studies, for example, have addressed this issue with varying degrees of sophistication.

An attitude survey by MORI (1990) for the RAC Motoring Services, among 1100 British drivers, asked them to think about their annual driving in terms of four categories: 'essential', 'important', 'not very important' and 'not at all important'. They were asked to estimate how much of their driving fell into each category, by allocating ten points among the four. Over-all, less than 50% of annual driving was categorised as essential, with higher scores for women (5.1) than men (4.3), and among people aged 35-54 (5.1). Across all groups, around 10% of car travel was rated as 'not at all important' and another 18% 'not very important'.

A much more detailed study into car dependence for the RAC Foundation for Motoring and the Environment was carried out by the Transport Studies Unit (1995) at Oxford University. A variety of research techniques were employed, including in-depth interviews, opinion surveys and activity/travel diaries.

The study found a spectrum of dependence on the car among the drivers interviewed, ranging from those who strongly disliked driving (particularly in urban areas during peak periods) to those who regarded their car as an welcome convenience – with many of the latter viewing the car as providing <u>in</u>dependence rather than dependence. There was a tendency for car dependence to grow over time, as households got used to the extra spatial and temporal oppor-

tunities afforded them. Segments of the car owning population varied in their level of general dependence on the car, ranging from 20% to 80% of different groups claiming a high degree of reliance. Interestingly, in the context of this paper, people who reported being most reliant on their car had the least knowledge about current public transport alternatives (but perceived them more negatively than other groups) – and had least interest in acquiring that information.

A detailed analysis of a selection of reported car trips found that, on average, in only 15% of cases was there no realistic alternative to driving, though often the alternative would involve an interchange and a doubling in average journey times; however, this figure was strongly affected by location, ranging from 5% (traditional urban area) to 35% (rural area). Overall, the study found that between a quarter and a third of respondents reported that they would like to travel less by car, if circumstances allowed – this varied both by residential location and by trip purpose. Thus, although car use may be regarded as essential in many situations (given current travel conditions), this does not necessarily mean that it always represents people's preferred means of travel.

An in-depth study for the AA Foundation (Jones and Bradshaw, 2000) found that around half the parents who currently drive their children to/from school would prefer not to have to undertake the 'school run'. Of the 476 parents who were interviewed, nearly 60% felt that measures could potentially be introduced that would enable them to stop doing so. Among the current barriers were lack of convenient public transport services and concerns about traffic danger (mentioned by 66% of respondents) and 'stranger danger' (52%). Again, parents did not always have comprehensive information about the existing alternatives.

Detailed work on car dependence, at the trip level, has been carried out by Werner Brög and colleagues at Socialdata in a number of studies in several countries. In ECMT (1996), for example, Brög and Erl draw on German studies from 1995 to look at the potential for modal shift from car to public transport, walking and cycling. They found that 45% of current car trips could not reasonably switch mode, due either to 'material' constraints (e.g. need to carry luggage, health-related reasons) or the lack of a reasonable alternative to the same destination at that time of day. Of the 55% that could in theory switch mode, there were an average of 1.3 alternatives per car trip, giving potential switches of 34% to public transport, 26% to bicycle and 15% to walking.

In about half of the cases where the journey could in principle switch from car to another mode (representing 28% of all car trips), there was a lack of information about the available alternatives, or a general negative attitude towards these modes. This proportion did not vary significantly between regions or urban areas.

This type of in-depth analysis both exposes the nature of car dependency and provides clues as to the types and targeting of interventions that might be successful in influencing driver perceptions, attitudes and travel behaviour.

2.2 Models of attitude formation and behavioural change

The various mechanisms by which changes in the provision of information and level of motivation might lead to changes in attitudes and behaviour have been examined in two research projects funded by the European Commission: **INPHORMM** (**IN**formation and **P**ublicity **H**elping the **O**bjective of **R**educing **M**otorised **M**obility) and its successor TAPESTRY (**T**ravel **A**wareness, **P**ublicity and **E**ducation supporting a **S**ustainable **T**ransport Strategy in Europe). See Tyler (2003).

Both studies have looked in detail at how to use information, publicity and communication programmes to change attitudes and travel behaviour and reduce car use. TAPESTRY has also involved carrying out and monitoring a number of demonstration projects in several European countries. The work has been undertaken by a consortium of partners from Member States, with the findings aimed at local authorities, public transport operators, environmental campaigners, cycling and walking groups, and site managers and businesses.

Drawing on experience from the health sector, in particular (e.g. Fergusson *et al*, 1999), INPHORMM identified a five-stage process that has to be facilitated among appropriate target groups, if changes in travel behaviour are to be achieved and sustained. This process was characterised as the 'Five A's', namely:

- **Awareness** of the problems
- **Acceptance** of the need for change
- Changing **attitudes** towards alternative travel modes
- Initiating **action** to reduce car use
- **Assimilation** of this new behaviour into everyday life

It was recognised that any information or marketing actions taken in accordance with this model would need to be repeated over time, both because of changes in personal circumstances that lead to new demands for travel (e.g. a change of job or the birth of a child), and due to the turnover of the population in an area, as 'incomers' gradually replace established residents.
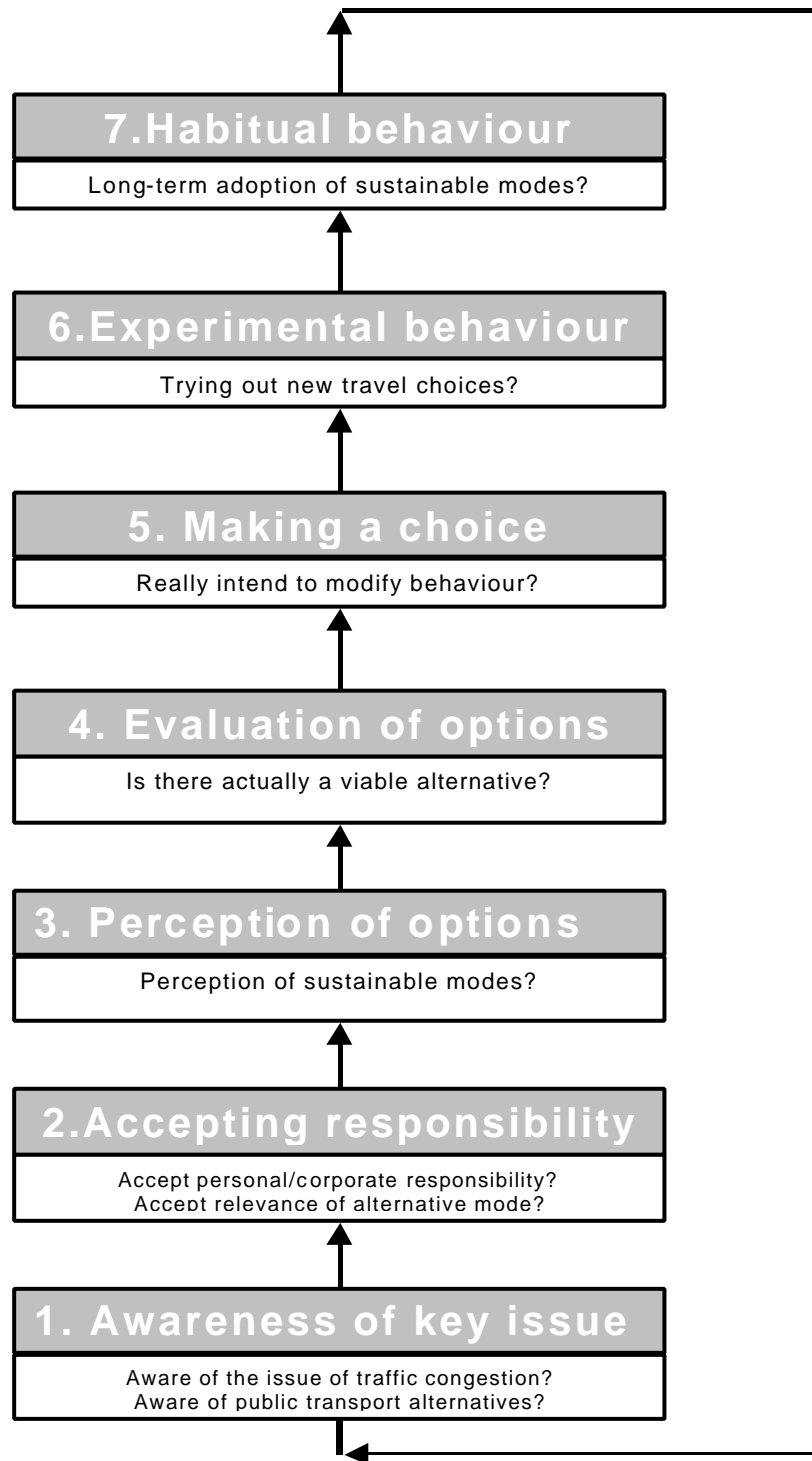
Figure 1: The 'Five A's' Process of Change
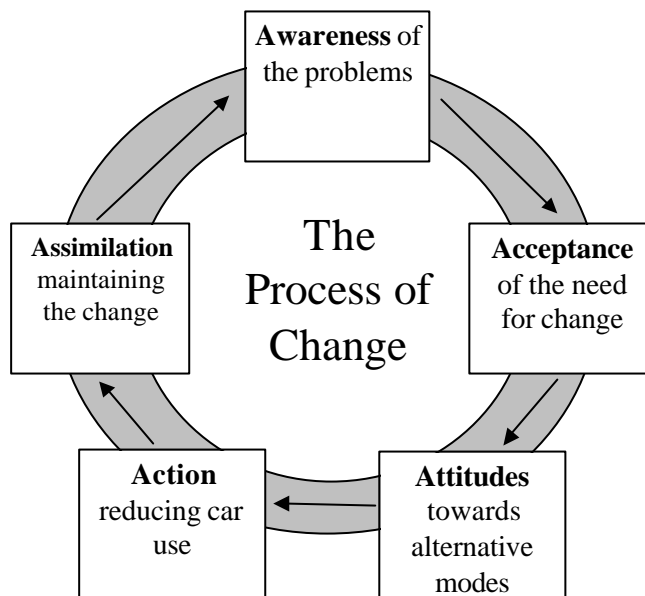
TAPESTRY has subsequently developed this model further, by incorporating the Theory of Planned Behaviour (Ajzen, 1998) and the Transtheoretical Model (Prochasaka and Marcus, 1994). It has proposed and developed the 'Seven Stages of Change' model shown in Figure 2. This again regards changing travel behaviour as the outcome of a process, and incorporates a feedback loop, from modified habitual behaviour back to awareness of new issues. Like an iceberg, there is much action taking place 'beneath the surface' to change perceptions, attitudes and intentions, before any manifest behavioural change is apparent. In some respects, the seven stage model can be regarded as a 'barometer'. The higher an individual rises up the scale, the closer they are to potentially making a behavioural change.

The seven stages can be described as follows:

1.   **Awareness of a key issue**: Gaining awareness of the problems caused by car traffic (e.g. congestion, pollution etc.), or of the difficulties experienced when travelling by car (e.g. stress), or of the existence of suitable modal alternatives, is the first step to changing attitudes and behaviour.

2.   **Accepting responsibility/acknowledging relevance**: The second stage is to accept a level of personal responsibility for, or contribution to, the problems and hence for also contributing to the solutions; or otherwise acknowledging that there might be possibilities to change personal travel behaviour.

Figure 2: The 'Seven Stages of Change' Model from TAPESTRY

7.Habitual behaviour

Long-term adoption of sustainable modes?

6.Experimental behaviour

Trying out new travel choices?

5. Making a choice

Really intend to modify behaviour?

4. Evaluation of options

Is there actually a viable alternative?

3. Perception of options

Perception of sustainable modes?

2.Accepting responsibility

Accept personal/corporate responsibility?
Accept relevance of alternative mode?

1. Awareness of key issue

Aware of the issue of traffic congestion?
Aware of public transport alternatives?

3.   Perception of options: The most important factors at this stage are related to the "system" (e.g. whether public transport is seen to be on time, safe, efficient, easy to use), and those related to "society" (e.g. an individual's reliance on the views of other people in shaping their own attitudes and behaviour).

4.   Evaluation of options: People may perceive different modes in different ways, and the way in which they prioritise the characteristics of the alternatives may vary according to particular circumstances. People will only consider voluntarily changing their preferred mode if they have a positive perception of the alternatives with regard to factors which are most important to them.

5.   Making a choice: This fifth stage relates to whether an individual really intends to change to using an alternative mode for certain trips. The establishment of an intention to change is one step before a change in behaviour can be measured.

6.   Experimental behaviour: Trying out the new mode for certain trips on an experimental basis is the penultimate step. If the experience is positive, then this change may become more permanent. If, however the (positive) perceptions are not confirmed by experience, then it may lead to a re-evaluation of the options and a relapse to the old behaviour. It may also lead to a re-assessment of their actual/stated level of concern about the underlying problem.

7.   Habitual behaviour: The final stage is the long term adoption of the new mode for certain trips. When this stage has been reached, the old habitual behaviour has been broken and a new pattern established. This is final goal of a programme to change travel behaviour, but it is the most difficult to achieve.

The model has formed the basis of a set of questions, designed to address each of the seven stages, as part of the TAPESTRY monitoring and assessment of the case studies.

Implications

Both INPHORMM and TAPESTRY have established that achieving sustained changes in attitudes and behaviour cannot be realised simply through one-off events, such as 'Car Free' days, though these may play a useful contributory role. Rather this requires the development of a comprehensive, long term Communications Strategy. This should ensure that all local agencies involved in developing and implementing transport policies, or providing transport services, should be consistent in the messages and strategies that they employ. These also need to be consistent at local, regional and national levels.

An important finding from this work is that there is a need for a **phased approach** for achieving change; and that an appropriate campaign to achieve one step of the process would be very unsuited to realising another. In particular, it has identified two key phases and three elements that are associated with a move from a broad-brush to a highly focused campaign, as the emphasis gradually switches from awareness raising to changes in individual behaviour. In the context of an overall objective to reduce car use, these might be organised as follows:

Phase 1: campaigns to raise public awareness and acceptance of the need for change. A general recognition of the existence of transport-related problems that require some form of action to ameliorate them is a prerequisite to achieving any change in attitudes and behaviour. Only when there is a critical level of awareness will groups such as the business community accept that reducing car use is a relevant topic for discussion, and one in which they should actively engage.

Here wide-ranging communication tools are appropriate, to build up levels of awareness across the appropriate communities. These include posters, local cinema and radio advertising, media events and travel awareness initiatives. Bringing other agencies on board (e.g. health, environment) can assist in gaining credibility and coverage. It is also important to involve key employees in the relevant organisations, so that there are aware of and supportive of the campaign in their dealings with members of the public.

Typical messages might include:

- "Current air quality is a danger to health, and traffic growth is a major cause"
- "Traffic congestion is bad and going to get worse"
- "City life is being threatened by the dominance of the car"

Phase 2A: initiatives targeted on particular groups to encourage attitude change and experimentation. Here it is necessary to carefully target particular groups and settings, in order to make the messages and information of more direct relevance to individuals. At the same time, however, it is important to continue with a base level of awareness raising initiatives, in order to maintain the momentum and bring newcomers up to speed.

Much of this activity will be channelled through particular sites, such as schools, hospitals, offices, leisure centres, where particular target groups can be identified; in most cases, these comprise at least 'employees' and 'customers'. Adopting a site level focus enables information of direct relevance to be supplied (e.g. bus services to the site), provides opportunities for local initiatives based around the site (e.g. a car pooling scheme) and adds an element of peer group support and pressure. The increasing number of companies now promoting 'travel plans' or 'mobility management' usually incorporate such campaigns into their initiatives.

Typical messages might include:

- "Cycling and walking to school improve children's health and independence"
- "Less car use means less congestion and pollution around sites"
- "Car parking space can be used more productively for other purposes"
- "Encouraging sustainable travel is good for the image of a company"

Phase 2B: Individualised campaigns. Once awareness in a local community has reached a critical mass, then significant changes in behaviour can also be achieved by targeting individuals in their households. Here the aim is to achieve a general reduction in levels of household car use, wherever suitable alternatives exist.

Techniques involve identifying households with a propensity to change behaviour, and then providing highly personalised packages of information. This is an interactive communication process, usually involving at least telephone contact and in some cases a personal visit.

Typical messages might include:

- "Reducing car use saves money and hassle"
- "Walking and cycling is a cheap way to exercise"
- "Small changes in individual behaviour add up to big differences on the road"

INPHORMM suggested a sequential approach, starting with Phase 1 and moving on to Phase 2A and then Phase 2B. However, alternative approaches (e.g. developing individualised campaigns more highly before moving on to site-based campaigns) also seem to be effective: there are no hard and fast principles.

3. Evidence of the effectiveness of measures

Here we look at a number of the more common Marketing and Management measures, that can be grouped under four broad headings:

- Awareness raising, designed to increased awareness of the need for – and opportunities for – change, either as a prelude to encouraging voluntary changes in behaviour, or to increase acceptance of the need to introduce measures to curb car use (e.g. lower speed limits, or traffic restraint measures).

- Techniques such as Individualised Marketing and Travel Blending, which provide detailed, personalised information about modal alternatives (so increasing subjective choice sets), as a basis for encouraging experimental changes in behaviour. These techniques do not usually involve any changes to service provision.

- Site-based travel planning (i.e. management), designed both to provide information and increase the relative attractiveness of modal alternatives through modest improvements in provision, thereby increasing both subjective and objective choice sets. The approach is known in much of Europe as 'mobility management' and now supports an annual conference (see www.epommweb.org)

- Techniques which couple more major improvements in the objective choice set with information, branding and targeted marketing. Here it can be difficult to determine how much of the resulting behaviour change is due to narrowly defined marketing and management ('soft') measures, and how much is due to the changes in service provision, as the two are tightly packaged together. Under this heading, we discuss public transport information and marketing (as part of wider strategies to encourage public transport use) and collective car ownership, through the development of 'car clubs'.

Information and marketing techniques were recently subject to a comprehensive review and assessment for the UK Department of Transport (DTLR, 2002), and mobility management has been comprehensively assessed in a large scale demonstration project called 'MOST' (Mobility Management Strategies for the Next Decades) supported by the European Commission. (See http://mo.st). Site-based travel plans have been under development in Europe and North America for a number of years. Early applications were introduced at major workplaces and schools. More recently, the approach has been extended to retail, tourist and leisure sites (e.g. large sports stadia), but in these latter cases insufficient evidence has yet accumulated to be able to make a general assessment of their effectiveness. In this section, we therefore limit ourselves to workplace and school travel plans.

3.1 Travel awareness campaigns

Awareness raising campaigns have been widely used as a means of promoting government policy, for example in the areas of health promotion (e.g. safe sex or smoking campaigns) and road safety (e.g. drink driving or seat belt campaigns). In the latter case, these campaigns have been run as a precursor (and successor) to national legislation, in part to 'prepare' the population for regulatory action.

A report prepared for Hampshire County Council (1993), as part of the preparation for a county-wide awareness raising initiative, reviewed a wide range of campaigns from different sectors. In general, success was judged mainly in terms of the level of awareness of the campaign message among the population, but a small number went further to measure impacts on behaviour. Examples included:

- A campaign to reduce home burglaries led to a high increase in awareness of the issues and a more than doubling of sales of window locks in the areas exposed to the advertisements.

- A regional advertising campaign to reduce cycle accidents, by asking drivers to give them more room on the road, resulted in a 30% recall of the campaign overall. Interestingly, although there was no significant change in driver attitudes towards cyclists, cycle accidents in the affected region dropped by around 15%, though numbers of cycle trips were unchanged.

- A campaign to encourage seat belt wearing in rural parts of Australia achieved an awareness level of 83% and a 3% increase in seat belt use.

All of these examples included television advertising.

During the early 1990s the 'TravelWise' initiative was established in the UK, and now involves the majority of local authorities in a series of awareness raising and information provision initiatives to encourage a switch from car to public transport, walking and cycling. These initiatives often provide a backcloth to the development of workplace and school travel plans, by helping to raise local awareness of the need to take action.

The regional public transport authority for Madrid (Consorcio de Transportes de Madrid) ran a high profile campaign between 1989 and 1991 to increase awareness of improved services and new ticketing options, and to gain support for increasing public transport priorities on the road network, using television, press, radio and leaflets/posters. It characterised cars as turtles, moving slowly in city traffic. The campaign achieved its main objectives, to improve the image of public transport, raise awareness of services and increase support for public transport priority (INPHORMM, 1998).

Several city councils have employed awareness raising techniques to increase support for local traffic restriction policies. For example, as a consequence of a sustained public awareness campaign in Kassel, Germany, public opinion in favour of giving cars priority in city planning dropped from 27% in 1988 to 9% in 1994, and support for 30kph speed limits in residential areas increased from 67% to 92% over the same period (INPHORMM, 1998).

3.2 Personalised travel planning

Personalised travel planning provides pro-active travel advice and information to people based on an understanding of their personal travel needs and trip patterns. It appears to be a very successful form of intervention because, as previously noted, many people make journeys by car for which a reasonable alternative (public transport, walking or cycling) already exists, but of which they are unaware.

Most of the experience of personalised travel planning comes from work by two different consultancies. The German organisation Socialdata has developed a technique which it calls

'Individualised Marketing'. British transport consultant Steer Davies Gleave has developed another approach which it calls 'Travel Blending'.

One of the larger trials of Individualised Marketing was in Perth, Western Australia, and involved contact with just under 15,000 households (TravelSmart, 2001). Here the aim was to encourage a switch from car driver to all other modes[2]. Each household was contacted and offered information about alternative modes; those who expressed interest (55%) were sent a range of information, according to requirements, and existing public transport users were thanked for their support; those not at all interested were not pursued. Random sample surveys before and after the project showed a fall in car driver trips of 14%, and a fall in vehicle kilometres of 17% across the population as a whole (suggesting that not only were people switching from car to other modes, but that some destination switching or trip-chaining had also been taking place).

Other Individualised Marketing projects have shown comparable results, with car driver mode share amongst targeted populations in urban areas falling by 7% – 14% (across different trials mainly targeting public transport modal shift in Germany, Australia and the UK), and rather lower reductions in car driver mode share (2% – 6%) in a smaller number of rural trials.

Travel Blending differs from Individualised Marketing in that it requires more involvement from participants, who must complete 'before' and 'after' travel diaries, with specific suggestions for changes to travel behaviour supplied to participants based on an analysis of their first diary. It seems to be effective in reducing car driver trips among participating households, with reductions in car driver mode share of 8% – 15%; however, take-up can be relatively low due to the effort involved. (These figures are not strictly comparable with the Individualised Marketing findings, as the latter quotes results based on the entire population approached, whereas Travel Blending results do not include households who do not participate or who have dropped out.)

Travel Blending encourages participants to 'chain' car trips as well as to switch to greener modes, which means that its effect on car mileage may be much greater than its effect on car trips. More recent applications have also been promoted as part of a 'Living Neighbourhood' initiative, in which the whole community is encouraged to take part in actions to encourage more sustainable travel and other more sustainable activities.

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[2] Most of the European applications focus on the switch from car to public transport only.

Some experience is also reported from personal journey plans that have been prepared for employees as part of a workplace Travel Plan. For example at the Meadowhall shopping centre in Sheffield, England (a large edge of city hypermarket), personal plans were prepared for 250 office staff, resulting in a 17% modal shift from car to public transport – despite the provision of free parking at the site (DTLR, 2002).

One concern which has been expressed about personalised travel planning is that its effects may be short-lived: people may quickly slide back into their old travel habits once the monitoring is over. There is evidence to suggest that this is not the case. In South Perth pilot study, follow-up monitoring a year later found the change in travel behaviour had not only been sustained but that there had been a slight further decrease in car use. Follow-up monitoring was carried out in Nürnberg, Germany, two years after the Individualised Marketing project, and in Kassel, Germany, four years after the project (INPHORMM, 1998). In both places, the initial increase in public transport use was still evident two or four years later.

Travel Blending in Adelaide, Australia, has also shown continued change after the project was completed. A sample of participants interviewed six months after the initial programme had reduced their car use by a further 5% as a result of a combination of factors: people 'taking a while to get round to it'; developing other measures themselves; changing school or job; or moving house (Ampt *et al* 1998).

Finally, it is interesting to see which journey purposes are most affected by personalised travel planning. In the Nürnberg and Kassel Individualised Marketing projects, the greatest increase in public transport use was for shopping and leisure trips, which accounted for more than 70% of the behaviour change.

3.3 Workplace travel plans

Workplace travel plans use a combination of 'pull' and 'push' measures to encourage people to use public transport, walk or cycle to get to work. 'Pull' measures might include special staff buses; discount tickets for public transport; cycle parking and other cycle facilities; car-sharing schemes; and parking 'cash out' schemes which pay staff extra on the days they do not drive to work. 'Push' factors usually include restrictions on car parking, ranging from preferential parking places for car sharers to the introduction of parking charges.

The aggregate impact of workplace travel plans depends on the number of workplaces adopting a travel plan (that is, level of take-up), and the average effectiveness of individual plans. A British study (DTLR 2001a) found that public sector organisations such as local authorities and hospitals were much more likely than private companies to have adopted a travel plan;

and within the private sector, take-up was higher amongst companies with over 300 employees. This study also found evidence that travel plans were rapidly becoming more common: 24% of local authorities had drawn up a travel plan, compared to just three 3% in an equivalent study three years earlier (DETR 1998).

Several studies have examined the average effectiveness of individual travel plans. Again in Britain, a recent study commissioned by the Department for Transport (DfT, 2002) analysed the 'before' and 'after' car use of staff at 20 private and public sector workplaces where travel plans had been implemented. On average, travel plans had reduced the number of commuter cars arriving by more than 14 per 100 staff (equivalent to an 18% reduction in the proportion of commuting journeys made as a car driver). There was considerable variation, from 3 to as high as 52 fewer cars per 100 staff across the 20 employers.

Other studies have found similar results, although some have also been able to show that travel plan effectiveness is related to the number and type of measures implemented. Their findings are summarised by DfT (2002):

- A review of Dutch studies and survey of 40 Dutch organisations found that plans with 'basic' measures (such as car-sharing schemes) reduced car mileage by 6% – 8%. Plans with 'luxury' measures (such as works buses) and / or 'push' measures (such as parking management) achieved reductions in the range 15% – 20% (Ligtermoet 1998). Another review of Dutch travel plans by Touwen (1999) came to similar conclusions.

- In the US, a study of travel plans implemented by 49 employers found an average vehicle trip reduction of 15.3%. Travel plans which provided information only achieved no car trip reduction; those with alternatives to the car (such as van pools) reduced car use by an average 8.5%; those with financial incentives (such as transit subsidies) achieved a 16.4% reduction; and those providing both financial incentives and alternatives such as van pools achieved a 24.5% reduction (TCRP, 1994).

The European Commission 'MOST' project co-ordinated demonstration projects at a number of different kinds of site. One was at a technology park, about 15km outside Malaga, with poor public transport access. While around 75% of employees travelled to work by car before the introduction of the travel plan, two-thirds expressed an interest in using alternatives, such as public transport, car pooling or telecommunications. A bus route was extended from the entrance of the site to serve the main workplaces, and a car pool matching scheme was provided on the site's intranet. Both were heavily advertised among employees. As a result, the car driver share dropped from 74% to 63%, car sharing increased from 13% to 19%, and bus use rose from 9% to 12% (MOST, 2003).

There is some evidence that the impact of individual workplace travel plans may become greater the longer they are in place. For example, Shoup (1997) studied the role of a parking

'cash out' programme in eight Californian businesses. For one firm, monitoring data was available for three years after the cash-out programme began, and single-occupancy car mode share fell in each of the three years. The DfT (2002) study included three employers where monitoring had been carried out over several years. One showed a steady fall over time in staff driving to work. The others showed an initial fall, followed by an increase, followed by a further decline. These findings led the authors to conclude that there is no 'natural maximum' level of use of sustainable modes, and that over time the potential for modal shift is likely to increase.

The impacts of workplace travel plans may increase over time for several reasons:

- *More measures:* the longer a travel plan goes on, the more incentives can be put in place.
- *Turnover of employees:* new employees are less likely to have fixed ideas about how to get to work, and may be more receptive to options such as car-share matching or cheap public transport.
- *Ideas take root:* as employees see 'early adopter' colleagues trying new ways of getting to work, the idea that they could try these too will gradually take root.

This is not to say that the benefits of travel plans are in any way automatic: the experience of travel plan co-ordinators shows that successful travel plans require determination and sustained commitment.

3.4 School travel plans

Growth in the 'school run' has led to increasing traffic congestion at the school gate and growing concerns about traffic accident risk in the vicinity of schools, which in turn is prompting interest in school travel plans. Measures to encourage non-car travel to school are also perceived to be important because it is believed that sustainable patterns of travel behaviour learnt by children may be carried into adult lives (and conversely, children who never travel by bike or bus are less likely to switch to these modes in adult life). There is a health benefit too: tentative evidence suggests a correlation (although not necessarily a causal link) between levels of cycling in different European countries and overweight problems among children (Department for Transport, 2003).

Many school travel plans concentrate on education and information measures, perhaps coupled with initiatives such as 'walking buses' and, more recently, 'cycle trains'. These involve volunteer parents escorting groups of children by foot or by bicycle on a fixed route. Sometimes these measures are accompanied by physical street improvements, such as traffic calming, 20mph zones, cycle lanes and safe crossings. More uncommonly, measures to encourage

bus use are promoted: for example personalised timetable information, discount tickets, new bus services and dedicated school buses.

Jones and Bradshaw (2000) concluded that improvements to public transport offer the greatest potential to reduce car escort mileage, because most car mileage for this journey purpose is associated with trips too long to be walked or cycled. However, they also note that there are often multiple factors encouraging parents to drive their children to school, including lack of supervision before and after school (to tie in with bus service timetables) and lack of secure locker facilities for coats, sports gear, etc.

Sloman (2003) reported before and after monitoring data on 17 school travel plans, gathered from a variety of sources. As with workplace travel plans, there was considerable variation in outcomes: the number of cars arriving per 100 pupils declined by between 4 and 23 (equivalent to a reduction in car use of between 8% and 52%). However, the three schools with the lowest 'before' car mode share (all under 10%) failed to achieve any further reduction (and in fact, in one case car mode share slightly increased).

In research commissioned by DTLR (2001b), only four local authorities felt they had sufficient experience to estimate the impact of school travel plans. One authority judged that travel plans typically reduced car travel at targeted schools by 30%; the other local authorities gave estimates of between 10% and 20%. Further data on the impact of individual school travel plans in Britain will be available next year, from a study commissioned by the Department for Transport.

As with workplace travel plans, there is some evidence suggesting that impacts may grow over time. The potential to influence mode choice for the journey to school may be increased because a new cohort of children and parents arrives each year, receptive to information and encouragement to walk, cycle, or travel by public transport.

Although there is great interest in the concept of the school travel plan – especially from transport professionals – relatively few schools in Britain as yet have a fully-fledged travel plan. The DTLR (2001b) report estimated that 4% – 5% of schools had implemented travel plans, with a comparable proportion having one 'firmly planned'. Most local authority transport departments had worked with only a small proportion of the schools in their area. British towns and cities clearly have a lot of catching up to do. By comparison, the city of Odense in Denmark has implemented more than 200 projects to improve safety for school pupils over the last 20 years (for example, traffic calming, traffic islands and cycle lanes), and consequently has an extremely low mode share for car escort trips to school (Andersen, undated).

3.5 Public transport information and marketing

'Soft' measures to encourage greater public transport use involve a variety of techniques, ranging from generalised (non-targeted) information about routes, frequencies and fares, to highly targeted personal journey planning services. A report by TAS (2001) listed a range of techniques available to promote bus use, as follows:

- Displays at bus stops / vehicles with times or frequencies of services; maps of local area around bus stops; named bus stops; interchange information.
- Real-time displays at stops or on vehicles.
- Branding of vehicles with service details, and branding services at stops.
- Individual timetables, booklets and maps.
- Phone enquiry lines.
- Internet information.

It can be difficult to distinguish the impacts of these measures from conventional ('hard') measures to encourage public transport use, such as changes to infrastructure to give buses greater priority in the traffic flow; improvements in vehicle quality; changes to service frequencies; and changes to fares and ticketing. 'Hard' and 'soft' measures are often applied together, and reported effects on patronage are therefore the result of a mixture of interventions.

However, there is some evidence to suggest that 'soft' measures are playing an important part in the behaviour change arising from these mixed interventions. For example, Brighton, a British south-coast city which has placed particular emphasis on information-based measures to encourage public transport use, has seen bus patronage increase by 50% over the last ten years (while the rest of Britain has experienced a decline in bus use). The measures adopted in Brighton include one-stop travel information shops (covering all modes) in the town centre and at the railway station; a colour-coded 'Metro' bus network; a phone-based travel enquiry service; leaflets to promote bus access for leisure walks in the surrounding rural area; and more recently, large-freestanding real-time information displays three metres away from bus shelters, which are intended to attract motorists' attention. A very simple ticketing system (a flat fare of £1 for any trip) is also perceived by the local authority to have helped attract passengers (Crowther, 2003).

Strong branding and easy-to-understand networks have helped increase bus use in the city of Cambridge. Here, the bus network was cut from about 12 services to a simpler six service network. This enabled service frequency on three routes to be increased to every 10 minutes. The new service was publicised using high-quality guides and maps for individual services, and pocket-sized timetables. Park and Ride buses were coloured blue, red or green depending

on which park-and-ride site they served. Patronage increased by 25% in the four months following the re-design of the network (CPT, 2002).

Brighton and Cambridge are examples of the use of generalised information and strong branding, but do not involve marketing targeted at specific sectors of the population. In Perth, Scotland, the bus operator ran a targeted marketing campaign to encourage increased bus use on a poor performing, low frequency bus route with a profile of aged owner-occupiers with high car dependency. Marketing was accompanied by service improvements: frequency doubled, low floor buses were introduced, fares were simplified and the council introduced bus priority measures and new bus shelters. The marketing included launch publicity, door-to-door interviews with potential customers, the offer of free trips, and promotions such as children's competitions and pensioners' lunches. This was followed by a telephone-based direct marketing campaign targeted at non-users. Patronage grew by 56% over two years, and the telephone marketing campaign resulted in conversion to public transport of 7-8% of those non-users contacted (Stagecoach, 2002 and Rosscraig, 2003).

3.6 Car clubs

Car clubs provide member households with access to a car when it is needed, without the high fixed costs of individual car ownership. Car club members are able to 'mix and match' their travel patterns, using a car when that is the best option, but travelling by foot, bike or public transport at other times; they are also usually able to access a range of vehicle types to match their needs on different occasions. Because car club members pay all the costs of car use as they drive, they are directly aware of the operating costs involved and rational decision-making about which mode to use is encouraged. By changing the way transport costs are perceived, there is evidence that car clubs stimulate behavioural change.

Car clubs have proved more successful in some countries than in others. In Switzerland and Germany, car club growth has been rapid. According to the German car club umbrella organisation Bundesverband Carsharing, all large cities in Germany (over 200,000 people) now have a car club and there are more than 50,000 individual members altogether. In Switzerland, one national organisation, Mobility, was formed by the merger of several car clubs. Mobility has members in some 400 communities, and a total membership of around 50,000. Car clubs are also proving popular, although on a smaller scale, in North America. In mid-2002 US car clubs had between them about 11,500 members, and Canadian car clubs had about 5000 members (Shaheen and Meyn, 2002). In other countries car club growth has been much slower. For example, in the UK around a dozen cities have car clubs, mostly with a member-

ship of about 30 – 60 people, with the largest (in Edinburgh) having a little over a hundred members.

It is difficult to judge how much the relative success of car clubs in different countries is a consequence of cultural differences in attitude to car ownership and use, which might be difficult to change, and how much it is related to the presence or absence of support mechanisms to enable car clubs to become established. The fact that car clubs seem to be doing well in North America, where membership is marketed as convenient and cool, and in Germany and Switzerland, where the green virtues are more strongly promoted, suggests that car clubs can be made to work in different cultural contexts.

Research reported in Muheim (1998) and Meijkamp and Aarts (1997) has investigated how people's travel habits change when they join a car club. Broadly, there are three types of behaviour. Some people give up their personal car when they join a car club, and this group appears to cut its car mileage by about 60% – 70%. Others join a car club but keep their existing car, so the car club effectively functions as a second household car. This group increases its car mileage, but only by a few percentage points. Finally, people who were non-car owners before joining a car club seem to use the car club as an alternative to taxis, lifts from friends and occasional car hire, and their car mileage remains about the same (in fact Meijkamp and Aarts reported that it went down). Taken together, Meijkamp and Aarts (1997) found that the average reduction in car club mileage of all car club members was about a third.

While car clubs in Germany and Switzerland may have grown rapidly, they will need to grow a lot more if they are to have a significant aggregate effect on traffic levels. Estimates of the number of people who might potentially join a car club suggest that there is significant growth potential. Muheim (1998) estimated that approximately 9% of the Swiss population were potential car club members, based on an evaluation of the number of people whose personal circumstances meant they could benefit from car club membership, coupled with survey data which found about a third were very or fairly interested in the idea. Steininger *et al.* (1996) concluded that about 18% of residents in an average urban residential area in Austria had the right profile to be car club 'early adopters'.

4. Scalability: can marketing and management measures have significant impacts over a wide area?

Research carried out by one of the authors (Sloman, 2003) sought to assess how much impact marketing and management measures might have on future car travel demand in Britain (taking the year 2010), if applied together and at greater intensity. Two scenarios were examined:

- 'Enlightened business as usual', in which most local authorities do what the best ones are doing already; and
- 'Ambitious change', in which national and local government match international best practice.

Both scenarios estimated the effect of adding together the individual impacts of marketing and management measures reviewed in this paper, plus some other measures which are a mix of 'hard' infrastructure and 'soft' marketing and management elements. Here we report only the findings relating to marketing and management measures, that is:

- personalised travel planning
- workplace travel plans
- school travel plans
- bus information and marketing
- car clubs.

The potential contribution from travel awareness programmes and rail information and marketing was not assessed.

The relative contribution of the different measures in a typical urban conurbation over a 24 hour period (using data from the West Midlands conurbation) is shown in Table 1, *assuming that they are additive* (see section 5). Workplace travel plans, bus information and marketing, and personalised travel planning have roughly similar effects; school travel plans have rather less effect (because car escort trips to school make up a fairly small proportion of total car mileage); and car clubs have negligible effect. It should be noted, though, that the contribution from car clubs is low because it is assumed car clubs will still be at an early stage of development in Britain in 2010. In other countries where growth is more advanced, the contribution from car clubs could be greater.

Much of the impact of the measures is concentrated at peak hours. For example, in the 'ambitious change' scenario, workplace travel plans *alone* could potentially reduce peak hour car travel demand in an urban conurbation by 24%. Two assumptions underlie this estimate. First, it assumes just under a third of the workforce is covered by a travel plan, which is probably

slightly conservative. Second, it assumes that, on average, workplace travel plans reduce car commuting by 14 vehicles per 100 staff, in line with the findings of the DTLR (2001a) study.

Table 1   Reduction in 24 hr. car travel demand in 2010 in a typical UK urban conurbation

Type of measure	'Enlightened' business as usual scenario	'Ambitious' change scenario
Personalised travel planning	-2.7%	-5.5%
Workplace travel plans	-3.4%	-6.9%
School travel plans	-0.9%	-2.8%
Bus information & marketing[3]	-1.8%	-6.0%
Car clubs	-0.14%	-0.3%
Total	**-8.9%**	**-21.5%**

Source: Derived from Sloman (2003)

Nationally, the cumulative impact of the measures is much less, as shown in Table 2. This is because journeys outside urban areas (that is, inter-urban journeys and rural journeys) are more difficult to shift from the car to more sustainable modes, and these tend to be the longer distance trips.

[3] The impact of bus information and marketing is difficult to distinguish from the impact of infrastructure measures such as bus lanes and priority at signals, as in practice both are generally applied together. In Britain a package of both types of measures is known as a 'quality bus partnership'. The figures quoted here are based on observed patronage increases for bus quality partnerships, and hence slightly overestimate the contribution from information and marketing measures alone.

Table 2   Reduction in 24 hr. car travel demand 2010: national & urban impact compared

Affected area	'Enlightened' business as usual scenario	'Ambitious' change scenario
Impact in urban areas	-8.9%	-21.5%
National impact	-2.7%	-5.9%

Source: Derived from Sloman (2003)

5.   Synergy, redundancy and induced traffic

The discussion so far has assumed that the impact of introducing a set of marketing and management measures is simply additive. However, there are at least four factors that might lead the combined impact of these measures (with each other and with more conventional transport measures) to be greater than the sum of their parts. This means we might expect to see *synergistic* effects. There are also two factors acting in the opposite direction, which might reduce the observed impact of marketing and management on travel demand and on observed car traffic levels.

The likely synergistic effects are of two types. First, those applying among combinations of 'soft' measures alone:

1. Marketing and management measures acting together may address the multiple reasons for making linked trips by car. Cars are well-suited to making linked trips (for example, dropping the children off at school on the way to work, or picking up shopping on the way home), because they offer several attributes which other modes cannot always match: freedom of destination, flexibility of timing, and storage and transport of goods. One measure – better information and marketing of bus services, *or* workplace travel plans, *or* school travel plans – may have little impact on travel choice for these complex trips. However, several measures in combination may have a greater effect. For example, a school travel plan combined with a workplace travel plan and local home delivery facilities would free working parents from the need to escort children to school and collect shopping, thus enabling them to take advantage of new choices available through a workplace travel plan (such as cut-price public transport tickets).

2. The 'snowball effect': long-term effects may be greater than short-term ones. Long-term effects of changes in the transport system on travel behaviour are generally larger than

short-term effects – as is evident with regard to long-term versus short-term elasticities (Goodwin, 1992). In the case of marketing and management measures, there is some evidence that change may be very slow at first, but then accelerate as people see their colleagues and neighbours changing their travel behaviour. This may be one of the reasons why growth in car club membership in Switzerland appears to be close to exponential, rather than linear. There are also effects at the level of the individual: for example individualised marketing pro-grammes seem to lead some people to make further cutbacks in car use over a period after their participation in the programme, as their circumstances change. Finally, measures like workplace travel plans are not simply 'on / off', but can become more effective over time, as more elements are put in place. These observations suggest that consistent implementation of marketing and management measures might plausibly 'snowball' in their effectiveness over time.

Second, synergetic affects from linking 'soft' measures with other policy measures:

3. Marketing and management measures may amplify the impact of 'hard' measures. As already noted, marketing and management measures are likely to be particularly effective when carried out in conjunction with conventional transport measures. For example, if new bus services or bike lanes are introduced, their use may be increased by a targeted marketing programme. The quality bus partnership in Perth, Scotland, illustrates this well. The project achieved patronage increases of about double the average for a quality bus partnership, probably because conventional measures such as bus lanes were coupled with a door-to-door and telesales marketing campaign which targeted people living in or near the bus corridor.

4. Marketing and management may increase the elasticity of response to restraint measures. Motorists respond to higher motoring costs in a variety of ways. Higher parking charges may lead some motorists to switch destination to another town or out-of-town shop-ping centre, but still drive; while others may switch modes. If fuel prices go up, some motor-ists may drive less, while others may adapt by buying a more fuel-efficient car (or driving more fuel-efficiently), or by cutting back their spending in other areas. However, if alterna-tives to driving are actively marketed, drivers' responses to higher travel costs are likely to become more elastic. Jones (2003) argues that, by combining the introduction of road user charging with a targeted information and marketing campaign, it would be possible to achieve desired reductions in traffic levels with a lower charge than would otherwise be needed, thereby reducing negative social impacts.

Acting in the **opposite direction** to these synergistic effects, there are two effects which may reduce the impact of marketing and management initiatives: redundancy, and the impact of induced traffic.

1.   Redundancy. Redundancy is the situation in which two (or more) marketing interventions are directed at the same group of people, who are unable to change their behaviour twice. For example, if introduction of a workplace travel plan has led a proportion of a workforce to start car-sharing or taking the bus to work, there may be relatively little benefit in exposing the same group to an individualised marketing programme. Those people most receptive to change will already have altered their travel habits, leaving only the group which is less willing to change (or less able to do so) to be influenced by the second intervention. The combined effect of the two interventions will then be less than might be predicted from knowledge of their separate effects on 'virgin' populations.

2.   Impact of induced traffic. If some people switch to other modes as a result of marketing and management interventions, others may notice that congestion is easing up, and may decide to drive on the less congested networks, perhaps re-routing or re-timing their trip, or switching to car from another mode of transport. In other words, in congested conditions some of the benefit from marketing and management measures may be eroded by traffic induction.

6.   Implications for policy

Marketing and management measures provide a useful addition to the armoury of the transportation planner, and offer an approach which is likely to be politically attractive as – in the main – the measures invite rather than coerce behaviour changes. 'Soft' measures can also pave the way for the introduction of measures than restrict car use, by raising awareness of the need for such actions among the population. If implemented in parallel with restraint measures, soft measures may also increase their effectiveness, offering politicians 'more gain for less pain'.

Estimates based on the limited evidence available suggest that the widespread introduction of marketing and management measures could have a significant impact on car traffic volumes within conurbations and urban areas, particularly during peak hours. Their impact is also expected to increase over time, as a result of longer term adaptations in travel behaviour. To date, most marketing and management measures have been targeted at urban traffic problems, and there is less understanding of how these measures might be developed and adapted to influence longer distance inter-urban person travel, travel in rural areas, or freight movements.

The growing number of studies in several countries is leading to an accumulation of knowledge as to which target groups are most susceptible to influence under different circumstances, and which techniques can be used with best effect. For example, it is often easier to

influence behaviour at times when established habits are broken, such as when a person moves home or workplace, or has a child. TAPESTRY (2003) has just produced a Best Practice Guide highlighting these issues, drawing on European experience in particular.

One of the other attractions of these measures is that many are relatively low cost, and – in some circumstances – can be self funding. For example, in the case of the Individualised Marketing initiatives aimed at increasing urban public transport patronage, Socialdata has estimated that public transport operators can recoup the costs of the initiative through higher fare revenues within one to two years (Brög and Schädler, 1999). In the case of Perth, it was argued that by rolling out the TravelSmart initiative over large parts of the city, it would be possible to delay or abandon proposed new freeway construction, saving expenditure of hundreds of millions of dollars. A conventional cost-benefit analysis applied to the Perth programme resulted in benefit-cost ratios of 30:1, well in excess of what might be achieved through a conventional road scheme (TravelSmart, 2001). However, more could be done to assess the cost-effectiveness of 'soft' measures under different circumstances.

One area that lacks evidence concerns the potential for synergetic benefits from intensively promoting a portfolio of 'soft' measures within the same urban area. The UK Department for Transport announced in June 2003 its intention to fund such a demonstration project, to establish a 'sustainable travel demonstration town', with a total budget of 10 million euro.

There is also considerable potential for using marketing and management techniques to maximise the benefit of major investment in new sustainable transport infrastructure, such as a cycle network or a light rail scheme. As previously noted, through a personalised travel planning campaign, the patronage of an improved public transport service (whether a new tram line or enhanced bus service) can be doubled compared with what would normally be expected if traditional information strategies had been employed. This represents very good value for money.

One concern that has been raised is that the benefits of such initiatives may be eroded as a result of induced traffic being attracted by the released road capacity. This is a wider problem with any policy designed to achieve traffic reduction in an area (e.g. new public transport service), and points to the need to remove or protect the spare capacity that has been released by the initiative. This might be done by reallocating roadspace (e.g. allocating reserved lanes for buses and cyclists, or installing wider footways), or by some method of traffic restraint (e.g. congestion charging or access restrictions), depending on local circumstances. Again, the use of marketing techniques can assist in making the case for action to safeguard the benefits derived from the reduction in car usage in the area.

7.   Implications for research

The growing policy interest in marketing and management initiatives in many countries is highlighting our lack of understanding of the processes by which these measures can influence attitudes and behaviour. We are presently unable to forecast the impacts of 'soft' measures within travel demand models.

 While there is a limited literature on the importance of subjective factors affecting travel behaviour that goes back several decades (e.g. Hartgen, 1974), it is not something that has been given prominence in the more quantitative analyses in the travel behaviour literature. Steg *et al.* (2001) suggest a number of reasons for this, including the limited involvement of sociologists and psychologists in the field, the lack of motivational variables in national travel surveys and other commonly used data sets, and a lack of knowledge as to how these factors might change over time.

A number of actions will need to be taken by the research community to rectify these deficiencies. First, our conceptual models of travel behaviour need to be expanded to recognise more fully the various subjective elements of travel decision making. While there is already acknowledgement of the importance of perceived rather than objective measures of transport system performance in shaping travel choices, there are two areas where our knowledge is very weak:

- How to encapsulate 'image' and 'acceptability' into estimates of the utility of different transport modes. One of the arguments commonly used to justify light rail schemes is that they offer a much more acceptable alternative than buses to car drivers, but this has not been fully explored (other than by capturing it in the modal constant term).
- How to forecast the effectiveness of different policy interventions that are designed to improve the image[4] of different transport modes.

There are also related aspects of travel behaviour which have been the subject of more substantial on-going research. The first deals with the longitudinal and dynamic nature of information acquisition and application. A traveller's current knowledge of travel alternatives is based on a history of past personal experiences and other forms of data acquisition, some of which can have a very strong influence on decision making (e.g. the experience of a long wait for a bus in unpleasant conditions might effectively rule out this option thereafter). Similarly,

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[4] Wright and Egan (2000) propose exactly the opposite: that marketing techniques should be employed to 'demarket' the car.

travellers are more amenable to and interested in acquiring new information in some situations than others. Interest tends to be greatest when new travel patterns need to be formed (e.g. when moving house, or retiring), or when current travel patterns are causing undue stress or dissatisfaction (e.g. increasing traffic delays on the journey to work). More information is still needed about the incidence and influence of these critical decision points.

The successful application of marketing and management measures also links strongly with on-going work on choice set formation, which is a key factor in successful model calibration and prediction. A key question in applying and forecasting the likely effectiveness of such measures is how modal options enter – and leave - the choice set and how their relative attractiveness can be affected by policy interventions.

As Steg *et al.* (2001) recognise, one of the key limitations from a research perspective is lack of data. This relates not only to the need which they identify to attach motivational variables to conventional travel surveys, but also to the use of stated preference and other techniques designed to elicit information on preferences and behavioural responses. In particular, stated preference exercises need to be more sophisticated, in at least two respects:

- In the treatment of information deficiency and uncertainty. Here computer-based gaming exercises have tried to assess the effects of incomplete or inaccurate traffic information on route choice behaviour in the context of improved ITS systems (e.g. Bonsall and Parry, 1991), and some SP studies have tried to build unreliability into the transport choices presented to respondents (e.g. Bates *et al.*, 2001), but much more needs to be done.

- In their recognition of respondent's interest in, or willingness to consider, a change in behaviour. At present all respondents are normally assumed to be 'active' choosers – or are asked in the exercise to imagine that they were in that situation. As noted previously, this is unrealistic and makes it difficult to estimate rates of take-up and eventual saturation levels for new products or policy interventions.

There is a requirement, therefore, not only for improved data collection *per se*, but also for the development of new instruments and techniques in order that we can reliably elicit the necessary information from respondents.

8.   Some issues for workshop discussion

The paper raises three types of issue. First, it highlights several limitations in our **empirical and conceptual understanding** of travel behaviour. For example:

- What do we mean by 'car dependence'? How can we identify trips that are most amenable to shifting from car driver to other modes?

- What is 'image'? How can we measure it? How does it affect attitudes and travel behaviour?

- How is information from the environment selectively filtered and how are 'barriers to perception' overcome?

Second, there are a number of **analytical** issues. For example:

- How can we improve procedures for the monitoring and assessment of 'soft' measures?

- How can we build the effects of information and image into SP experiments or other data capture tools?

- How can we develop more sophisticated choice set formation and evaluation models that are sensitive to the impacts of 'soft' policy measures?

Finally, there are several **policy** issues. For example:

- What are the optimum strategies for implementing 'soft' policy measures, in terms of: target groups, timing, methods, etc.?

- How can synergies between various 'hard' and 'soft' policy measures be maximised?

- How can the potential disbenefits of induced traffic be minimised?

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