
WHY IS IT SO DIFFICULT TO GET PEOPLE OUT OF THEIR CARS (AND IS IT ALL OUR FAULT)?

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Abstract

The car bestows many benefits on users, but there are reasons to consider whether the growth in car use can be reduced. This paper examines why it is so difficult to encourage people to use alternatives to the car. It starts by showing how car use has grown in Britain while walking, cycling and bus use have declined over the past sixty years. The barriers to switching to the alternatives are considered under three headings: lack of motivation, lack of time, and difficulty in walking, cycling and using the bus. It is shown how many households have adopted a lifestyle that is car oriented; in some cases people have chosen to live in locations where their needs can only be met by using the car. The methodology used to forecast and appraise new transport schemes is examined. It is found to be biased towards the car, mainly because it uses 'economic efficiency' as the overriding criterion. It is argued that other factors such as social, environmental and health should be given equivalent weighting when assessing transport schemes. Transport professionals have been responsible for the development and use of this methodology which has not changed significantly in forty years. The paper concludes by calling upon transport researchers to lead a paradigm shift so the transport schemes are developed using a methodology that is more appropriate for the 21st Century, by taking into account a wider range of factors reflecting various aspects of quality of life.

1. Introduction

The purpose of this paper is to examine why car use has grown so much over recent years and why it is difficult to reverse this trend. Whilst many factors underlie the trend, it is possible that the methodologies used in transport planning have encouraged it. This hypothesis is examined in the paper.

2. Trends in travel in Great Britain

Car ownership has risen dramatically in Britain since 1945 largely because of increases in disposable incomes. In 1950 there were 1,979,000 cars licensed; by 2006 this had increased to 26,508,000, which is a 13-fold increase over a 56 year period, which is an average annual increase of about 5 per cent (Department for Transport, 2007b). Over the period 1947 to 2006, the length of road increased from 294,592 km to 398,350 km, a growth of 35 per cent, implying an annual average rate of increase of about 0.5 per cent. In 1914 when car use was very low there were 284,843 km of road, an increase of only 39 per cent to 2006.

As shown in Table 1, car usage (strictly car, taxi and van) increased from 58 billion passenger-kilometres in 1952 to 686 billion passenger-kilometres in 2006, a twelve-fold increase, which is an annual average increase of about 5 per cent. Average car (and taxi and van) occupancy has remained constant at about 1.5 from 1952 to 2006. The total number of vehicles on the road has increased from 3,970,000 in 1950 to 33,369,000 in 2006, an eight-fold increase, with car an increasing proportion. Not

surprisingly, the density of traffic on the roads has increased considerably, so that there is now a significant concern about the problems that cars cause, for example congestion, leading to the waste of time for motorists and others, environmental damage in the form of atmospheric pollution, and the increasing use of fossil fuels.

Table 1 Passenger transport in Great Britain in billion-passenger kilometres

	1952	2006
Car, vans and taxis	58	686
Bus and coaches	92	50
Rail	38	55
Pedal cycles	23	5
Total	218	812

Source: Department for Transport (2007b)

Other modes have shown rather different trends. In 1952 the total distance travelled by bus and coach was 92 billion passenger-km a year, since which time it diminished to about 43 billion passenger-km in the mid-1990s with a slight up turn to about 50 billion passenger-km a year recently (Department for Transport, 2007b). Rail use has increased, but it has decreased its share of the total travel market. In 1952 the total distance travelled by pedal cycle was 23 billion passenger-km. The total distance cycled decreased to 4 billion passenger-km in 1970, after which it grew slightly in the 1980s and then it declined again to the early 1990s, since when it has grown slightly.

Table 2 shows the trends in personal travel by various modes of transport between from 1975/76 to 2006. The total number of trips and total distance travelled have increased, with increases in car travel. The increase in the mean trip length for all trips reflects two trends: the decentralisation of urban activities and the switch from the slower modes to car which means that people can travel further within a given time. This has led to greater choice of, for example, shops and schools. Walking, cycling and bus use have all decreased. Rail use has increased, but it is still a small percentage of total travel. The average lengths of trips by all modes except walking have increased while those for walking have remained constant. This reflects the greater physical spread of urban areas.

Table 2 Trips and distance travelled per head in Great Britain

	Trips per year			Distance per year in km			Mean trip length in km		
	1975/ 76	2006	Change	1975/ 76	2006	Change	1975/ 76	2006	Change
Walk	325	249	-23%	408	322	-21%	1.3	1.3	0%
Bicycle	30	16	-46%	82	61	-26%	2.7	3.8	+41%
Bus	108	66	-39%	773	574	-26%	7.1	8.7	+23%
Rail	15	24	+60%	520	866	+67%	34.7	36.1	+4%
Car	429	658	+53%	5118	9109	+78%	11.9	13.8	+16%
All travel	935	1037	+11%	7584	11413	+50%	8.1	11.0	+36%

Source: Department for Transport (2000, 2007a)

The influence of the car on levels of walking are illustrated by the fact that in 2006, people living in households with a car walked an average of 288 km a year while those living in households without a car walked an average of 469 km (Department for Transport, 2007b). Of those living in households with a car, those regarded as the main driver, walked an average of only 238 km.

The Department for Transport is responsible for the provision of roads for the cars to use, and so is expected to find solutions to the problems posed by the car by formulating suitable policies and, where appropriate, taking action. Not surprisingly, given the dramatic difference in the car ownership levels now compared with those just after the Second World War, the whole approach has changed. Indeed, the whole attitude to the car has shifted from the car offering convenience and pleasure to a small, relatively wealthy, proportion of the population (14 per cent of households owned one or more cars in 1951) to mass car ownership (75 per cent of households owned one or more cars by 2005). As the comparison above of the rates of growth of car ownership and car use show, there is a close relationship between the two topics, with an increase in the mean distance travelled by each car from 13777 km in 1952 to 15180 km in 2006.

It is clear that car use has grown over recent years, and that walking, cycling and bus use have all decreased significantly (but with signs of slight growth in recent years). Rail use has grown but is still a very small proportion of travel. It is quite clear that the car has become the dominant mode, unlike the position at the beginning of the 1950s, and that much of the decline in walking, cycling and bus use can be attributed to the growth in the influence of the car, both directly and indirectly. It has also caused a massive increase in the total amount of travel.

In the next section, barriers to the use of alternatives to the car will be examined. The discussion will be in terms of short and medium length trips which form the vast majority of trips made (95% of trips made in 2006 were less than 40 km long (Department for Transport, 2007a)). This means that rail will not be considered explicitly further.

3. Barriers to use of alternatives to the car

To identify the barriers to alternative modes to the car, the question that needs to be addressed is: what stops an individual who does not walk, cycle or travel by bus from doing so? It should be borne in mind that most bus trips involve a walk journey to and from the bus stop and that this may be part of the barrier to bus use. A number of reasons can be identified (Mackett, 2003, Mackett and Ahern, 2000), which can be categorised under three headings:

- Lack of motivation;
- Lack of time;
- Difficulty in walking, cycling and using the bus.

Faced with the alternative of making a (short) trip using either the car which will make the journey quickly and comfortably, safe from the weather, or walking, cycling or using the bus which will take longer, require effort and involve exposure to the weather, many people choose the car. The problem stems from the very widespread availability of the car, which arises from increases in incomes: once people can afford a car, they tend to buy one. Overcoming this barrier will require either significantly increased awareness of the benefits of other modes relative to using the car or for the cost of using the car to be increased relative to walking ('cost' here includes not just the marginal cost of using it for a trip, such as the cost of the petrol, but other aspects such as time and the cost of parking). A second approach to this is to address the issue of car ownership, by increasing the cost of doing so, or making it more difficult to do so.

For some people, staying at home may be more attractive than going out. Home entertainment in the form of television, social computing networks such as Facebook, computer games, home shopping, and so on, means that the many of the activities people used to leave home for, such as entertainment, shopping and social contact can be achieved in an electronic form at home,

reducing the motivation for some people, particularly those who are electronically literate, who are often the young, to go out. The need to make some local trips has been removed by technological innovation, thus reducing the motivation to leave the house to make such trips, which would often have been walked or cycled in the past.

Modern family life has become very complex, partly because more mothers are employed, often part-time, and partly because there is a perceived need to protect younger children by not letting them out without adult supervision. This perceived need to supervise children, based upon concerns about road safety and possible abduction, has led to the shift from free play to supervised structured activities for children. In the past children were allowed out to play, alone or with friends. Now children tend to go to clubs, lessons and other organized activities. This means that parents have to ensure that they can reach them. This is made much more complex if there are several children in the household. Because, unlike play, the structured activities occur in specific locations which are often not very close to home, and they often occur at specific times of day, such as after school, parents tend to use the car rather than walk to take their children there (Mackett et al 2005). The more rapid pace of modern family life has led to many trips being made by car when previously they would have been walked, cycled or made by bus because the car offers flexibility and time savings compared with using other modes.

There are a number of possible difficulties in making a walking, cycling or bus trip:

- Physical difficulties;
- Fear of going out;
- Local environment is unsuitable;
- Desired opportunities are far away.

Some people have a well-defined disability that prevents them from walking (or cycling). Physical aids such as wheelchairs can facilitate local trips. Many others, particularly the more elderly, who make up an increasing proportion of the population, have difficulties walking. Whilst some assistance may be given by walking sticks and similar equipment, the distance that many elderly people can walk is often rather limited. The introduction of low-floored buses has helped make local trips easier for those who find making a large vertical step difficult. It has also helped those with luggage or pushchairs. At any time, younger people can have difficulty walking, for example when shopping or with very young children. Many people shop in large supermarkets which provide almost every type of good, but mean that large volumes of shopping need to be carried home: for those who own a car, this is the most efficient way to transport the goods. Very young children cannot walk very far: many parents use pushchairs, but it may often be perceived as easier to take the child on a short car ride than a longer walk, pushing a pushchair with all the paraphernalia that is needed with very young children such as nappies, spare clothes, and toys.

Newspapers publish many stories about crime. Whilst there are some places in Britain where street crime levels are high, people reading such stories may perceive that their local area as being much more dangerous than it really is. They may interpret signs such as groups of young people or graffiti as indications that areas are threatening even if there is little or no crime there. Such perceptions may be heightened after dark. This may cause people not to walk about, or parents to forbid their children from doing so. Instead they use their cars or stay at home, which they perceive as being safer, ignoring the increased risks to their health from lack of physical activity.

People need to feel safe and comfortable in their environment when they go out. Streets with poor quality pavements, dog mess, chewing gum, and so on, do not make pleasant areas in which to walk. At night, streets lacking good lighting will discourage people from walking. People making a journey in daylight but returning after dark, may well choose to use the car because of the return journey, even though they might have been willing to walk or take the bus on the outward leg of the journey.

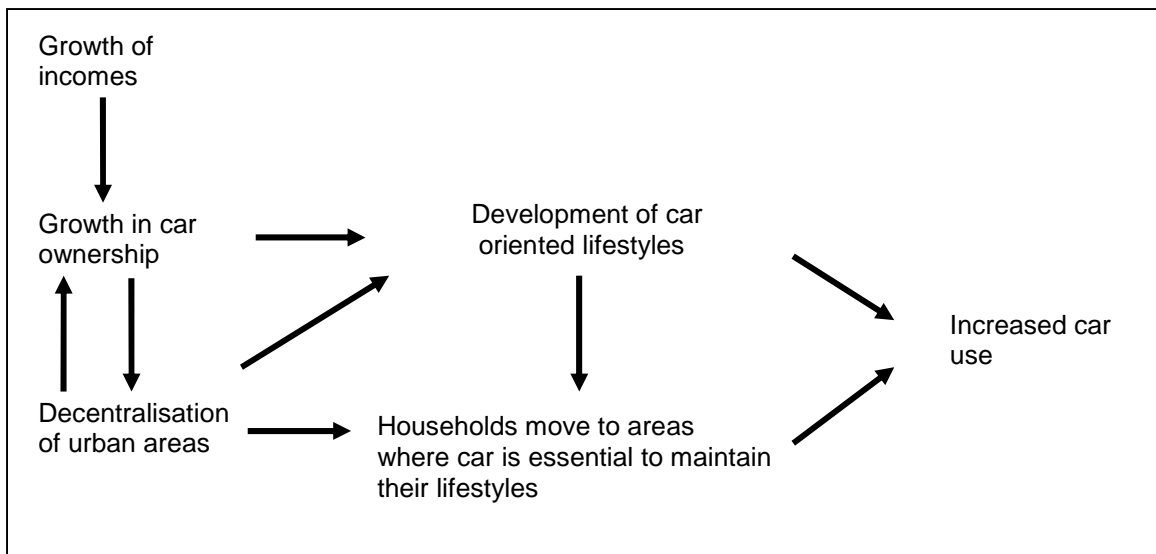
As mentioned above, over recent years, urban areas have spread. Suburbs have been developed, providing high quality housing with individual gardens where families can create their own environment largely free from interference from neighbours. Usually such dwellings have one or more garages. It is usually possible to walk in such areas and, often, quite pleasant to do so, because they contain trees and other greenery, have suitable pavements and low crime rates. However, the size of the plots mean that densities are fairly low, and so many people tend not to live very near to the activities they need as part of their lives, such as employment, shops, schools and leisure facilities. Because they tend to have cars and the roads are usually not very busy, the mode of travel usually used is the car. In some cases, they could walk, but these are often the people mentioned above who have busy lives ferrying children from one activity to another.

Many of the reasons for not walking, cycling or using the bus outlined above reflect the modern lifestyles that many families have adopted. Once people can afford to own a car, they tend to do so. In 2006 76% of households owned one or more cars, with 32% owning two or more (Department for Transport, 2007a). Once people own a car they tend to use it, because many of the costs are fixed: purchase, insurance and vehicle excise duty. The marginal cost of using a car is relatively low, particularly if several people are using it together. For many people, it is much easier and quicker to load up the car with people and luggage and set off, than to walk along the streets, carrying goods or equipment. Hence, for many people, car has become the mode of travel of choice, which is why walking, cycling and bus use have declined as car ownership has risen, even for short trips.

Many of the reasons discussed above could be summarised under the term 'lifestyle'. Many households have adopted a car-oriented lifestyle because they can afford enough cars to meet most of their travel needs, and the range and location of activities that they have chosen to participate in, are reachable by car. Some may be within walking distance such as primary schools or local shops and they may walk (or cycle) to them, but in general most of their trips are made by car. Some longer local trips may be possible by bus, but at some inconvenience. Many of the equivalent trips by their parents and grandparents would have been walked, cycled or been taken by bus, because many fewer people would have owned a car, or the only car would have been used by the adult male of the household to travel to work and not be available during the day. As implied above, this gradual transition towards a car-oriented society has been part of a two-way interaction with the decentralisation process: as cars have become more widely available, suppliers, such as retailing chains, have chosen locations best served by cars, and households have felt an increasing need for a car (or two) to help them reach the opportunities offered. This process has been reinforced by decisions by public bodies to concentrate facilities such as schools and hospitals into larger premises to offer economies of scale and a greater range of activity within the premises. The transport implications for users are rarely considered.

There is a further dimension, which makes it particularly difficult to increase the volumes of walking and cycling. Many of the types of household discussed above have chosen to live in places where car is the only way to reach the desired range of destinations. Many families live in different types of residential environments to their parents and grandparents: lower density, suburban or rural, poorer access to public transport, and further from shops, schools and leisure activities. This works well if the car is available, but fails if it is not. These factors are summarised in Figure 1.

Figure 1 Why the shift to car use is difficult to reverse



This all means that it is difficult to encourage more people to use alternatives to the car. It is not simply a matter of reversing the pattern of switching from walking, cycling or the bus to the car. As discussed above, many people have grown up in an environment where society is largely geared up to using the car. For them it is the easy choice, enabling fast journeys and opening up opportunities unreachable by any other means. It enables people to continue the comfortable lifestyle that they have created. It enables them to project an image of success to their friends and neighbours. There is evidence from the United States that the nature of the neighbourhood and the time spent in cars are related to levels of obesity (Frank et al, 2004). This car-oriented lifestyle is not true of everywhere in Britain, because there are places, for example within London, where people do manage without cars, cycle to work and walk with their children to school. Handy (2006) has suggested that in the United States 'New Urbanists' may walk more than those living in suburban areas, but recognising that the neotraditional neighbourhoods may be selected by those who wish to walk and cycle. Overall, such people are probably in the minority.

It is clear that it will not be easy to increase the volumes of walking, cycling and bus use because the long-term trends have been in the opposite direction, and the various factors that have caused the rise in car use have been mutual reinforcing. Some of the ways of doing so will be discussed in the next section.

4. Overcoming the barriers to walking, cycling and bus travel

For those not currently walking or cycling, the motivation to do so will need to be based on the intrinsic benefits, such as health. This requires increasing awareness of the health risks associated with lack of physical activity. Advertising campaigns may help here, but it seems unlikely that these alone will have very much impact on those who currently choose a sedentary lifestyle. In some cases, it may be more effective to target other members of the household who can repeat messages to their more sedentary spouses, children or parents whenever they think it is appropriate.

For those who make short trips by car it is necessary to make the alternatives appear to be more attractive relative to the car, or, putting it another way, make use of the car less attractive. The latter is probably easier and can involve increasing the cost of car use or increasing travel time by car. Increasing the cost of using the car is, in theory, straightforward: increasing fuel tax or charging

for the use of road space can both be implemented if the government has the will to do so. Fuel tax is already high in Britain compared with some other countries. The nature of taxation on fuel is such that if the price increases for external reasons, the tax also increases. Large increases have induced protests in the past. The government is aware that the majority of the population live in car-owning households, and that votes may be at lost if motorists feel they are being treated unfairly. Charging for road space such as the congestion charging scheme in central London can be effective at shifting some people out of their cars, but there is no clear evidence on the impact on walking and cycling. Another way of making car use less attractive is to increasing the cost of vehicle ownership by increasing vehicle excise duty. Currently (2008) there are plans to do this for environmental reasons, increasing tax for cars that use large amounts of fossil fuels and decreasing it for cars that are seen as 'green' but these may be abandoned for political reasons.

The problems caused by modern lifestyles which mean that the car is the only method of travel that allows people to continue to live as they currently do, seem even more daunting than ones of motivating people to shift from the car. Many of the motivations for using the car arise from meeting the needs of children (Mackett, 2003). These needs partly arise because of parental concern about the risks to children of allowing them to walk or cycle without an adult. Hence, one need is to increase parental confidence in letting children out without an adult. This may involve making the streets safer and convincing parents that this is the case. Parents, particularly mothers, may then have more time to walk to the shops, but this seems unlikely to have more than a marginal effect.

Methods of overcoming the barriers associated with the difficulties of walking and cycling are relatively easy to identify. Improving the walking environment by investing in better and wider pavements, installing more street lighting, putting in more benches, and paying staff to clear up litter and dog mess are straightforward. Similar improvements can be made for cycling. Whether they actually encourage more people to walk or cycle is another matter. Such improvements, together with effective policing can help to reduce crime levels. If local residents can be convinced that this has happened, they may be more willing to walk or cycle.

The problems caused by greater dispersal of urban activities, which have led to increased distances from home to shops, schools and leisure facilities, can be addressed by planning policies. There are two difficulties here: firstly the trend has been towards larger, more centralised facilities, and there would need to be a policy reversal. Given that one of the motivating factors behind this trend has been reduction in public expenditure, it may be difficult to reverse it. The second difficulty is that many of the facilities are owned and operated by the private sector, and it is motivated by a desire to make money, and so will only choose more localised facilities if they are perceived to be in the companies' interests. There has been a trend towards setting up local stores by the large supermarket chains in Britain, partly in response to difficulty in obtaining planning permission to develop out-of-town stores. In theory, this should have increased walking, but often they have replaced existing small shops, and so may not have increased the total stock. In many ways, the damage is already done, with many households taking advantage of the convenience of the car to carry out a large bulk shopping trip: it is hard to see many households switching back to doing all their shopping at the local shops and then carrying it home.

However, just as it has been possible to reduce the pace of development of large, out-of-town superstores, it could equally be possible to use planning controls to reduce the development of large facilities such as hospitals and schools. As implied above, there would probably be a cost associated with it, but this could, in theory, be offset against the financial saving to the National Health Service of the reduction in illnesses associated with low levels of physical activity. The difficulty would be to establish that there would be an increase in the volumes of walking and cycling, and then to put a monetary value on the resulting health improvement.

Another approach to reducing the distance people need to travel is to increase residential densities. Densities fell with the suburbanization process, which led to longer trips, which, in turn, led some people to use cars rather than walk or cycle. The increase in the forecast population has led to pressure to build on 'brown-field' sites, that is, largely within existing urban areas. This may

cause densities to increase, but will not reduce the distance of existing residents from shops, schools and so on, unless new shops and schools are built to meet the increasing demand, and they are within walking distance of existing residents.

Even if these planning policies of increasing densities and providing local shops and services are implemented further, they will do little or nothing to reduce the problems caused by people who have moved to areas where they can only maintain their lifestyles by using one or more cars for all their trips. Whilst it seems unlikely that many of them are going to return to high density urban living, it should be borne in mind that the population is dynamic: new households are being formed all the time, while others dissolve. This means that, whilst the existing households who have move right out of the city may not move back, the equivalent households going through the stage in the life cycle when households in the recent past chose to move out, might come to a different conclusion and choose a more urbanized lifestyle. The different outcomes to the decision process might result from different states of the housing market and the cost of travel. If this is correct, it suggests that it is important to target households before they move out to very low density rural areas, not after. It also requires the provision of suitable housing to meet their needs.

It is clearly difficult to reverse the shift from active travel to car. It is not just a matter of switching back from the car, because the whole spatial pattern of life has changed. Part of the problem arises from the actions of transport planners in responding to the growth in number of cars. Modal shifts arising from the growth in income has led to lower levels of walking, cycling and bus use. Because part of this process has involved changes of home location, as well as of lifestyle, they are very difficult to reverse. Much of the change that has occurred over the past sixty years has resulted from the actions of planners, trying to accommodate the car. They have used analytical processes in taking decisions. In the next section these will be examined to see if they have exacerbated some of these trends.

5. Methodological issues

In Britain, and other countries, decisions about investing in transport infrastructure are made by comparing the anticipated benefits brought about by the new infrastructure with the anticipated costs. This evaluation process carried out as part of the development of schemes is usually called 'appraisal'. Since infrastructure tends to last a long time, it is necessary to consider these costs and benefits over a long period. In this country this is usually 30 years for roads because that is regarded as the period that is required before major rebuilding is necessary. This means that it is necessary to predict the benefits and costs 30 years into the future. The costs are fairly straightforward engineering calculations, to estimate the costs of building and maintaining the infrastructure. The benefits are more difficult. The main benefits of building a road are usually seen to be travel time savings, accident reductions and environmental benefits. These benefits are functions of the numbers of travellers using the infrastructure. Only schemes where the benefits exceed the costs will be built (and not necessarily all of those). Usually a number of alternatives are considered and the one chosen is the one that produces the greatest benefits relative to the costs. The benefits are usually estimated as the difference between the situation with the new infrastructure and the situation without it.

The main tool for this forecasting process is a model. A model is a simplified representation of reality. It is a collection of assumptions and theories. In this context, models are usually sets of mathematical equations that relate the number of travellers to various relevant variables. The models are programmed into a computer and need a suitable data base to represent the various inputs. Travel demand modelling is very complex, and cannot be described fully here (see Department for Transport (2008a) for further information on modelling). A key point is that it is assumed that people are rational and choose the alternative that gives them the highest utility. This means that spending less time travelling is assumed to be better than spending more. As indicated above, travel time savings are an element of the benefits arising from a new scheme. In fact, travel time savings tend to be the largest element. This means that the scheme that gives the largest travel time saving is probably going to give the largest benefit. Only the marginal cost of car use (fuel) is considered, not

the costs of ownership because empirical evidence shows this is what people do. However, for public transport, the fare is considered, which is all the monetary cost. This means that car is usually cheaper for any given journey. Thus schemes which encourage most car use and most transfer from public transport to car are likely to give the greatest benefit relative to the cost. The method used for forecasting travel demand tries to replicate the observed reality, usually using generalised cost to determine mode and destination choice and travel time for route choice and assignment. Generalised cost is a linear sum of monetary and time elements including access elements such as walking and waiting and parking charges. In order to convert the elements to common units in order to sum them, the value of time is used a conversion factor between time and money. The models are used to examine alternatives such as a set of possible routes. The nature of the function means that the optimal solution is the one that saves the greatest number of minutes of travel time. Because those with high incomes are the ones with the highest value of time, the optimal solution is likely to be the one that benefits those with high incomes the most. It has been observed that people usually do not take the reduction in travel time as an opportunity to spend the time saved in other activities: instead they tend to travel further, sometimes as part of a long term decision about where to live. This means that they are benefiting from the greater range of opportunities offered by the greater speed. This is illustrated by the remarkable constancy of time spent travelling (at about 60 minutes per day per head) (Department for Transport, 2007a, Metz, 2008). This means that the solution that is optimal is likely to lead to the greatest number of people choosing to live further way from where they work.

The effects of changes to transport networks and policies on locational decisions are not normally modelled when transport schemes are being examined. This is a weakness of the models used as part of the standard methodology to appraise transport schemes. As implied above, when it becomes easier to travel further because of a new road, people often choose to live further from their workplaces or choose a job further from where they live. They may also choose to shop further away. This process is reinforced by the actions of developers who will develop new housing, retail and employment opportunities in places that have become more accessible. These phenomena can be seen in the M25 motorway around London that was near capacity soon after it opened and stimulated the development of retail parks at Lakeside near Thurrock and Bluewater near Dartford. Models exist which can be used to represent such effects, but there is no commonly agreed methodology and they are seen as rather complicated.

It seems to be regarded as axiomatic that schemes have to be appraised in terms of economic efficiency, but it can be argued that this has led to much greater benefits to those with high incomes than those with low incomes and has contributed to the decentralisation of urban areas which makes it difficult to encourage people to switch from the car to alternative modes. Other criteria that could be used as the basis of the evaluation of transport schemes relating to wider aspects of the quality of life include social, health and environmental criteria.

Social and environmental factors are taken into account in NATA (The New Approach to Appraisal) (Department for Transport, 1998) but only in peripheral ways which mean that the users of the methodology are required to take note of such factors. In the NATA Refresh exercise (Department for Transport, 2008b) it is recognised that accessibility (which is where social factors are taken into account) is not well represented in NATA. Social criteria could be about giving greatest weight to schemes that encourage increases in accessibility in such a way that those with very low levels of access such as elderly people without access to a car are given greater weight. This implies some form of equity criterion. If this seems an unusual suggestion it should be thought of in terms of the question 'Why are we happy to use a methodology that encourages investment in schemes that help those with highest incomes travel further and faster, but place little or no value on helping those with low incomes or who are excluded from society to reach local opportunities to meet basic necessities in life such as shopping and social interaction?' Environmental criteria could be about identifying the environmental outcomes of each alternative and selecting the one that did the least damage.

Obesity is being seen as a major topic on the policy agenda which greater physical activity could help address. Generally this means encouraging walking and cycling. The more time spent on

either will help increase health. This means that a longer trip is better than a shorter trip. This is in direct conflict with the fundamental assumption which underpins the conventional transport methodology that a short trip is better than a long one because it consumes fewer resources. This apparent paradox can be overcome by putting a value on the health benefits to be gained from physical activity. There is a wider need for research into the financial benefits of health resulting from more physical activity. Until recently, physical activity was not considered at all when appraising transport schemes. Currently the system used for appraising walking and cycling schemes (Department for Transport, 2007c) uses some rudimentary figures for health benefits from better physical activity based on calculations of the number lives saved through decreased mortality through the reduction in the number of deaths caused by coronary heart disease (CHD), stroke and cancer of the colon, based on a method proposed by Transport for London (2004) for cycling. In appraising road schemes, that is schemes for providing facilities for cars, which might cause a shift to or from walking and cycling, the key indicator that is used is the number of people achieving 30 minutes a day of moderate activity (Department for Transport, 2003), based upon evidence in the document *Our Healthier Nation: a Contract for Health*, published by the Department of Health (Department of Health, 1998). Research is now being carried out to strengthen the health component of the effects of walking and cycling for use in economic assessment (Cavill et al, 2007), and into the development of tools which use such information (Rutter et al, 2007). However, there is still a long way to go before such factors are given appropriate weight in the appraisal process.

6. How could the transport planning methodology be modified to take active travel into account?

Some weaknesses of the paradigm used for modelling and appraising transport schemes have been outlined above. These include:

- By replicating the observed trends in which the growth in car use has been a dominant factor, this is perpetuated;
- Using economic efficiency as the overriding criterion rather than the quality of life;
- Allowing travel time savings to be the dominant factor in determining which scheme is optimal;
- Not modelling the locational effects of new transport infrastructure;
- Not taking into account social, health and environmental factors fully into account.

Some of the factors that ought to be taken into account much more explicitly were outlined in the previous section. It would be very difficult to bring about the necessary paradigm shift for several reasons. These include vested interests in maintaining the status quo, because various bodies involved developing transport schemes have invested time and money in the present system and it would cost a lot of money to change. Furthermore, if there were a paradigm shift to a new methodology, some schemes that were selected in the past might not have been and others that were rejected might have been built, which could be politically embarrassing.

There are two ways in which the appraisal methodology could incorporate wider quality of life factors as part of the criterion to be optimized. One way would be to use a form of multi-criteria analysis with suitable weights on the social, health, environmental and economic criteria. The other way would be to retain the existing framework, but putting monetary values on all factors. This would mean, for example, estimating the benefit to society and the individual concerned, of giving an elderly person access to social facilities. This is a complex research question but is, arguably, just as valid as trying to place a value on a minute of travel time saving for a business person. It is widely recognised that the method used to place values on travel time savings is very crude. The fact that it has been done for many years and has been accepted as a pragmatic way to obtain values to place on alternative transport developments so that they can be ranked, does not mean that it is sound or sensible. It certainly does not mean that other factors are not equally valuable to society. Research is required urgently into the value of changes in health, social and environmental factors caused by changes in transport infrastructure. The same methodology should be used for large and small schemes, to ensure a sensible balance is achieved between investment in

schemes to improve facilities for car users, walkers, cyclists and public transport users. This should include negative factors such as the marginal increase in the damage to health (and therefore cost to the National Health Service) of people switching from walking, cycling and bus use as a result of a scheme to improve roads for cars.

7. Conclusions

This paper has shown how complex it would be to obtain a switch from car use to other modes. For many households, their lives revolve around use of the car. In some cases they have chosen to live in places where they can only reach the activities they need to function such as employment, education and shopping, by using the car. Suppliers of facilities such as shops and hospitals have tended to concentrate the facilities into large units, most easily accessed by car as part of the general process of decentralisation of urban activities. It has also been shown that the methodology used to forecast and appraise transport schemes tends to favour the car because the overriding criterion used is economic efficiency which favours the mode which is fastest and cheapest, which usually turns out to be the car. This methodology has been developed and applied by transport professionals in a fairly uncritical way. Whilst some alternative approaches have been developed, none of them have had a significant impact on the basic forecasting and appraisal framework, which has remained largely unchanged in forty years. In the paper it has been suggested that a broader range of criteria representing various aspects of quality of life should be considered rather than just economic efficiency. Transport researchers should stimulate a debate into the whole purpose of investment in transport developments, and how they could meet the needs of society better than the present approach, which does not seem very appropriate in the 21st Century.

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