Area Travel Plans V’s Local Travel Plans

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This paper reviews the efficiency and cost implications of Area Travel Plans (ATP’s) relative to site-specific Travel Plans (TP’s) from the perspective of the network users and travel planners. It is seen that the implementation of ATP’s may decrease the potential for development planning related traffic ‘rebounds’. Rebound itself is characterized by an increase in demand incurred by indirect price benefits – an obvious example being increased fuel efficiency in cars. The present example identifies how such effects can potentially manifest in the development planning process. In particular it is shown that a TP results in a reduced generalised cost of travel and so offers positive externalities to all members of the surrounding community – not just those whom the policies are intended to directly affect – and consequently leaves individuals facing a new cost structure for alternative modes of transport. As a result, rebound may occur through mode switching behaviour (ie from bus to car) and/or an increased number of trips. Investigation of the effects of implementing two alternative, though potentially complementary TDM interventions namely (i) ‘soft factor’ policies which are intended to instigate behavioural change and (ii) ‘hard factor’ policies which impose constraints on car use, are conducted using a graphical supply and demand analysis. This diagrammatic exposition coupled with some consideration of the socio-psychological benefits provides a compelling argument for further application of ATP’s by the planning community.

INTRODUCTION

Demand for transport is derived from the desire and need to consume goods and services, whereby transport is merely a necessary tool to access these goods and services. If one accepts a stock definition that a lifestyle is characterised by the activities conducted by an individual (and the time allocated to those activities), it is then clear that lifestyles hinge on the availability of transport and also that the demand for transport depends on lifestyle choices. Such a connection is in some ways intuitively simple and requires little explanation whilst in other ways it is fraught with undesirable complexities and caveats. Current projects such as the UK Economic and Social Research Council’s £2.9 million Research on Lifestyles Values and the Environment (RESOLVE)1 stands testament to the need to better define the link between lifestyle choice and the inception of sustainable lifestyles.

Contemporary lifestyles are significantly influenced by technological advances, through, for instance, media such as the internet and the increased communication capacity afforded by the invention and inception of mobile telecommunications (see for instance Ofcom (2004)). These advances have allowed international economic activity to pick up pace, where for instance websites such as ‘e-bay’ allow for international economic activity to pick up pace, where for instance websites such as ‘e-bay’ allow for conventional barriers to market entry to be significantly re-defined, thus stimulating competition. This increased demand for activity translates as an increase in the demand for energy, however it is well recognised that ‘conventional’ energy sources are finite in supply, particularly those primarily used for transport. This serves to be a further catalyst for the recent rapid expansion of the sustainable communities policy drive, where sustainability is commonly expressed using the Brundtland definition;

‘Humanity has the ability to make development sustainable - to ensure that it meets the needs of the present without compromising the ability of future generations to meet their needs’

(WCED, 1987)

However it is arbitrarily defined that sustainability for the road transport sector (with the exception of freight transport which is an entirely unique sector2), focuses primarily on the reduction of car use, particularly single/low occupancy journeys. This paper therefore contributes to the discussions surrounding the level of ‘spatial aggregation’ at which policy interventions for reducing the demand for car travel should be implemented.

TRAVEL PLANNING IN THE EARLY 21ST CENTURY

Stakeholder engagement has internationally become a key issue in the transport industry in recent years (see for instance ECMT (2002, p25)), more so than had been previously considered appropriate3.

Travel Planning and Travel Demand Management (TDM) have thus become the core tools of the present day transport professional due to their direct involvement with the network users, whereas the pure ‘Predict and Provide’ approach of yesteryear (see Berry, 1960), ie simply increasing network capacity, has now been largely foregone. Such approaches (ie Travel planning and TDM) tend to influence behavioural change at the origin end of the journey and increase mode choice availability, rather than to impose constraints on car use.

The structure of relevant policy interventions

The range of instruments available to policy setters for intervening in, and adjusting behaviour towards the setter’s objective goals is potentially infinite. As a result it is more con-
venient to define a general target for what policies must achieve, policies can then be defined in any way so long as they meet these criteria. The SMART criteria (see for instance DfT (2004a)) are adopted here;

**SMART**

- There must be no ambiguity in the output
- The policy target(s) can be set against directly observable output(s)
- The policy must be feasible (Rocket science should be avoided...)
- Targets should be within reasonable bounds and not too optimistic
- The output of the policy should be observable over a pre-determined time frame

Such SMART policies can subsequently be implemented in a number of ways, the present paper considers the following alternatives; Site Specific Travel Plans and Area Travel Plans as will each be briefly discussed;

**Site Specific Travel Plans (TP)**

The TP can be broadly defined as the process whereby a specific site (e.g., an office block) evaluates its existing travel requirements/demand (or predicted requirements in the case of new developments), then through the implementation of an appropriate mix of policy instruments, seeks to reduce that travel demand to some agreed target level. The DfT offers expanding amounts of advice and guidance for Commuter Transport is also very active in disseminating advice to practitioners around the UK. The TP policy interventions.

**Area Travel Plans (ATP)**

Area Travel Plans are a natural extension of the site specific Travel Plan (TP), where the planning process is not instigated by the local authority, but by the stakeholders themselves, so as to take proactive TDM actions. However the ATP is trying to manage travel across a much wider network and not constrained to implementation at discrete points of time.

ATP’s offer high levels of community engagement, and are a dynamic process seeking community feedback with the introduction of each new development in an area to ensure they are managed appropriately. This affords ATP’s the ability to instantaneously adjust the development of a region to account for its constantly changing dynamics. Thus community engagement is far more frequent, thus allowing network users to adjust behaviour instantaneously. Furthermore the manner in which the ATP decentralises organisational power away from the government, and further provides stakeholders with the ability to influence the development of their local network is seen as an advantage over alternative statutory transport planning instruments.

**Supplementary, demand and economic rebound**

The concept of rebound behaviour, otherwise known as ‘Off-setting behaviour’, ‘backfire’ or ‘Takeback effect’, is generally characterised by an increase in the demand for a commodity, in this instance car travel, induced by an indirect reduction in the price of that service. The notion, stemming largely from the pioneering research of Khazoom (1980) and Brookes (1978), is often characterized by price reductions induced by technological advancements, in particular implied price reductions which come about through increased efficiency. The ‘technology’ in the case of this paper is the policy intervention, which is implemented to reduce car use and therefore reduce the level of associated externalities attributed to an area of the network.

An interesting question is ‘why might rebound behaviour occur in the transport industry?’ The response is intuitively simple; a reduction in the cost of travel, holding the price of all other goods constant, reduces the relative price of all goods and services and hence increases the amount of disposable income available. This indirect increase in disposable income allows individuals the opportunity to engage in a greater number of activities (e.g., shopping or leisure), indirectly generating increased demand for travel. Therefore a reduction in the price of travel causes an indirect increase in the demand for transport. Rebound however likely occurs not only because individuals have the ability to increase consumption, but must necessarily be supplemented by a desire to increase activity. The law of diminishing marginal utility would imply for instance that rebound is more prominent for lower income lifestyles, suggesting that rebound is a direct (inverse) function of implied quality of life.

**Policy implementation and the importance of Stakeholders.**

A general framework by which policies are implemented could be summarised as in Figure 1. This framework begins by first assessing the scope for policy change, i.e. what is the current consumption attitude for car use? Following this, the relevant stakeholders should be identified and segmented into the target and non-target groups. Stage 3 sees the defi-
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The identification of specific policies which might be considered for reducing car use, whilst stage 4 subsequently evaluates the effects of the policies defined in stage 3 (upon the target and non-target groups). Once stage 4 is complete, planners will have the necessary knowledge to compare the overall effects of alternative policy schemes and choose the one which best suits their needs.

Following for example Cairns et al. (2004a, 2004b), policies can be considered to be either soft or hard factor interventions, whereby soft factors are interventions such as teleworking, car-sharing and travel awareness campaigns whilst hard factors are those such as reducing parking provision at a site or removing lanes on a multiple lane carriageway. Supply and demand analysis will now be used to consider the effects of soft and hard factor interventions on the target and on-target groups in turn (analogous to policy implementation through a site specific TP).

All figures, unless otherwise stated, represent the demand for car travel, further, the demand curves are Marshallian or compensated demand curves (see for example Varian (1992) or Mankiw (2004)) and therefore implicitly incorporate mode switching (substitution) behaviour. The demand curve in Figure 2a (D) is represented by the downward sloping curve denoted ‘Demand’ (D) in the subsequent Figures) indicating that at high prices consumers only desire a small quantity of goods, whilst at low prices much higher quantities are demanded. The Figure also features an upward sloping line denoted ‘Supply’ (S in the subsequent figures) which indicates that supply is high when prices are high (as more revenue can be skimmed from the market) and vice versa.

Figure 2a shows the initial supply and demand schedules in the market for car travel with the equilibrium quantity consumed being $q_1$ with price $p_1$. Soft factor interventions therefore work by adjusting the behavioural profiles of individuals in the market for car travel, hence an effective soft factor intervention will work by shifting the demand curve (with no change in the supply schedule) to the left with the following implications (see Figure 2b):

- Demand shifts inward from $D_1$ to $D_2$, thus indicating a lower quantity demanded for any given price.
- Given that the target group is aware of the introduction of the policy intervention, quantity of car travel demanded instantly moves to the new equilibrium and decreases demand from $q_1$ to $q_2$.
- The price of car travel also decreases, moving from $p_1$ to $p_2$.

Figure 3 shows the effects of the implementation of a hard factor policy intervention upon the target group. Hard factor’s take an alternative approach to TDM (relative to Soft factors), and instead of working to adjust attitudes towards car use simply impose restrictions on car use. Therefore there is no adjustment to the demand schedule in the market for car use, but supply will be reduced with the following effects (see Figure 3b):

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**Figure 2:** Effect of Soft Factor policy intervention upon policy target group.

**Figure 3:** Effect of Hard Factor policy intervention upon policy target group.

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• Supply shifts inward from $S_1$ to $S_2$, thus indicating a lower quantity available in the market at any given price.

• Given that the target group is aware of the introduction of the policy intervention, quantity of car travel demanded instantly moves to the new equilibrium and decreases from $q_1$ to $q_2$.

• The price of car travel also increases, moving from $p_1$ to $p_2$.

One important point revealed by Figures 2 and 3 is that hard factors increase the generalised cost (price) of car use for the targeted individuals, whilst soft factors reduce it. This would imply that soft factor interventions provide greater scope for rebound behaviour within the group that the policy intervention is directly targeted upon.

Now, the implications of Soft and Hard factor policy interventions upon individuals for whom the policy is not directly intended to alter the travel behaviour of (ie the non-target group), will be considered. One common feature presides in the following discussion, which is that policy interventions manifest as a reduction in the price of car travel for the non-target group as follows;

• A reduction in the quantity of car travel on a given subsection of the road network reduces the generalised cost of travel through that part of the road network (the ‘area of implementation’ via reduced congestion.

• Sections of the road network adjacent to this ‘area of implementation’ will be able to substitute their existing route for a new route which passes through the ‘area of implementation’, paying a lower overall price for the trip.

• There will subsequently be a knock on effect of traffic redistribution across the whole network due to further route substitution. This comes about as the areas bordering the section of the network immediately adjacent to the ‘area of implementation’, experiences a similar cost reduction as is inferred in the previous bullet (See Figure 4).

As this continues across the entire network, the overall result will be that residents and network users will be able to sustain the same level of consumption (for all goods and services) as enjoyed before the policy intervention, but with lower travel costs.

As the price of transport falls (assuming for simplicity that transport costs are fixed across all goods), the budget line for all goods and services shifts proportionally outwards. This comes about as the effective costs of all goods have fallen by a fixed amount. Given that transport is a complement for all other goods and services, the demand for transport therefore also increases.

Figure 5 shows the implications of these two effects (price reduction and demand increase). In the instance of a Soft factor measure (see Figure 5a);

• Price reduces from $p_1$ to $p_2$, moving the individual out of equilibrium behaviour. This comes about as the reduced number of cars on the roads eases congestion and hence reduced the generalised cost (price) for all transport network users.

• The consumer re-evaluates their budget constraint and translates the reduced price of transport as a general reduction in the cost of living. This allows them to increase overall consumption and achieve a higher utility curve. Demand increases from $D_1$ to $D_2$.

• Quantity demanded increases from $q_1$ to $q_3$ whilst price adjusts to the new equilibrium at $p_3$.

Therefore the implementation of the travel demand management policy might result in an increase in the demand for travel by the non-target group when using soft factors. The general result remains the same when using Hard factor policies but for the following exception (see Figure 5b);

• Depending on the type of Hard factor used, supply in the overall market for car travel may reduce. This reduction in supply will reduce quantity demanded from $q_2$ to $q_1$ and raise price from $p_2$ to $p_3$.

As a result, the true effect of a hard factor depends on the degree to which supply is constrained. If the reduction in supply exactly equals the increase in demand, then the quantity demanded will remain unchanged, however the
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price associated with that level of demand will be higher (as the same amount of road users will be competing for a smaller amount of road space).

The distinction between two uniquely observable groups, namely (i) the permanent users of the spatial regions travel network being directly targeted by the policy instrument (the target group), and (ii) the users who are not (the non-target group). For the target group it was observed that policies will have the desired effect of reduced quantities of car use. However for the non-target group it can be seen that undesirable increases in the quantity of car use are both rational and feasible. These two equal and opposite effects mean that careful spatial consideration is required in the implementation of policy.

When using a site specific TP, the net effect of a policy intervention is ambiguous and depends on the proportion of society which is engaged by the policy and the relative ability of those not directly targeted by the policy to increase car travel. Therefore it is evident that the greater the proportion of a ‘spatial region’ which is incorporated into a travel plan process, the less possibility there is for rebound behaviour to occur and hence the more effective the policy intervention will be. The ATP by definition includes the whole spatial region and therefore minimises the potential for rebound as far as is practicably possible.

CONCLUDING REMARKS

This paper has exploited the theoretical potential for a situation such that if policy interventions are implemented at an inappropriate level of spatial aggregation, rebound behaviour may occur. These policies are implemented so as to reduce the impact of a site’s negative externalities upon the general public however it can be seen that externalities may reach higher levels than had the policy not been implemented at all. These effects, if not at least recognized by policy planners and implementers, may significantly hamper progress in sustainable development.

Empirical evidence is necessary to see whether or not this theoretical phenomenon is prevalent in reality and the magnitude to which it may be masking the effectiveness of policy interventions. Further it is recommended that the time has come for development control officers to stop being SMART and to start being SMARTeR; (Specific, Measurable, Achievable, Realistic, Time bound and excludes Rebound). The ATP is considered as one such instrument with the ability to implement this ‘SMARTeR’ approach to sustainable development.

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Footnotes

1 See www.surrey.ac.uk/resolve for further details.

2 Freight transport is sometimes unable to reduce the magnitude of trips, i.e. number of journeys or journey lengths, but may alternatively be able to manage the levels of upstream and downstream externalities (pollution of various types, and carbon abatement in particular) associated with freight activity.

3 Recognition of such issues can however be found as early as in Adam Smith’s ‘The Wealth of Nations’ in 1776, whom remarked in relation to the development of infrastructure for movement; ‘Such undertakings, therefore, may be, and accordingly frequently are, very successfully managed by joint stock companies without any exclusive privilege’ (Smith (1776), The Wealth of Nations Vol. 2, p280)

4 With the subtle difference that ‘Achievable’ is used in place of ‘Appropriate’ (as used by the DfT) ‘in line with the majority use of the SMART acronym.

5 See; http://www.dft.gov.uk/stellent/groups/dft_sustravel/documents/page/dft_sustravel_504128.hcsp

6 No statutory instruments exist at present to enforce ATP’s however local authorities may feasibly encourage their implementation when requesting TP’s for new developments.

7 Although backfire, within the academic literature, refers to a far more extreme form of rebound. See for Instance Jaccard and Bataille (2000).

8 See the TDM online encyclopaedia at; http://www.vtpi.org/tdm/tdm64.htm

9 A good example being increases in vehicle fuel efficiency, which reduce the direct element of the cost of travel per mile. The indirect nature of such changes in cost structures make their empirical analysis problematic as empirically tractable and derivable demand relationships require a greater degree of analytical skill.

10 The vertical axis in Figures 2, 3 and 5 represents the price of car travel whilst the horizontal access is the quantity of car travel. Prices are measured in terms of ‘generalised cost’.