The impact of travel information on motorists' choice patterns: opportunities and limitations

Travel information and travel recommendations are generally regarded as key opportunities for influencing motorists. As recent research shows, however, it is important not to set our expectations too high, as ingrained behavioural patterns are hard to change.

Car mobility has increased significantly over the past few decades and is expected to increase further, particularly once the current economic recession is over. Besides the general growth in car mobility, there will always continue to be local traffic problems as a result of the reduced capacity at specific hubs, changes in speed, and the capacity of the local network. Both professionals and academics have concluded that building more infrastructure in and of itself will never fully solve congestion issues and that the optimum use of the available capacity must be complementary to an increase in capacity.

The Dutch government has introduced a number of measures over the years to take maximum advantage of the existing infrastructure, with free bus lanes, traffic management systems, road charges, peak avoidance and

carpooling being just several examples of the measures implemented. By and large, the effectiveness of these measures has proved to have been very limited, particularly in relation to the expectations beforehand, which tended to be very high.

The emergence of modern IT resources, including smartphone apps, could potentially provide new opportunities for influencing motorists' transport behaviour. This time around, expectations are high once again. The idea is to provide current travel information in order to keep motorists up-to-date of current road network conditions, thereby potentially avoiding congestion. Travel information may also involve alerting users to options (e.g. routes and travel alternatives) of which they were previously unaware. An alternative option to this type of descriptive travel information is prescriptive travel information, which entails providing specific, personalised advice to motorists. This type of information is similar to route suggestions made by navigation systems, the difference being that the information is dynamic rather than static and that the advice can be provided in such a variety of ways as to allow the information users to access the full potential of the system The system can also take into account personal preferences and limitations. The number of apps based on these principles has grown rapidly of late.

The DBR research programme TRISTAM (Traveller Response and Information Service Technology: Analysis and Modelling) was designed to gain a greater understanding of the impact of travel information on travellers' behaviour. The sub-projects, for their part, were designed (i) to determine whether passengers would select a different route, (ii) to determine what the effects are on day-to-day activity patterns (i.e. not only the route, but also the time of departure, choice of destination, etc.) and, by extension, what the spatial effects are, (iii) to develop a broad definition of the term "accessibility", also factoring in travel information, and (iv) to investigate the impact of teleworking on transport behaviour. The various projects have produced some interesting results, which are outlined in this article.

Old habits are hard to change

The main conclusion of the DBR study into travel information was once again that expectations of influencing travel behaviour through travel information or travel advice should not be too high. Due to a variety of factors, the impact of travel information on behaviour is less significant than is often assumed. Commutes and transport for other purposes are the result of travellers' experiences over a period of in some cases many years

and based on their experience they have found the most optimal route – or at least one that is acceptable. Transport is characterised by a high level of routine behaviour (patterns). This routine behaviour may or may not be context-dependent (e.g. the day of the week, or activities which must be completed), but within that context there is relatively little variability. In addition, it is also important to realise that transport is not a purpose in and of itself: The convenience with which individuals and households organise their day-to-day lives in terms of time and space is most important. Any minor time gains do not weigh up against the effort required to achieve those time gains.

Furthermore, if travellers already have access to real-time information, they tend to study this information only when they are already en route or right before they embark on their journey. Passengers do not typically choose the perfect departure time, one with minimum delays, and the "routine departure time" is never adjusted. It appears as though passengers gather real-time information mainly to be notified of the expected travel time and arrival time. The process of gathering real-time travel information may eliminate some of the uncertainty regarding arrival time, with passengers being able to communicate estimated arrival times to their partner or colleagues. However, this does not automatically bring about changes in behaviour.

Passengers tend to only change their planned travel-activity pattern (based on travel information) if they stand to benefit significantly by doing so: they are not inclined to change their routes to arrive several minutes earlier or later, for example. Travel information becomes more valuable if the user has the option to work from home: In that case, passengers use the information to make a strategic decision to either go to the office or work from home. The importance of travel information also increases when the information corresponds to important personal values, such as values related to sustainability.

In a general sense, we note that adaptive behaviour is characterised by as little mental effort as possible. Passengers first change the duration of the journey and the activities they intend to undertake and only select an alternative route if the detour would not be too great and the delay has turned out to be significantly longer than usual. They are less likely to consider other aspects of activity travel patterns, including a change in destination. It should be noted that this is not only a matter of passengers being unwilling: interviews with passengers have, in fact, taught us that even if a passenger had seriously considered the travel advice received, they

ultimately did not select that route because the differences between the regular route and the suggested route were too small, or because they had limited options in terms of changing their plans in view of other commitments. The majority of passengers did, as expected, drive out of their residential area and onto a motorway, and would then exit it again to get to their final destination. If there were any other possible routes in the first place, they only involved minor changes in the route to and from the motorway.

Another problem is that general travel information does not take into account people's individual schedules, which means there is a significant likelihood that the travel advice received does not constitute an improvement, is difficult to incorporate, or turns out to be irrelevant. In addition, we also saw that most people's diaries and schedules are relatively straightforward and fairly flexible. A slightly longer travel time does not really make much of an impact: even for business travel, traffic-related delays would appear to be socially acceptable and make for a simple excuse. Mobile phones have made it easy to inform others of any delays we may incur. Personal travel advice (i.e. factoring in people's diaries/schedules and flexibility) may be (slightly) more effective.

The fact that this does not concern a strategic decision is further highlighted by the fact that real-time travel information (e.g. TomTom HD travel information), provided it is available, is the most frequently consulted source of information. Travel information on the radio is one alternative: roadside information is consulted far less frequently. This suggests that investments in digital services are more effective than investments in hardware.

Beware of "secondary and tertiary effects"

Whereas the focus used to be mainly on the positive effects of travel information and more effective use of the existing capacity, we must not close our eyes to the possible negative long-term effects. Based on economic theory, it is to be expected that reduced congestion will result in people spending more time at home. This can potentially result in suburbanisation and, by extension, to an increase in the number of kilometres travelled.

IT is not just an essential condition for travel information: it is also required to enable people to work from home. The option of telework is often regarded as a key factor in reducing mobility, but we have been aware for some time that this is somewhat simplified reasoning. Not being required to travel during peak times could mean that people will start travelling by car to other activities or that another family member will now use vehicle for all manner of activities, for which they

would normally use the bike. The DDR study into travel information also revealed that teleworking for only a part of the day in order to avoid peak-hour traffic can result in marginal economic loss, Since, if more passengers travel at a later hour, this could lead to serious congestion later in the day. In that case, passengers are not distributed over time and the traffic peak merely shifts, without significantly reducing travel costs.

Impact of travel information depends on large number of variables

It is not possible, them, to draw easy blanket conclusions regarding the contribution of travel information to sustainable mobility. The effects of this policy vary depending on the situation and the intended user group. The extent to which passengers will be able to adapt their behaviour in the shorter or longer term depends on the specific local situation, their schedule, and the level of flexibility of the time pressure they experience, along with the extent to which the travel advice received matches passengers' personal preferences and the physical possibilities and limitations of their journey. The margins, in this context, are small and expectations of the impact of policy and traffic management should not be excessively high.

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Bibliography
Gubins, Sergejs & Erik T. Verhoef (2011) Teleworking and Congestion: A Dynamic Bottleneck Analysis, Tinbergen Institute Discussion Paper TI 2011-096/3
Gubins, Sergejs & Erik T. Verhoef (2013) Dynamic Congestion and Urban Equilibrium, Tinbergen Institute Discussion Paper TI 2012-137/VIII
Gubins, Sergejs, Erik T. Verhoef & Thomas de Graaff (2012) Welfare effects of road pricing and traffic information under alternative ownership regimes, Transportation Research Part A: Policy and Practice 46(8): 1304-1317
Lu , Ruihua, Caspar G. Chorus & Bert van Wee (2012) The effects of different forms of ICT on accessibility – a behavioural model and numerical examples,

Transportmetrica,
DOI: 10.1080/18128602.2012.742171
Parvaneh, Zahra, Theo Arentze, Harry
Timmermans (2012) Understanding
Travelers' Behavior in Provision of Travel
Information: A Bayesian Belief Approach,
Proceedings of 15th meeting of the EURO
Working Group on Transportation
Ramos, GM, Daamen, W & Hoogendoorn,
SP (2011) Expected utility theory,
prospect theory, and regret theory
compared for prediction of route choice
behavior, Transportation Research Record,
Vol. 2230, pp. 19-28.
Ramos, GM, Daamen, W & Hoogendoorn,
SP (2013) Modelling travellers'
heterogeneous route choice behaviour as
prospect maximizers, The Journal of
Choice Modelling 6 (2013) 17–33.
http://dx.doi.org/10.1016/j.jocm.2013.04.
002
Ramos, GM, Frejinger, E, Daamen, W &
Hoogendoorn, SP (2012) A revealed
preference study on route choices in a
congested network with real-time
information, Presented at the 13th
International Conference on Travel
Behaviour Research. July 15th - 20th,
2012 - Toronto - Canada.