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Traffic Impact Assessment Lines of Approach for Considering Traffic Avoidance in Planning

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In our present day society, transport assume a central status. It plays a major role in the production process based on the principle of division of labour in our economic system, and it is the prerequisite for expanding the European or the International market. The high level of mobility in passenger transport is considered to be an important component of individual freedom. In the leisure and holiday sector the importance of transport has increased strongly. And – with commuters – transport contributes to overcoming regional disparities in the employment market.

During the past decades traffic has increased enormously. Between 1960 and 1990 the volume of both motorised private vehicle traffic and goods traffic on the german roads grew 3.7 times as much as it had been to start with. From 1985 to 1990 alone, road haulage increased by 28 % and passenger traffic by 23 %.

This growth has consequences. The traffic infrastructure, i.e. in this case the road system, frequently reaches the limits of its capacity. Further expansion conflicts to a growing extent with other objectives, such as environmental protection and conservation. The drastic increase in the volume of traffic partly offsets the substantial efforts made to reduce emissions or the rate of fuel consumption by technical means. Despite the introduction of the catalytic converter, under status quo conditions a reduction in traffic-related nitrogen oxide emissions for the year 2005 of only 32 % by comparison with 1988 is forecast (1). According to this prognosis, carbon dioxide emissions (CO_2) by traffic in Germany will in fact even increase - by 38 %.

Forward-looking traffic strategies attempt to shift motorised road traffic to more environmentally sound means of transport. However, the potential for shift is limited. The current rail infrastructure is not sufficient to achieve any major relief - as the volume of traffic increases. In regional passenger traffic systems reductions in CO_2 emissions of 8 - 10 % will be attainable by the year 2005 on the grounds of a change in the means of transport selected by the population (2). Even if extensive pollution-reducing measures are taken, the level of CO_2 emissions by traffic in Germany could at best be maintained constant up to the year 2005 - with a parallel increase of 23 % in passenger traffic volume and 69 % in road haulage (1).

Traffic Avoidance as a Further Strategy for Action

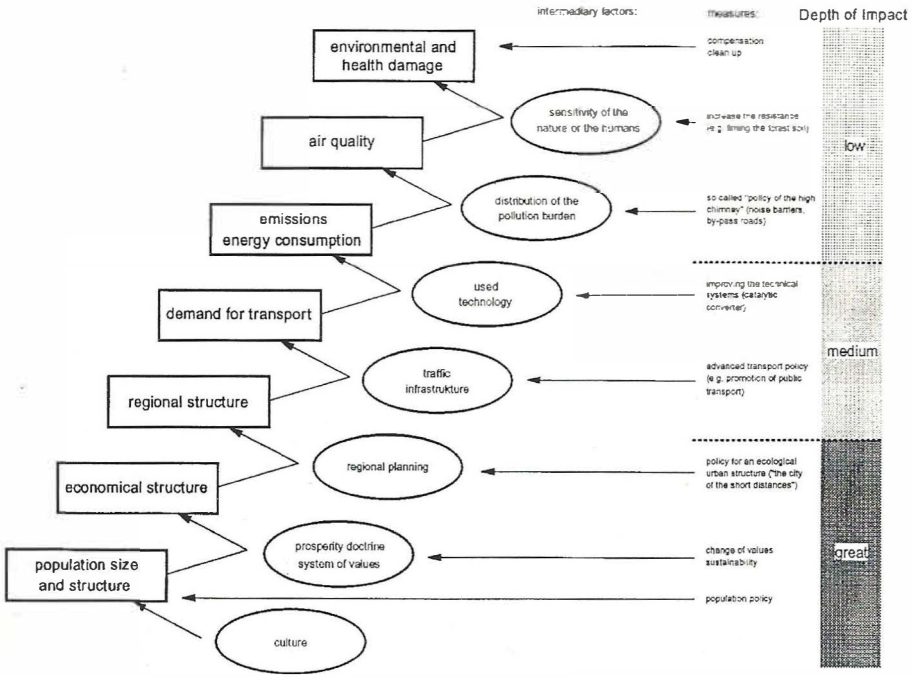
This leads to the question of whether it is not also necessary to take the growth rates in the volume of traffic as a starting point for active intervention. In addition to improving the technical systems, increasing the load factor of the means of transport and achieving a diversion in the use of different means of transport, traffic avoidance should also be considered as an additional strategy for action in a transport policy or traffic planning which 'makes provision for the future'.

The objective of traffic avoidance is to reduce the traffic mileage, in other words the passenger kilometres for passenger traffic and the ton kilometres for goods traffic. Fundamentally, traffic avoidance activities can start by tackling the traffic generated in a specific area - less is transported - or by tackling the mileage covered - passengers and goods are carried for shorter distances.

. 'Traffic avoidance' as a planning strategy for action should not aim primarily at restricting an existing and conscious demand for transport on the part of the road users. Traffic avoidance should instead start by dealing with the upstream determinants generating traffic. Traffic avoidance should take place as far as possible at the structural level at which the demand for transport is created in advance. Traffic avoidance reduces the demand for transport by avoiding the conditions which lead to its emergence (3). Crucial points of approach are the structures relevant for the generation of traffic (e.g. regional structure) and activity patterns in our society. A distinction should be made as regards a structural approach to traffic avoidance consisting of purely regulatory-policy or price-policy measures which fall more in the realm of traffic restriction (quantity-policy restrictions) or traffic restraint (individual decision based on cost advantages or disadvantages).

Traffic avoidance thus becomes a cross-sectional task which affects not only transport policy and planning, but also many other areas of government or societal action. The question which arises is what range of instruments can be used in order to lend greater weight to traffic avoidance in government administration and planning actions.

Fig. 1: The phase model of 'depth of impact'



The Depth of Impact as a Guiding Concept

The necessity to avoid traffic can also be explained with a phase model in which the various measures of environment-related action are classified on the basis of a so-called 'depth of impact'. This was developed by Prittwitz (1990) and it was used, for instance, in a climate protection study for the City of Heidelberg in order to evaluate measures (2). Fig. 1 shows the cause-consequence relations on the left, which are conveyed by the factors (presented in oval frames). On the right examples of measures which act on the factors are shown. The environmental and health damage to be prevented results from the quality of the environment, which depends on the emissions. In the traffic sector the emissions can be traced back to the demand for transport. The demand for transport is inter alia a consequence of regional structures, through the intermediary of the traffic infrastructure. The regional structure can in turn be traced back to the structure of the economy and the population size and structure.

The phases are influenced by intermediary factors, which are themselves not to be considered primarily as causal, e.g. the technology used, or the distribution of the pollution burden. Naturally there are further determinants for the various phases in some cases, as well as feedback between the individual phases.

The deeper the level at which a measure tackles the problem, i.e. the greater the depth of impact, then the more the causes of the environmental problems are tackled, the broader the effect of the measure. Moreover, the time of impact is generally long for measures with a high depth of impact. Changes in the regional structure only have a very long-term effect on the demand for transport and on the emissions, but they cover all the consequences of traffic, whereas although the catalytic converter will be installed in all cars in a few years time, it will only reduce emissions of a few pollutants.

We are faced with the situation that in recent years a few measures with a low depth of impact have been taken: noise barriers and sound-insulated windows, by-pass roads, catalytic converters, (residential) zones with a speed limit of 30 km/h. The success of these measures has been regularly offset by the growth rates in the volume of traffic. Improved rail services have, for instance, merely increased the overall capacity of the transport system, but have not reduced motorised traffic on the roads. Future strategies must therefore achieve a higher depth of impact, i.e. they must reduce the ecological and social consequences extensively and on a long-term basis. Traffic avoidance is such a strategy and it extends beyond simply shifting traffic to other means of transport.

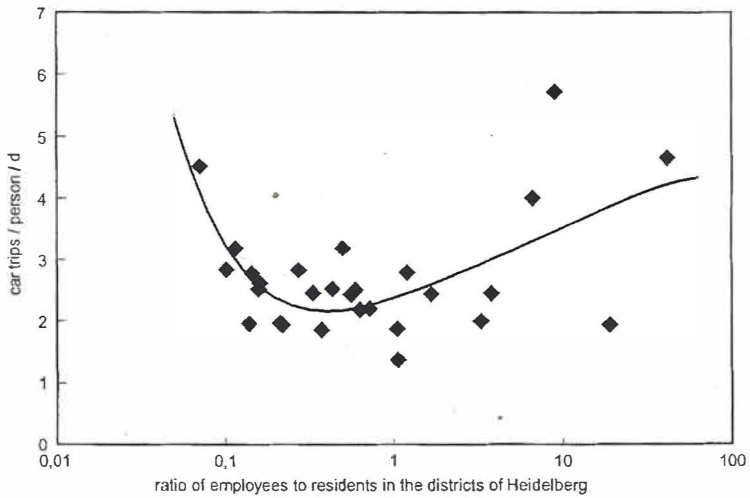
Fields of Application

The possible lines of approach for avoiding traffic are just as varied as the influences on the demand for transport, and they lie at virtually all levels of planning and administration (federal government, state government, local government levels). In our opinion the concept of traffic avoidance is to be taken into consideration in a large number of different departments. This inter-departmental character is in fact an essential feature of traffic avoidance strategies.

At the local authority level the complete land use zoning plan is affected in addition to traffic-related infrastructural measures. The objective here would be to optimise regional and urban structures in such a fashion that the volume of motorised transport is kept as low as possible - in a process of balancing advantages and disadvantages against other societal objectives.

This can be achieved by greater mixing of the urban functions of working, living, recreation etc. at district level or on a regional scale. Fig. 2 shows the connection between mixed use and the volume of motorised traffic in a town (4). Furthermore, it is conceivable that individual movement patterns can be influenced by appropriate steering of the supply and leisure facilities, which could also contribute to reducing the volume of traffic.

Fig. 2: The influence of mixed use (working and living) on the volume of motorised traffic in the different districts of the city of Heidelberg. Ref.: Schmidt et al. (1992).



At the regional and state level development plans and programmes are of particular importance, for example what status should be accorded to intermediate and higher-ranking centres, how the numbers of work or school commuters can be steered or reduced by appropriate structural policy, etc. Business promotion or industrial settlement policies for large-scale projects are thus of major importance.

At national level direct actions and planning by the government are important on the one hand. In Germany these naturally include the federal plan for transport, as well as e.g. projects of the Bundeswehr (German Army) or the postal authorities, which can sometimes have major impacts on the traffic sector.

On the other hand, legal requirements can also indirectly be of major importance for the demand for transport and hence for possible lines of approach for avoiding traffic. In this connection the german law regulating shop-closing times with the late opening evening should be mentioned, which according to the results of scientific investigations has led to an additional demand for transport - without any essential increase in turnover. It is feared that in the long term the late opening evening will tend to favour centralised structures, which would speak against greater small-scale mixing of use in the supply sector.

A further example is the law governing rents and tenancy which on the grounds of a (certainly expedient) protection against eviction makes the construction and renting of works housing unattractive for employers and also makes spatial integration of living and working difficult. Measures from the environmental department can also, under certain circumstances, lead to

undesirable side-effects relating to the demand for transport. The regulations governing packageings and the introduction of the 'dual system' of waste disposal have led to a clear increase in the volume of transport in the waste management and recycling sector.

Finally, fiscal conditions have not only a direct and short-term influence on the demand for transport - as is most frequently discussed - for instance by a rise in the mineral oil tax. In the long term they also influence the development of regional structures and must be considered as an important factor for less regional resistance and hence e.g. for processes of suburbanisation (5).

Implementation Instruments

The examples mentioned show already that traffic avoidance cannot be an absolute goal. It must always be balanced against other, sometimes conflicting goals. It is crucial, however, that such balancing of interests take place at all and that the impacts of a measure or planning on traffic are taken into account. A prime task of an appropriate range of instruments is, therefore, to point up these impacts for decision-making bodies in the administrative and policy-making sectors.

What possibilities are there for taking traffic avoidance into account in the planning process ?

Taking the cross-sectional character of traffic avoidance as a basis, one possible instrument is the Environmental Impact Assessment (EIA). Since traffic avoidance is chiefly an objective derived from the sector of environment and climate protection, it is natural to require that traffic avoidance be taken into account within the framework of EIAs. The EIA - as it is implemented in the European Community - has a pronouncedly cross-sectional character and must be taken into consideration in various planning processes.

However, the EIA generally only relates to individual projects or schemes (Project-EIA). It is seldom applied when plans and programmes are drawn up (e.g. development/town and country planning), which are of particular importance for the structural scope of action. It would be fundamentally conceivable to take the aspect of traffic avoidance into account in the so-called Plan-EIAs, especially if the implementation of Plan-EIAs is to be specified within the EC or the Federal Republic of Germany. However, an original EC draft for a Plan-EIA was withdrawn last year and is not in prospect at the present time.

Furthermore, traffic avoidance extends well beyond the depth of investigation of today's EIAs. The EIA generally only considers the direct impacts on the environment, e.g. local emissions in the case of a concrete road-building project. The aspects of traffic generation and avoidance and the various interactions between regional structure and traffic are generally neglected. In its present form, therefore, the EIA does not extend to the actual causal level - at any rate not for the traffic sector.

We therefore consider it expedient to introduce a Traffic Impact Assessment (TIA) to examine the impacts of central government decisions within the framework of draft bills, administrative regulations, programmes, plans and the

approval of projects. The TIA would have to be designed differently depending on the field of application.

In the local authority and regional sector the TIA could make use of existing quantification methods. For example, classical transport planning models which have so far been used in traffic development planning to determine demand and plan the traffic infrastructure could be used for this purpose. These methods would make it possible to examine the interactions between regional structures and traffic, and they could reveal concrete options for action in the settlement structure sector, as well as - or especially - when traffic planning is not the key subject under review.

It is conceivable that such instruments can be anchored in the planning process with differing levels of commitment. For example, the TIA could become a fixed component of the planning repertoire of the urban and regional planners in that new planning standards are set with the aid of concrete model cases. It would be possible to incorporate the aspect of traffic avoidance in the general objectives or principles of legal regulations, so that they would have to be fundamentally considered in the balancing of interests process in planning operations. Theoretically, it would even be possible to create a mandatory TIA procedure, if necessary by means of a separate TIA Act.

If one considers the field of political planning, i.e. legislative procedures at national level, it is no longer possible to stimulate a generally valid methodology to quantify traffic impacts. For the influences exerted in the transport sector can be many and very varied. What is more important here is the qualitative consideration of the transport aspect in the decision-making process. For instance, internal guidelines within specific authorities regarding the implementation of a TIA or consideration of traffic-related aspects for national schemes and projects would be conceivable.

A 'memo item' can be specified for bills being introduced. By analogy with the german 'price impact clause', a traffic impact clause would then make it necessary to comment on possible impacts on traffic and transport. This would in any case only be the expression of reasonable departmental participation in the drafting of the texts of such laws, but it would draw the attention of decision-makers explicitly to traffic and transport aspects. Such a procedure - albeit not binding - is currently being planned for the rules of procedure of the German Federal Ministries.

Chances of Realisation - Results of a Delphi Survey

Since the TIA involves additional inputs in the planning and legislation procedures, the question of its political feasibility must be raised. A survey using the Delphi method was conducted among representatives of political parties, public authorities, scientific institutions and federations in a study for the German Federal Ministry of Transport (6).

During these talks it became evident that most of the representatives welcomed the TIA as an instrument for avoiding traffic. Critical statements and rejections came from some of the trade associations and some public

authorities. The criticism generally related to the fact that with a formalised TIA a further cumbersome test procedure would be introduced which would lead to further extensions of planning times. However, the circumstance that traffic impacts are taken into account at an early stage during the planning and in the decision-making process was welcomed unreservedly.

Prospects

Traffic avoidance and possible instruments to implement this will without doubt play an increasingly important role in the discussion on transport policy. Although a content-related distinction must be made between traffic avoidance on the one hand and other strategies for action in the shift to other means of transport or technical optimisation and improved utilisation of transport systems on the other hand, traffic avoidance supplements these aspects in the field of structural measures which are not solely geared to the traffic sector. The line of approach at the structural level makes traffic avoidance a very long-term strategy. It cannot serve to achieve short-term success. Despite this it is necessary if the level of CO_2 emissions is to be reduced by 80 % by comparison with 1987 in the long term, i.e. by the year 2050. In the long term, traffic avoidance should be just as much a fundamentally accepted goal in our society as rational use of energy or avoidance of waste.

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Footnotes

[1] Höpfner et al. (1992)
[2] Schmidt et al. (1992); Schmidt (1993)
[3] Thomson (1978)
[4] Schmidt et al. (1992); see also: Franz (1978)
[5] Schmitz (1992)
[6] Schmidt, Bergmann, Knisch (1993)