Summary:

Bottlenecks in Transport Research

This report focuses on some basic problems of transport research. The intention is to discuss why these, for a number of reasons, should also be termed bottleneck problems. The main keywords are <u>behavioural relevance</u> and <u>prediction of behaviour</u>. They shall indicate that the description of behaviour must reflect actual behaviour. This is a necessary condition for a description that in turn can contribute towards prediction of present behavioural patterns.

Whenever we are faced with the task to evaluate whether a given research method is in fact applicable in a given situation, we are required to discuss the following three-stage hierarchical model of representation:

- The theory and discussion of its status in the light of, in the present context, its behavioural relevance,

- the specification of models, i.e. the application of the theory, and

- calibration, i.e. the empirical testing of specification and measurement errors.

There is no way in which such basic problems can be solved by overlooking them. And the need to follow the hierarchical representation procedure becomes even more pressing for research to be applicable in an actual decision-making process. Here, we shall exemplify the bottleneck problem in applied transport research by examining the following six more or less interrelated topics. These are all much too important to be 'solved' by way of sweeping them under the carpet, which in many ways is exactly what we are doing now:

- Behaviour-relevant private car costs

  Behaviour-relevant time costs

  Generalised costs and cost-benefit analysis

  Attitude surveys and self-ability

  Forecasting history versus forecasting the future

  Indirect effects and the perfect traffic forecast

Behaviour-relevant private car costs

Behaviour-relevant costs can be defined as those costs which actually control people's behaviour. These reflect their perception of the economy of the private car, and are of crucial importance in order to understand the competition between the car and other means of transport, and how it varies in and between geographic and functional sub-markets.

Contrary to what seems to be the case regarding other bottleneck topics, this is one where the general level of knowledge appears to be very modest. This status is

something of a paradox, that we may have the least behaviour-relevant knowledge about the private car, the means of transport which we otherwise have the most knowledge about.

We are confronted with two problems. First, we know little or nothing about the *current* relationship between subjective and objective costs. This, in turn, generates problems of predicting the response to objective costs that may be of a completely different magnitude than they are today. Both problems are complicated methodologically, and, of course, the latter in particular. But there is no easy way out: private car costs and the perception of these have an extremely critical function, not only in the cost-benefit analysis, but in understanding the competition between the car and other means of transport. It is in fact possible that clearifying the issue of behaviour-relevant private car costs should be characterized as the single most important problem within the entire field of transport research.

Behaviour-relevant time costs: Loyal or disloyal applications of a theory?

The monetary valuation of time as applied in the road sector may be one of the most striking examples of how a method can also become a straitjacket, that is an example of the method as a premise and not a consequence. It is a historical fact that the economic time-utility theory has been most frequently and extensively applied in the road sector's cost-benefit analyses. Its application has, in fact, been so successful that today it represents a two-edged sword. For in the average project the calculated use of time savings constitutes by far the most important element, amounting to 75-80% of the total benefits. This says everything about the dependency upon the conventional valuation of time being interpreted and perceived as economically credible.

The author's arguments are primarily to be associated with the aggregation problem, to how one argues for evaluating large and small time savings equally, to how one can defend their aggregation in time and space, and to when the sum of the individuals' 'willingness to pay' should be defined as identical to that of society's willingness to pay.

Measurements of willingness to pay may be extremely difficult, but nevertheless difficulties that are correspondingly underestimated, cf the discussion of attitudinal research later. But even if such measurements were carried out so efficiently that they manage to register the individual's evaluation of small as opposed to large time savings, and the manner in which these are distributed throughout time and space, the hypothesis remains that these aggregation problems <u>still</u> do not disappear, neither when aggregation takes place for the same individual over time, nor for individuals collectively. It is not a controversial issue that time must be included in the evaluation of the profitability of transport investments. What is controversial is <u>how</u>, and the assertion here is that the demands inherent in the theory have not been treated seriously enough in order to be able to apply it properly according to intention.

Generalised costs and cost-benefit analysis

How 'general' are generalised costs? If we define these as the sum of time costs and 'normal' driving costs, then this question is concerned with behaviour relevance in both cost components, but also and perhaps not least in the underline of these components. But again, this is a topic that seems neglected in the literature. This is even more important to note in view of the fact that the concept of generalised costs is applied in cost-benefit analysis as a complete matter of course. To what extent is there material coverage for doing this?

The actual political decision differs from that indicated by the cost-benefit analysis first and foremost with reference to elements which are not formally integrated in the analysis. They are generally considered the reason why the application of cost-benefit analyses is so controversial as it in fact is. Another view is that the opposite is the case. Cost-benefit analysis should be controversial not so much on account of the elements that are not included, but on account of how the elements are treated that always and as a matter of course *are* included –cost-benefit analysis has a core problem which is larger than problems related to its delimitation.

Self-ability in attitudinal research: A problem overlooked?

The fundamental prerequisite for being able to predict behaviour is that we understand behaviour. It is interesting, then, that it has become commonplace to use attitudinal research, for example with the aid of stated preference techniques, in studies of behaviour and the prediction of behaviour. Under what assumptions, then, are such techniques befitting to their actual applications?

Stated preference methods can be defined as a family of techniques to register opinions of one's own behaviour. They are a good example of 'modern' techniques which may easily be misused, and especially if one overlooks the ability problem that arises when the respondent is to state his opinion – and technically is even able to do so – on a hypothetical choice upon which he actually does not have any pre-assumptions. Self-ability is the individual's inherent knowledge and ability to make a reply with behavioural-predictive potential within the given set of individual and contextual factors. The problem is to identify whether the individual in a particular situation does or does not have the ability to express himself credibly about his own future actions.

It seems that the literature is not concerned with this problem. This is the more important to note since it is not only with regard to obviously difficult contexts that self-ability is a pertinent theme. The author's hypothesis is, on the contrary, that it is may be so in virtually all situations, even, and maybe particularly so, in those with which we initially are very familiar, for example time-use in relation to our own travel activity. And without having controlled for the presence or absence of self-ability in a given situation, the results of the attitudinal investigations will not have any credibility, irrespective of the technical quality of the procedure. If this control has not been carried out then this technique is misused.

Does it suffice to forecast the past?

The fundamental distinction between description and prediction is the difference between forecasting the past as it actually was and forecasting change, i.e. the future. Both of these tasks are difficult, but the latter definitely more so. Distinguishing between the two represents the major challenge of forecasting, i.e. to have to distinguish between descriptive and predictive models. And even though forecasting is an area which is generally surrounded by great interest, it is still possible to maintain that this particular and fundamental problem is an ignored one.

The demands for distinguishing between description and prediction pose strict demands on the explanatory variables and their influential power. The corresponding challenges to be met may be illustrated by the following questions: When must a model be discarded, even if it should be perfect with regard to forecasting the past? How well founded and described must a forecast be in order that the decision-maker not <u>at pleasure</u> can reject it?

Indirect effects and the perfect traffic forecast

The traditional cost-benefit analysis is supposedly taking into consideration indirect effects if one correctly predicts both the general growth of transport and transport generated as a result of the specific project in question. The assumptions that indirect, including induced, effects will be implicitly handled is, in other words, the 'perfect' traffic forecast. In this case as well, it is the impression that the literature is satisfied with defining the assumptions, thereafter only to forget then, i.e. implicitly to accept that they are satisfied, but without their being documented and controlled explicitly. Again we must ask: When and to what extent are the demands required in such a traffic forecast met?

The condition that a cost-benefit analysis has been well executed in the sense that it includes all ring-growth effects is dependent upon correct predictions of traffic growth and realistic values-of-time. Such assertions may be interpreted as evidence of fact that it is precisely these difficult-to-identify effects which must be explained. Otherwise the reasoning behind the perfect traffic prognosis may easily become circular and hide that the prerequisite for a satisfactory traffic forecast is explicit analyses of indirect effects.

Transport research: Identification of behaviour-relevant bottleneck problems

The purpose of this report is to formulate new research ideas and angles in relation to established and well-known themes, to stimulate the identification of the most critical bottlenecks, and in the next instance to eliminate them. Emphasis is on raising questions answers to which are still blowing in the wind, and whose scientific challenge may be summed up in the following questions:

In what situations are current methods and practice wanting, and in which future situations will a similar application result in a complete breakdown of these methods? And if the present bottleneck questions are deemed valid and sustainable, what are the necessary conditions and chances for obtaining answers to be relied upon, and to be <u>agreed</u> upon?