THE CONCEPT OF DELAY

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ABSTRACT

The word "delay" is so widely used that it may be assumed to be a simple concept which is well understood. It is taken to be a name for wasted time on a journey, but attempts to quantify it in order to use it as a measure of performance of a transportation facility have not given complete satisfaction. Drivers are observed to behave in ways which reveal attitudes to wasted time which differ from those of the researcher. These problems have been reported in many studies but do not seem to have been pursued.

This paper discusses the concept of delay. A basic definition leads to problems of measurement which suggest alternative definitions which have more apparent relevance to traffic networks in which more than one cause of delay is of interest. Further speculation about these definitions points to the fact that delay can be either of two separate concepts.

In conclusion it is argued that delay should no longer be regarded as an objective quantity capable of direct measurement. Instead of delay being thought the cause of driver annoyance, it should be taken that it is the existence of driver frustration which converts time lost into delay. It is better to define delay as unwanted journey time.

Introduction: Measures of Performance

In everyday usage, the delays associated with a journey seem to be taken as an important measure of the quality of that journey. "Have you had a good journey? Were there many delays?" is the sort of familiar conversation which illustrates the fundamental nature of delay in the mind of the traveller. If the route is known then delay is probably the only unpredictable aspect of the journey and therefore is seen as particularly important. The discussion of delay should therefore begin by considering its role as a measure of the performance of traffic networks, and it is found that it is relatively unimportant in the context of economic appraisal for planning purposes. The need for objective evaluation arises when changes to the road system are
being considered. Implementation of improvements involves financial investment, and the problem is to demonstrate that this expenditure is justified. The COBA method of appraisal instituted by the Department of the Environment (1972) uses a computer model to predict the effects of a proposed change, and these are reduced to benefits expressed in economic terms. The Consultative Document produced by the Department of the Environment (1976) states that in a typical cost-benefit analysis for a road improvement, it is the savings in journey time which account for about 80% of the benefits. Savings in accident costs account for most of the remaining 20%.

A saving in journey time is not necessarily a saving in delay, particularly when two different routes are under consideration. Delay, as such, plays no part in the process of economic appraisal. However there are many aspects of the performance of a traffic network, including delay, which are seen as useful measures of performance even though they do not figure in cost-benefit analysis. One simple measure is the number of stops per unit length of journey. Having to stop is a cause of frustration and so the number of stops seems a useful, easily measured, performance indicator. Another measure of performance is acceleration noise. This is more difficult to measure than the number of stops and is described by Jones and Potts (1962). Frequent changes in speed reduce the comfort of a journey, and acceleration noise gives an objective measure of this aspect of journey quality.

Highway Research Board Bulletin 130 (1972) is devoted to a review of measures of the quality of traffic service. Delay is discussed and it is recognised that measurement is not straightforward. It is suggested that a distinction be drawn between network delays and operational delays. Network delays are the losses associated with negotiating tight bends, stopping at junctions, and so on, whereas operational delays arise from the interactions with other vehicles. At night, with few vehicles on the road, only network delays operate, and so it is suggested that journey time measurements be made both at night and during the day. By subtracting the nighttime measurements from those made during the day, an estimate of the operational delays can be obtained. The measurement of the network delays is rather more problematic.

Delay, along with other measures of performance, may play no direct part in the adopted methods of economic appraisal but it is recognised that they can provide valuable insights into specific problems. They provide for a numerical evaluation of aspects of network performance which are of concern to road users and therefore may be the basis for putting forward a specific proposal for improvement.