

Variable Demand Modelling – Preliminary Assessment Procedures

TAG Unit 3.10.1

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Transport Analysis Guidance (TAG)

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1 Variable Demand Modelling – Preliminary Assessment Procedures

1.1 Background

- 1.1.1 TAG units 2.9 and 3.10 explain why variable demand modelling needs to be considered and provide guidance on how to carry out such modelling. This unit forms the first stage in the process and explains how to establish whether there is a need for variable demand modelling in a particular application.

1.2 The Importance of Variable Demand Modelling

- 1.2.1 Any change to transport conditions will, in principle, cause a change in demand. The purpose of variable demand modelling is to predict and quantify these changes.
- 1.2.2 The Standing Advisory Committee on Trunk Road Appraisal (SACTRA) considered all these effects in 1994 and emphasised the importance of establishing a realistic scenario in the absence of the scheme or strategy, the extent of travel suppression in the "without-scheme" case, and the extra traffic *induced* in the "with-scheme" case.
- 1.2.3 Although the modelling effort needs to be proportionate to the scale of the scheme, the need to consider variable demand is **not** simply a question of the size of the scheme. Since both demand changes and benefits tend to scale with the size of the scheme, changes in demand can have similar proportionate effects on benefits for both large and small schemes. Thus changes in demand can seriously undermine the economic efficiency justification for schemes of any size.
- 1.2.4 There may be wider effects of the scheme, on the environment, accessibility or safety, for example, which will also be affected by changes in demand: these must be judged separately from the economic efficiency of the scheme. Any reduction in any type of benefit can undermine the justification for the scheme, since this depends on the balance between the benefits and the costs of the scheme.
- 1.2.5 Detailed responses in the demand for transport of **freight** are not considered here. It is usually sufficient to assume that freight traffic is growthed up from the base using NRTF factors and is susceptible to re-routeing.

1.3 Assessment of the Need for Variable Demand Modelling

- 1.3.1 It may be acceptable to limit the assessment of a scheme to a fixed demand assessment if the scheme is quite modest both spatially and in terms of its effect on travel costs. Schemes with a capital cost of less than £5 million can generally be considered as modest.
- 1.3.2 When carrying out the assessment of the need for variable demand, it is important that a reference case forecast is defined. This captures the background growth as a result of demographic changes and growth in car ownership. The reference case forecast expresses forecast demand at the base year generalised cost and value of time. Under congested conditions, the reference case forecasts may be affected by diverted or suppressed traffic. Hence, construction of the correct do minimum could have a considerable impact on the scheme benefits. It is therefore important that the do-minimum forecasts as a result of assigning the reference case forecast to the "without scheme" network model explicitly the effect of congestion on demand before modelling the effect of the transport scheme.

- 1.3.3 It is expected that where a variable demand model is used for forecasting, then that model will be used to derive forecasts for all scenarios, both with and without the scheme.
- 1.3.4 It should be remembered that the benefit from schemes can be substantially reduced by changes in demand arising from the scheme, and that any scheme potentially encourages more trips and affects congestion levels over the entire journey distances travelled by the traffic through it. Indeed, where the link speed-flow relationship of the scheme itself is nearly flat under the expected operating conditions, induced traffic may have little effect on speeds on the scheme, but there may still be substantial reductions in speeds on roads leading to and from it due to induced traffic. Those extra induced trips and longer trips are the key components of induced traffic.
- 1.3.5 In order to establish a case for omitting fully specified variable demand modelling for schemes above £5 million, it is strongly recommended that preliminary quantitative estimates of the potential effects of variable demand on both traffic levels and benefit are made. An elastic assignment procedure can give an initial indication of the effects. This procedure should only be used to ascertain whether variable demand modelling is required and for nothing else.
- 1.3.6 In order to make any benefit assessment, the same model must be used in both the do-minimum and the do-something.
- 1.3.7 In assessing whether variable demand modelling is required, the procedures required are:
1. A fixed trip matrix approach – i.e., simple TEMPRO growth but no suppression or induction
 2. A variable demand matrix approach - TEMPRO growth plus elastic suppression/induction.

Note that the do-minimum and do-something matrices in 1 are identical to each other. Also note that the do-minimum for 2 is different from the do-minimum for 1. A robust case for carrying out a fixed-demand assessment is if the difference in scheme benefits between 1 and 2 is less than 10% in the opening year, or 15% in the forecast year (10 to 15 years later)..

- 1.3.8 These calculations may convince you that it is safe not to model variable demand and thus provide a useful justification for restricting the assessment to fixed trip matrix.
- 1.3.9 The environmental and other wider effects, and the possible superiority of alternative schemes, including improvements to public transport, also need to be considered.
- 1.3.10 Taking into account the qualitative aspects discussed above, if you decide that variable demand modelling is required then you need to establish the scope of the variable demand model, see *VDM Scope of the Model* (TAG Unit 3.10.2) and build one, see *VDM Key Processes* (TAG Unit 3.10.3).

1.4 Reporting

- 1.4.1 It is expected that the outcome of the above assessment will be reported in the model or appraisal documentation. Details of how each criterion has been considered and all the evidence that has been compiled should be fully documented.

2 Further Information

The following documents provide information that follows on directly from the key topics covered in this TAG Unit.

For information on:	See:	Link:
An overview of modelling issues	<i>Summary Advice on Modelling</i>	TAG Unit 2.4
An overview of variable demand modelling	<i>Variable Demand Modelling</i>	TAG Unit 2.9
Detailed advice on transport modelling	<i>Modelling</i>	TAG Unit 3.1

3 References

DETR (July 1998) *A New Deal for Transport: Better for Everyone*

4 Document Provenance

This Transport Analysis Guidance (TAG) Unit reflects the consultation comments received on Steps 1 to 4 of the draft Variable Demand Modelling Advice produced by TRL in June 2003.

Technical queries and comments on this TAG Unit should be referred to:

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