European Commission

EUROMED TRANSPORT INFRASTRUCTURE NETWORK PROJECT

INTRODUCTION TO TRANSPORT FEASIBILITY STUDIES

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SESSION 4

INTRODUCTION TO TRANSPORT MODELS AND TRAFFIC FORECASTS

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SESSION 4

INTRODUCTION TO TRANSPORT MODELS AND TRAFFIC FORECASTS

(How to choose the right model for your problem and not to be blinded by Science)

Peter Burgess

1. INTRODUCTION: ETAF EXAMPLE

See ETAF Transport Modelling handout.

- This example illustrates some of the jargon and issues/questions which may confront you as a potential purchaser of such a model.
- Objective: appraisal framework to assess the case for new River crossings in east London.

Includes: transport models, databases, analytical procedures, to assess economic and financial case for new infrastructure schemes and their transport, traffic, socio-economic and environmental impacts.

- Enter a world of acronyms:

ETAF = East Thames River Crossings Appraisal Framework
LATS = London Area Transport Survey
LTS = strategic transport model for London
SATURN = transport model [in ETAF for road network]
EMME2 = transport model [in ETAF for public transport network]
GIS = geographic information system

and jargon:

"refined trip matrices" = simplified pattern of travel movements
"network" = computerised representation of the transport network
"trip re-distribution and modal split":

to understand these, we need to understand the process of a conventional four stage land use transport model:

2. THE FOUR STAGE MODEL: FOR "LOCAL" TRAFFIC FORECASTS

Local traffic forecasts (as distinct from National Traffic forecasts) depend on a range of local factors which can, broadly speaking, be divided into two groups:

- *land-use factors*: population, land uses and how much these are likely to generate and attract traffic, income levels;

- *network factors*: the quality of the road in question and how "attractive" this makes it compared to alternative routes.

These factors can be combined to forecast traffic on a particular road by dividing the entire area into a number of zones (differentiated by land use), representing the road system as a network and combining these two effects in a *land-use transport model*. Such a model is described briefly below. It is a complicated and data-intensive exercise.

Main steps in a land-use transport model:

Traffic is estimated on each link in the road network in a series of steps:

i) the town and its surrounding area would be divided into a number of zones; these size of these zones would reflect population density being be relatively small in size nearest the town centre and progressively larger in area further from the centre;

ii) trip rates for different land uses (housing, schools, shops, public services, industry, farming etc) and time periods would be estimated;

iii) based on these trip rates and the future land-use pattern the number of trips *generated* and *attracted* to each zone would be estimated;

iv) the trips *generated* by land uses in each zone would be *distributed* to *attracting* land uses in other zones using a mathematical algorithm;

v) a further algorithm would take account of [forecast] car ownership and public transport services to estimate the numbers of trips by each transport mode;

vi) car trips would be *assigned* to minimum cost routes. This *assignment* [a jargon word which describes the way people choose their travel routes] procedure is usually based on journey time but can be a function of generalised cost, taking account of time, [or distance] and money costs;

vii) the accuracy of the model would be checked by comparing ['calibrating'] the forecasts of traffic on specific roads with observed traffic flows.

This is a simplified description.

This is the kind of land-use transport model which is normally applied to evaluate complex transport schemes.

So returning to the ETAF handout - side 2 - see details of:

years;

time periods;

zoning:

assignment mechanism.

3. MEPLAN TYPE MODELS

The conventional model, summarised above, starts by assuming forecast year land uses and using these to generate travel patterns. The proposed scheme is added to the transport network and evaluated by comparing the trips on each link in the network, and associated costs, without and with the proposed investment.

The MEPLAN model can be operated as a conventional model but, alternatively, it can be run, initially, in the opposite to the conventional sequence:

i) the proposed scheme is input to the network
ii) the model calculates the effect which this scheme would have on accessibility indices;
iii) the model produces changes to the "without scheme" land use and trip generation and trip patterns;
iv) the scheme is evaluated in the conventional fashion.

Potentially, this is a powerful approach to evaluation. However, it is very difficult to measure the effects of improved accessibility on land use and the results produced (as with any model !) should be analysed very carefully to establish how much they depend upon the forecast land use changes and other key assumptions.

4. FACTORS TO CONSIDER WHEN EVALUATING WHAT IS THE PARTICULAR MODEL CONFIGURATION WHICH IS RIGHT FOR YOU:

i) objectives: what are the questions you want to answer?

For example, are you more interested in (a) absolute evaluation (whether any scheme is necessary) or (b) relative evaluation (comparing alternatives)?

[Political decision may have been taken that a new crossing is necessary - only question is where].

Question: if you know where i.e there may be so many constraints that only one corridor is feasible, do you still need a model - for example to decide the kind of structure?

Answer: “yes" if need to demonstrate absolute case in economic terms, but, if not, more important to obtain accurate estimates of costs for each type of structure.

ii) What is the quality of input data (broadly speaking there is no point in using a highly sophisticated model if the quality of input data is poor)?

- what is the model base year?
- has input data been updated to a recent year?
- how extensive were surveys?

iii) How well has the model been calibrated? (against recent counts not used in model estimation?)

- at cordon crossing points alone?
- on link flows 2 way?
- on link flows by direction?
- on journey times?

iv) How complex is the road network?

Use of diversion curve approach: Lithuania: Kedainiai-Kaunas example.
This evaluation considered six alternative alignments between the same two end points. The same national traffic forecast applied to all six. A spreadsheet model, employing a diversion curve was used to estimate the proportions of traffic which would divert from the existing routes to each of the proposed schemes. This % was was assumed to depend on the travel times in the Do-Minimum and on each of the alternatives.

v) How will the scheme be financed?

If it is a Loan, who is taking the repayment risk and how will the Loan be repaid:

- Road Fund, backed by Sovereign Guarantee
- Toll Revenue
- City Budget will determine how critical is traffic forecast.

vi) Other factors

The costs, public sensitivity of the scheme being evaluated and the available Study budget are some of the factors which should be taken into consideration. The costs of more detailed modelling, forecasting and all other aspects of scheme preparation should be estimated and balanced against the potential costs of a wrong decision on location or timing of construction (which could be £ millions).

MEDITERRANEAN TRANSPORT INFRASTRUCTURE NETWORK PROJECT (MTIN)

SESSION 4: INTRODUCTION TO TRANSPORT MODELS

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ECONOMIC EVALUATION METHODS

4.1 Introduction: ETAF Example (handout)

4.2 The four stage model

4.3 MEPLAN type models

4.4 Factors to consider when evaluating what is the particular model configuration which is right for you

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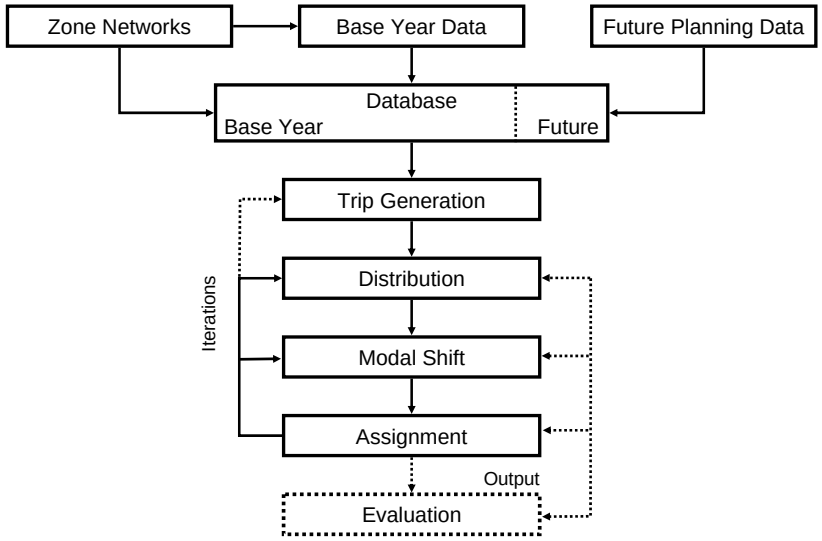
FOUR-STAGE TRANSPORT MODEL



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