

1. INTRODUCTION

1.1 GENERAL

1.1.1 Purpose of Report

This report describes the development, calibration and validation of a multi-modal transportation model for the A453 Nottingham to M1 Junction 24 Multi-Modal Study. This report is the third in a series of reports describing the study process. Earlier reports in the series comprise:

- The Inception Report
- Report of Surveys

A further report will cover travel demand forecasting and a final report describing strategy and option evaluation, study recommendations and a programme of implementation.

1.1.2 Study Objectives

The study objectives are outlined in the Study Brief and may be summarised as follows:

- Appraisal of total transport needs in the corridor to the year 2021 considering:-
 - the contribution of various travel modes to alternative solutions to problems identified
 - the effects and incidence of integrated transport approach
- Identify viable, sustainable costed options to solve problems
- Recommend:-
 - a long term strategy
 - a plan to address most urgent problems including opportunities to induce modal transfer
 - a detailed range of measures to implement the strategy showing cost effectiveness and incidence of (dis) benefits

1.1.3 The Study Area

The Study Area is illustrated in Figure 1.1, and stretches from the west of Nottingham City centre to the east of Derby City centre, including to the north the A52 Derby to Nottingham route and J25 (M1), and J23A (M1) and Kegworth to the south. The East Midlands Airport and several large settlements fall within the Study Area including Kegworth, Spondon, Borrowash, Long Eaton, Stapleford, Beeston and Clifton.

- Hinterland to Nottingham
- Local Movements in Clifton
 - Short journeys by car
 - Pedestrian and Cycle movements
- Frontage acces to local premises
- Major traffic generators
 - East Midlands Airport, adjacent business parks, Ratcliffe-on-Soar Power Station
 - Trent University campus, Dunkirk and Queen's Drive Industrial Areas

This provides an indication of a wide range of movements currently taking place in the Study Area that are of national, regional and local significance. These are especially so in the south western approaches to the City of Nottingham

1.2 GENERAL FORM OF THE MODEL

1.1.5 Main Components

The transport model consists of two main components (Figure 1.2):

- the data base as numerical input
- the software with the methods and algorithms of the transport planning process.

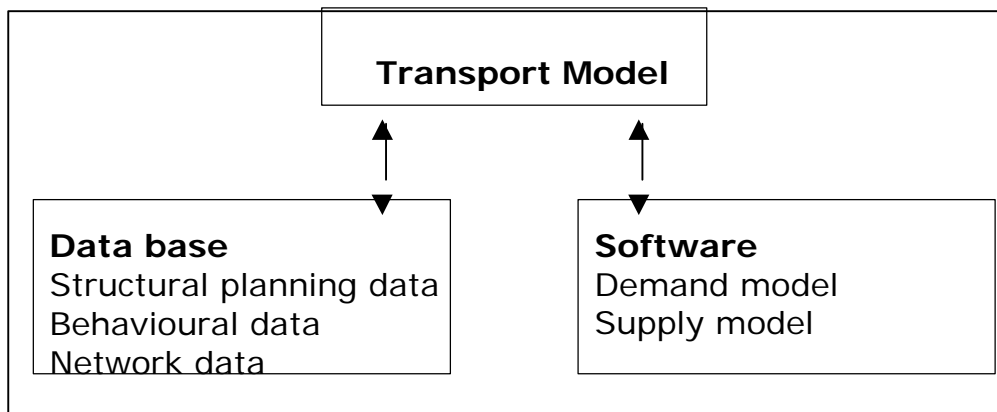


Figure 1.2: Transport Model Components

The application of the transport planning algorithms is generally separated into four elements:

- Trip generation
- Trip distribution
- Modal split
- Trip assignment

Figure 1.3 shows the interactions between these four elements. The first three elements, trip generation, trip distribution, and modal split define the demand model. This procedure, often known as synthetic modelling, has the capability of quantifying all movements in a study area. This is important for option appraisal in urban areas. The fourth element is the supply side defined by the public transport and highway networks. Assignment is the process by means of which travel demand is allocated to the networks to give traffic and passenger flows on routes.

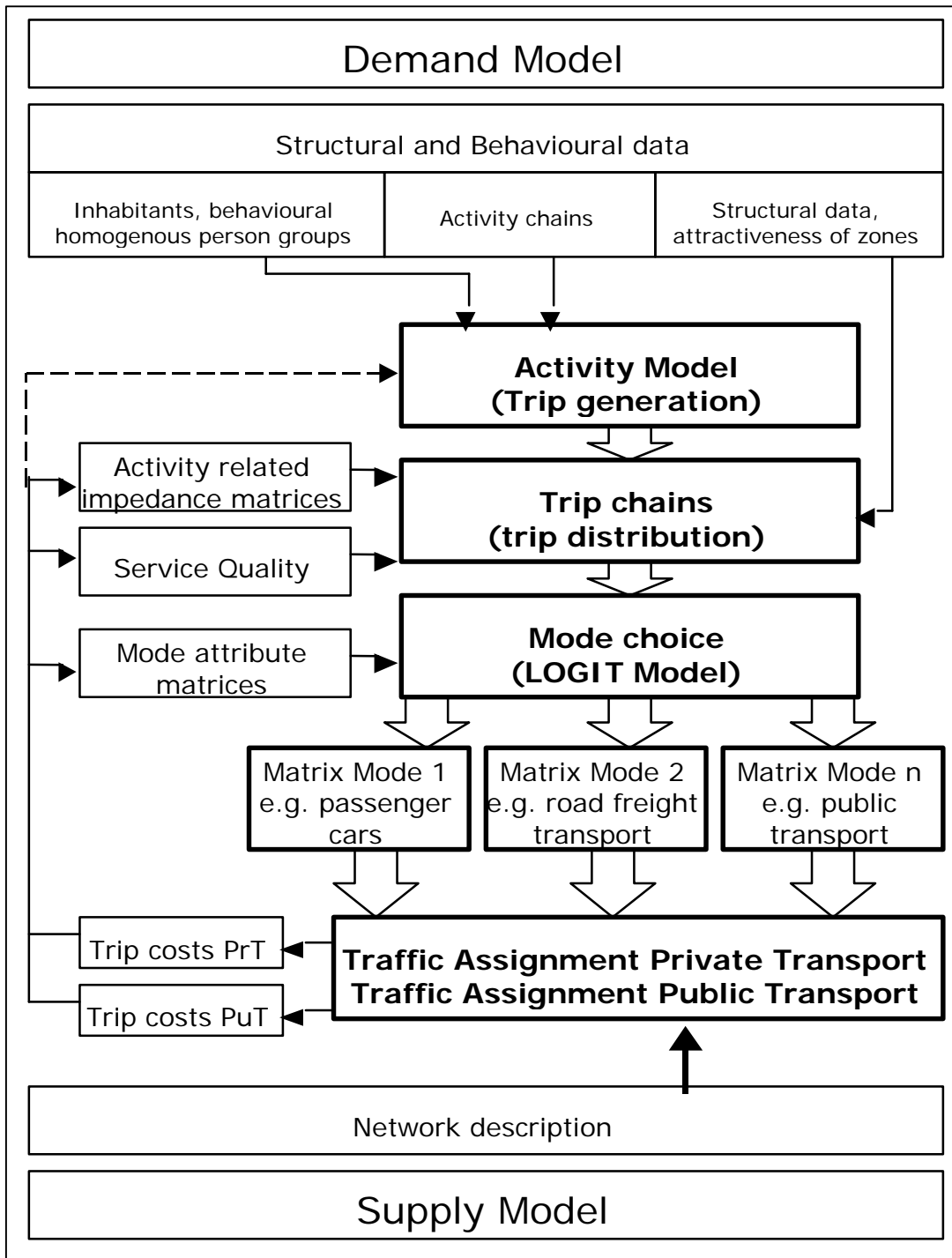


Figure 1.3: Transport Model Interactions

A key feature of the model is that demand is inextricably linked to supply in an iterative process in which the performance of the transport networks resulting from the "loading" of demand in the assignments is cycled back into further runs of modal choice, distribution. This is an equilibrium process which results in a "converged" set of results.

For most local studies, including the A453 MMS, it is neither practical nor necessary to model movements over the whole of mainland UK. Commonly, detailed and in this case synthetic modelling, is undertaken over an area where future changes are likely to have a significant influence on movements within the Study Area and the assessment of strategies/options. Longer distance/external movements may be included from surveys or from a more strategic modelling process such as the M1 Corridor Study.

The form of synthetic model adopted for the A453 study has the capability to reflect the different behaviour of different traveller groups ("behaviourally homogeneous groups") and their pattern of travel through an average day ("trip chains").

1.3 STAGES OF MODEL DEVELOPMENT

The transport modelling for the A453 multi-modal study includes the following main sequence of steps :

- Definition of the Modelling Area(s)
- Establishing the Demand Model Data Base
 - Preparing and Carrying Out Household Surveys
 - Analysis of the Household Surveys
- Processing of the Population Structural Data
- Development of an Integrated Network for Public and Private Transport
 - Data Bases for Network Modelling
- Calibration of the Demand Model
 - Person Travel Demand by Behavioural Group
 - Freight Demand
- Adding External Based Movements to the Model
- Assignment and Network Calibration
 - Public Transport
 - Private Transport
- Validation (base year 2000)
 - Matrices (Tables of trips)
 - Assigned flows
 - Journey times
 - Select link analysis

This report outlines all the stages of the development and validation of the transportation model at the year 2000.

These model development stages will be followed by

- Forecasting
- Do Minimum Case Forecasts
- Option/Test Case Forecasts
- Evaluation

These stages are covered in later study reports.

1.4 MODEL BASE

The model base is Annual Average Weekday Travel (AAWT) in the year 2000 (ie Monday to Friday average). This is represented by the preparation of assignments for 1 hour representing the morning (AM) peak period, evening (PM) peak period and an interpeak period.

The definition of these peak periods is as follows:-

- 60% of the travel demand between 7 and 9 am, and
- 60% of the travel demand between 4 and 6 pm.

The interpeak hour has been defined as

- 33% of the travel demand between 11am and 2pm.