

Many of the problems facing urban societies are complex and not altogether obvious: traffic and transport problems are clearly prominent, confronting the public on a day-to-day basis. There is a wide divergence of opinion on how to solve the 'urban transport problem', but the aim of transport planning is to search for the best solutions given the resources available.

Transport planning, as a professional activity, can be justified to the community only if problems and solutions are considered in a rigorous way, including a detailed analysis of all relevant factors. This chapter provides an introduction to the fundamentals of transport planning and argues strongly for the need to understand how a city works in terms of the interaction between land use, traffic and transport.

The systems approach provides the planners with a suitable framework for pursuing these ideals. In the first section, land use, traffic and transport are defined as a 'system' and the steps of the transport planning process are outlined. The next two sections explain how the system 'works', first following a descriptive approach, then following a quantitative approach. Systems modelling is best explained with simple worked examples and these are presented in section four. The final section indicates the application of systems modelling in the preparation of alternative plans.

1.1 A Systems Planning Framework

The major steps that make up an orderly approach to planning are stated in Figure 1.1. This framework is perfectly general, and has found numerous applications in planning (McLoughlin, 1969; Chadwick, 1978). A clear statement of the problem is necessary before the purpose or objectives of a study can be specified. Steps 2 and 3 suggest that an understanding of how any system works is based on reliable data and analytical methods. Quantitative methods are used in step 4 to forecast how the system might evolve in the future. The uncertainty surrounding the future is recognised in step 5 by examining alternative plans. Step 6 specifies the criteria and procedures for choosing the best plan.

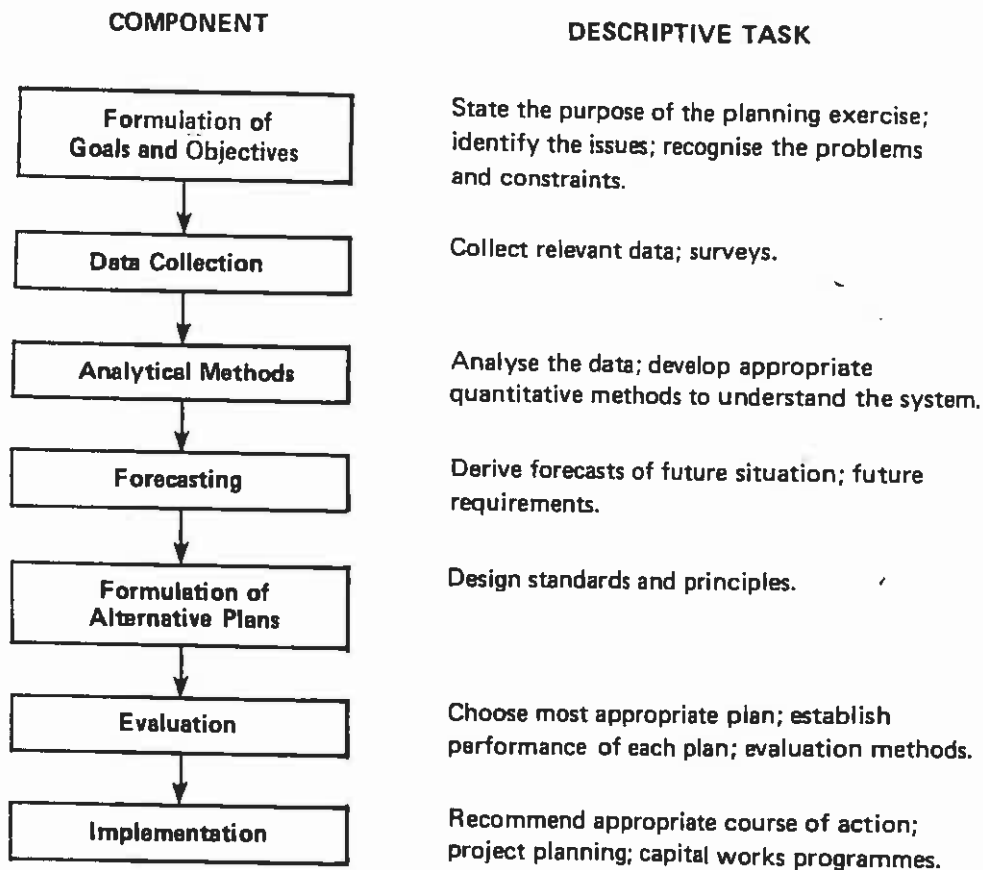


Figure 1.1: The Systems Approach

Finally, plan implementation requires resources and political support. This linear progression is a little misleading, because the systems approach contains feedback loops from one step to another to ensure internal consistency.

The word 'system' is often used loosely, but it does have a precise scientific meaning. A system is 'a set of objects together with relationships between the objects' (Hall and Fagen, 1956, p. 18). This is based on the observation that in any organised system of component parts (objects) the behaviour of any one part has some effect on or interaction with other parts. In transport analysis, the system is comprised of three major objects or components:

- (a) *Land Use*—deceptively simple words that convey a complexity of meanings. In this book, they are used very broadly to mean (i) the legal use to which the land is put (residential, industrial, etc.);

- (ii) the type of structures built on the land (houses, factories, schools); and (iii) measures of the intensity of social and economic activities that take place on the land (population, employment, factory output, etc.).
- (b) *Transport Supply*—forms the physical channels or links between land use. It includes (i) a variety of transport modes such as footpaths, roads, tramways, bus routes and railways; and (ii) the operational characteristics of these modes, such as travel times, costs or service frequencies.
- (c) *Traffic*—is the joint consequence of land use *and* transport supply. Pedestrian and vehicular traffic represents the horizontal movement of people and goods over the transport network.

1.2 Understanding the System—a Description

Understanding how the system works is closely tied to the unravelling of the interactions between land use, traffic and transport supply. Five concepts are fundamental:

- (a) accessibility;
- (b) traffic generation;
- (c) spatial pattern of traffic;
- (d) selection of transport mode and route; and
- (e) traffic on the transport network.

1.2.1 Accessibility

Accessibility is the concept which combines the geographical arrangement of land use and the transport that serves these land uses. Accessibility is a description of how conveniently land uses are located in relation to each other, and how easy or difficult it is to reach them via the transport network. Figure 1.2 presents a simple scheme for classifying accessibility. When many land-use activities are located close together and the transport connections are good, high accessibility is achieved. Conversely, when activities are located far apart and the transport connections are poor, low accessibility results.

Different geographical locations do not have the same accessibility because land-use activities are distributed unevenly and transport is neither of uniform coverage nor quality. Some land uses have a dispersed pattern (e.g. dwellings), others are more clustered (e.g. shops), and a

