Systems Approach to transport Planning

Introduction

The processes forming part of the systems approach to transport planning consist of various interconnected steps as shown in Fig. 1 below:

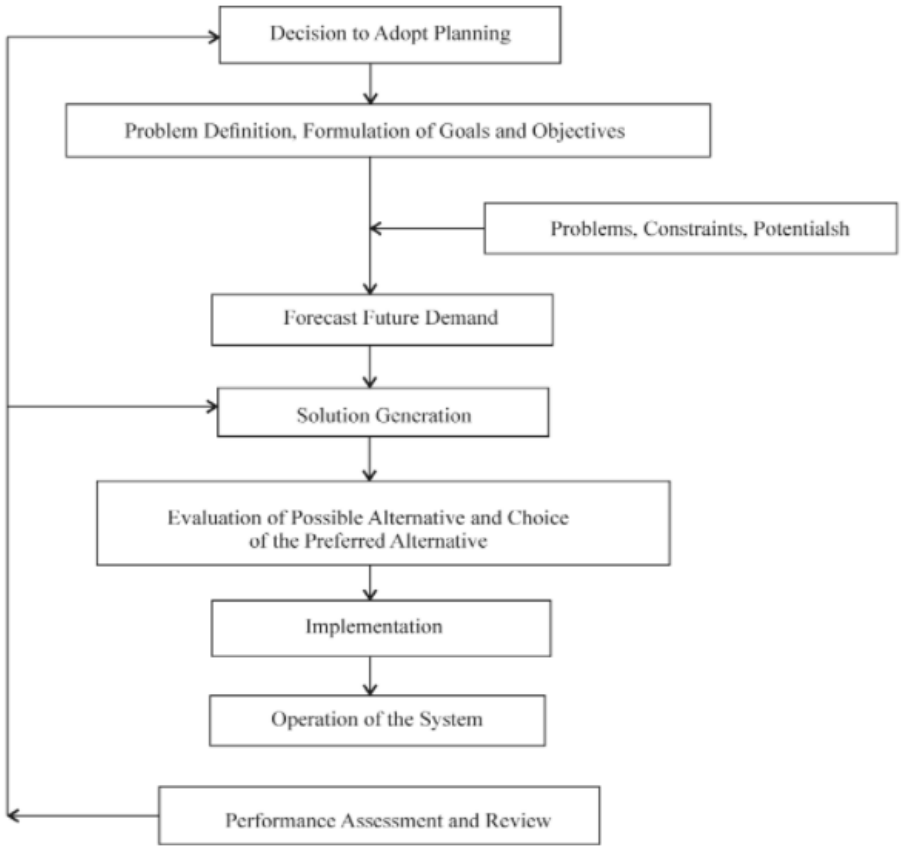

Fig 1: Systems Approach to Transport Planning

To start the transport planning process, the goals and objectives must be clearly understood. Some of these could be:

1. The transport plan should be in conformity with the nation's overall economic development plan. For example, the Five Year Plans give broad guidelines on development of the transport infrastructure and these should be respected.
2. The transport plan should be a harmonious mix of various alternatives and modes so as to give the maximum benefits such as economy in cost of operation, conveniences, comfort, safety and speed.
3. Environmental considerations and sustainability should be given importance.
4. Transport development should be in step with the development plans for other sectors such as agriculture, industry, mining, forestry, employment generation and export/ import trade.

5. A balanced development of urban settlements and rural habitations should be aimed at.
6. Conservation of energy should be given high priority in the plans.
7. Public transport should be given priority over use of personalized vehicles.
8. Pedestrians and cyclists should get adequate attention.

Time Horizon for Planning

Short-term plans having a time horizon of 5 years or less are intended to give quick relief and remove bottlenecks.
Examples are:

- Improvement of junctions,
- Signalization,
- Providing dedicated cycle tracks and "one-way street" operation.

Medium term plans have a period of about 10 years and involve substantial outlays on engineering improvements.
Examples are:

- Provision of pedestrian and cattle subways,
- Construction of grade separators,
- Provision of off-street parking facilities and construction of bypasses.

Long-term transport plans have a time horizon of about 20 years. They are also known as Master Plans, Strategic Plans and Comprehensive Plans.

States in the Transport Planning Process

These are depicted in Fig. 2.

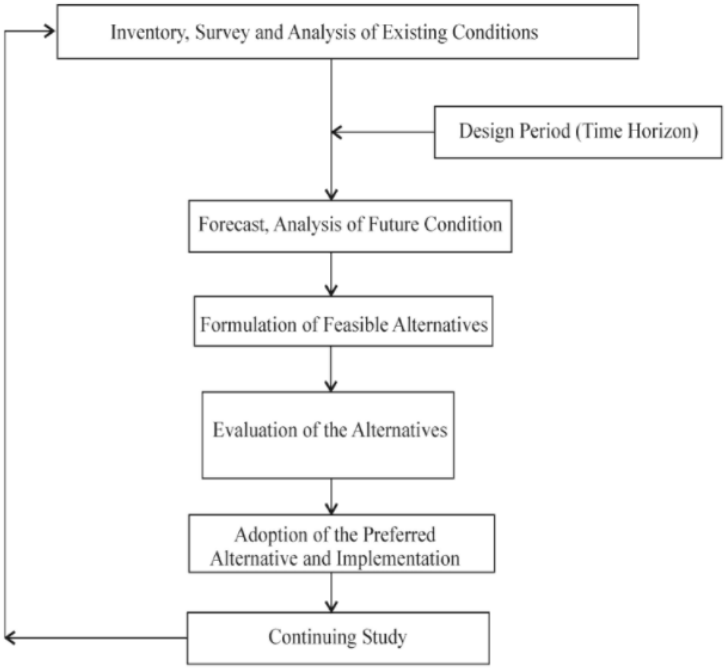

Fig 2: Stages in the Transport Planning Process

The stages involved in the Transport Planning Process are:

1. Inventory, survey and analysis of existing conditions
2. Forecast, analysis of future conditions
3. Formulation of feasible alternatives
4. Evaluation of the alternatives
5. Adoption of the preferred alternative and implementation
6. Continuing study

Inventory, Survey and Analysis of existing Conditions

The above consists of three different tasks:

(i) Collection of data on traffic
(ii) Collection of data on existing transport facilities
(iii) Inventory of land-use and socio-economic data of residents

Data on traffic to be collected includes:

(i) Origin and Destination of journeys
(ii) Traffic volume on various links including vehicle class, hourly variation, daily variation and any seasonal variation that can be expected
(iii) Data on movement of goods
(iv) Data on movement of public transport (Buses, Metro, LRT)
(iv) Data on movement by railways (vi) Parking characteristics (supply, usage, duration and method of charging)

Data on existing transport facilities include:

(i) Inventory of streets (width, surface type, control devices, location of utilities, drainage, pedestrian and cyclist facilities)
(ii) Travel time by different modes
(iii) Public transport facilities like bus terminals, Metro stations, their operating speeds, schedules, capacity, headways, passengers carried
(iv) Parking Inventory (on-street and off-street)
(v) Accident Data
(vi) Data on railway stations, airports, port and harbor facilities
(vii) Pollution data (noise, air-quality)

Inventory of land-use and socio-economic data of residents includes:

(i) Land-use type (residential, industrial, commercial, educational, recreational etc.)
(ii) Vacant land
(iii) Zoning laws in operation
(iv) Population statistics (from census data)
(v) Household structure such as family size, sex, car-ownership, family income)
(vi) Employment pattern (vii) School and college attendance

The data collected is analyzed to determine any quantifiable relationships between travel pattern and land-use and other socio-economic characteristics of the household.

Transportation Survey

This activity is crucial to the transport planning process, as the data forms the basis for formulating plans. Since the survey costs are high, proper organization of the work and following guidelines evolved by various organizations are very important.

The study begins with the definition of the study area, which can be at the national, regional or local level. For planning at the city level, it is necessary that the area not only covers the existing city limits but should include areas of possible future growth. The boundary of the study area is an imaginary line known as the "external cordon", and should be continuous and should intersect roads where it is safe and convenient to carry out traffic surveys.

The study area is then sub-divided into "zones", so that the data from a zone reflects the same land-use (for example: residential, industrial, commercial, educational, recreational etc) and the average characteristics of individual households. The zones are later used for associating the origins and destinations of travel. Zones within the study area are called "internal zones" and those outside the study area where trips can originate and terminate are called "external zones". Guidance may be taken from the zoning adopted by other bodies, such as Population Census. The boundaries of zones should match with natural barriers such as canals, rivers etc.

The movements that are possible between zones are represented in the figure below: Fig 4: Movements possible in a transportation survey

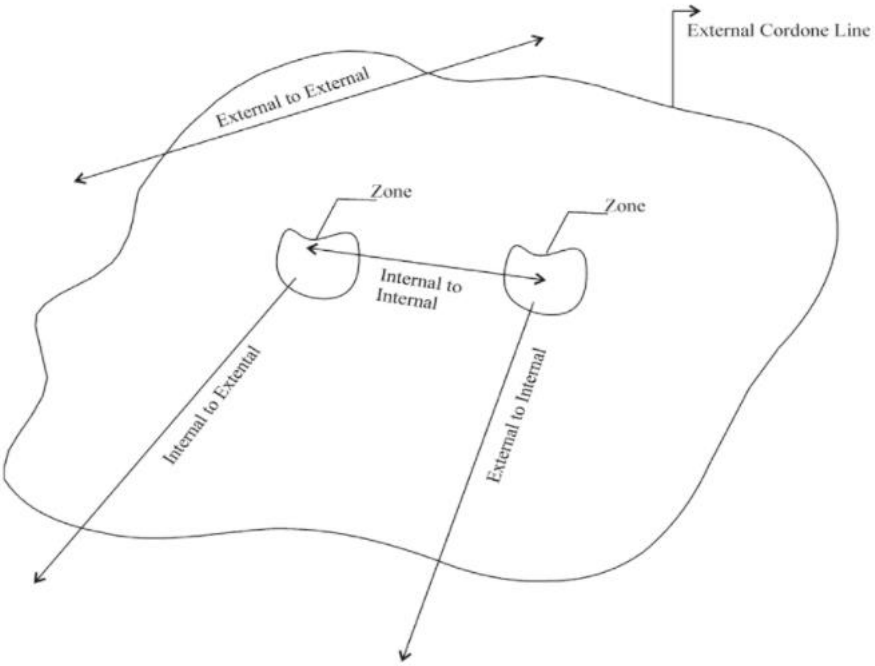

Fig 4: Movements possible in a transportation survey.

The types of surveys that are usually carried out are:

(ii) Commercial vehicle survey
(iv) taxi survey
(v) public transport survey
(vi) road-side interview survey
(vii) post-card questionnaire survey
(viii) registration number plate survey (viii) tag survey

Population of Study Area Sample Size

Under 50,000	1 in 5 households
50,000–150,000	1 in 8 households
150,000–300,000	1 in 10 households
300,000–500,000	1 in 15 households
500,000–1,000,000	1 in 20 households
Over 1,000,000	1 in 25 households

Standard forms should be evolved and the data collected should be capable of being coded in a computer for quick analysis.

Public Transport Survey

This survey is conducted at roads intersecting a cordon line. The buses are stopped and the passengers are interviewed and information on their journey and socio-economic characteristics is collected. Alternatively, a prepared questionnaire is handed out with a request to complete the form and send it by post. Similar surveys can also be conducted on passengers travelling in a train.

Inventory of Transport Facilities

The inventory of existing transport facilities should cover:

1. Inventory of streets:
(i) Layout (with a map);
(ii) Length;
(iii) Width of street (carriageway, footpath, median, cycle track);
(iv) Capacity;
(v) Traffic signals

2. Inventory of bus transport:
(i)Number of buses;
(ii)Routes;
(iii)Location of depots and terminals;
(iv)Schedules;
(v)Operating speeds;
(vi) Passengers carried;
(vii) Fare structure.

3. Inventory or fail-based facilities:
(i) Sub-urban rail system, with routes, stations;
(ii)Metro;
(iii)LRT;
(iv) Number of passengers carried;
(v) Fare structure;
(vi) Schedules;
(vii) Operating speed.

4. Accident Data for the past 3 years:
(i) Location;
(ii)Number of accidents;
(iii)Serious Injuries;
(iv) Minor Injuries

5. Pollution Data:
(i)Noise levels recorded;
(ii) Air-quality levels recorded