DISTILLATE

PROJECT F

Appendix D

Encouraging public transport use through land use planning

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Encouraging public transport use through land use planning

(Land use instruments group: policy instruments to influence where homes, workplaces, shops and other facilities are located)

1. Description

Definition

Encouraging public transport use through land use planning involves the planning of new land development and the management of existing land in such a way as to:

- improve conditions for the efficient operation of public transport,
- locate land uses close to public transport services which serve them, and
- increase the demand for public transport, particularly by encouraging mode change from the private car.

This is normally done by increasing development densities or by organising the location and mix of land use types, or both.

This instrument is closely related to the instrument ‘land use densities and mix’.

How can land use planning encourage the use of public transport?

Several studies indicate that if development is planned specifically to encourage public transport there can be a significant reduction in per capita car travel. Public transport nodes, including rail stations, serve as a catalyst for more accessible land use by creating higher density, mixed-use, pedestrian-orientated centres. Households living in such neighbourhoods tend to own fewer cars, and people working in such areas are more likely to commute by alternative modes (partly because they do not need a car for lunchtime errands).

These factors result in higher levels of public transport commuting, increase nonmotorised travel for non-commuting trips (such as shopping and trips to school), and reduce car travel. As a result of these various factors, there tends to be a "leverage" to much greater reductions in vehicle travel than that which is directly shifted from car to public transport. It has been estimated that each passenger-kilometre of rail travel appears to be associated with a reduction of 5 to 7 kilometres of car travel through these various mechanisms.

A number of studies have concluded that public transport service can facilitate land use development patterns, but is only one of many factors, and will not cause significant land use or travel behaviour change by itself. If an area is ready for development, improved transit service (such as a rail station) can provide a catalyst for higher density development and increased property values, but it will not by itself stop urban decline or change the character of a neighbourhood. (Material in this and the previous two paragraphs is from studies by Cambridge Systematics (1994), Newman and Kenworthy (1998) and Badoe and Miller (2000), all as summarised by VTPI, 2002).

In practical terms, this means that there are two specific but inter-related ways in which land use planning can encourage the use of public transport:

- by locating trip origins and destinations near public transport routes;
- by ensuring trip densities are sufficiently intense to establish an efficient service.

The general principle is thus to ensure that trip origins and destinations are arranged in nodal or linear patterns which are compatible with the demand patterns needed to ensure that public transport services, both bus and rail, are viable and efficient.

It is important to note that the effects of land use planning on public transport use are likely to be greatest where sufficiently strong regulation of land use is in place.

In its guide 'Shaping Up', the state government of Queensland (Government of Queensland, undated) offers guidance on the design of public-transport-friendly development, in the form of idealised 'how to do it' and 'how not to do it' examples.

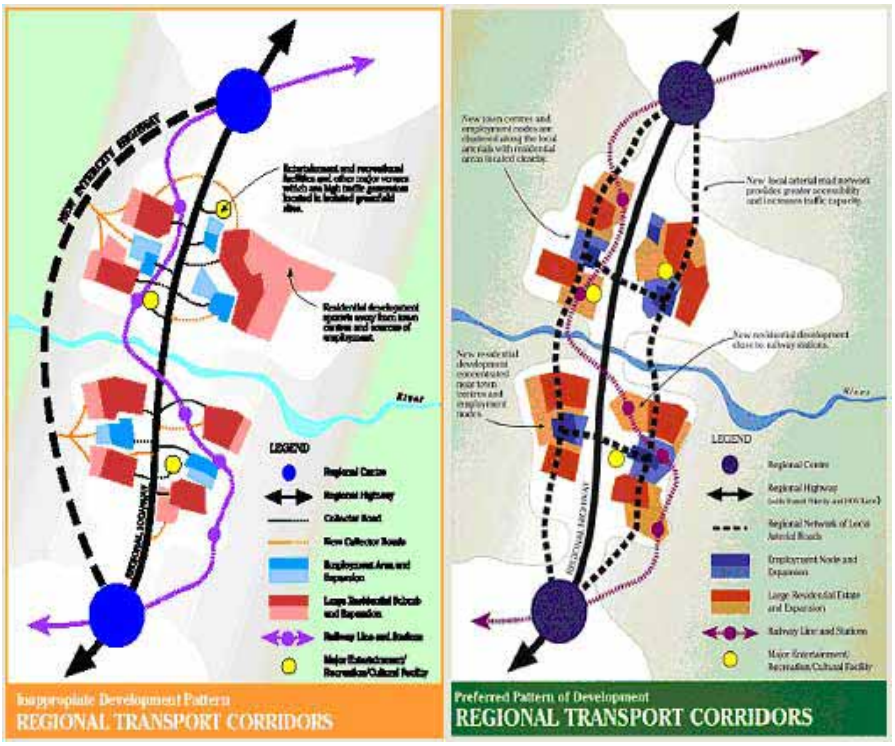

Figure: an example from ‘Shaping Up’ (‘preferred’ plan on right)

The Guide describes the principles involved in the design of transport corridors for improved public transport as follows:

> "Urban growth often takes place along corridors created by major highways or railway lines. The way in which these transport corridors are planned and designed at the regional level can have major implications for public transport use. Corridor planning and the distribution of land uses also impacts significantly on public transport costs, operational efficiency and funding requirements".

The Guide suggests the following approaches to good practice:

- Public transport is more cost effective and efficient if organized along a linear corridor with highly accessible activity nodes, so development should be concentrated along major corridors based on a main 'line haul' public transport route (with feeder routes wherever appropriate).
- Major activities, employment nodes and higher density residential areas should be encouraged near stations, significant stops and interchanges along public transport routes (preferably within 800 metres of a railway station).
- Urban development should be compact, concentrated along public transport corridors, and focused around key business and activity nodes which incorporate public transport interchanges.
- The overall road network should ensure that 90 per cent of the urban area is within 400 metres of public transport stops located on the arterial and collector road network. (This also supports faster public transport services and enables stops to be 250 metres apart).
- A mix of business and residential land uses should be concentrated at clearly defined nodes located at the intersection of local arterials where 'line haul' public transport services converge. This concentrates trips at a discrete number of locations which allows multi-purpose trips and increases public transport passenger loadings.
- Public transport interchanges should be integrated into these mixed-use business and activity nodes. This increases public transport use and enables easy and convenient passenger transfers between bus, rail and taxi services." ('Shaping Up': Government of Queensland)

It should be noted that large scale park and ride facilities can conflict with accessibility and liveability benefits: a railway station that is surrounded by large parking areas and by main roads with heavy traffic is unlikely to provide the best environment for residential development or for pedestrian access. As part of land use planning, it is thus important that such facilities be properly located, designed and managed to minimise such conflicts.

2. Assessment

Why use land use planning to encourage public transport use?

From the traveller's point-of-view, a journey starts with a point of origin and finishes with a point of destination. If there is a need for long walking distances at either end, lengthy waiting in exposed places, unpredictability of a seat, changing routes with the prospect of waiting and then losing one's seat, then even the most appealing form of public transport cannot compete with the car, unless passengers are captive (i.e. have no access to a car for the journey). From the public transport operator's point-of-view, the provision of public transport is costly and cannot be efficient unless there is guaranteed patronage. In low-density areas, a public transport-friendly service cannot be guaranteed, certainly not at off peak periods.

Public transport use may be encouraged through land use planning, by locating trip origins and destinations near public transport routes and ensuring trip densities are sufficiently intense to establish an efficient service. Conversely, new or improved public transport routes and services should be linked with existing or planned concentrations of trip origins and destinations.

Demand impacts of this instrument

Increasing development densities and altering the development mix to encourage public transport can have an effect on demand in several ways:

- Encouraging public transport use by improving conditions to enable public transport to operate more efficiently;
- Reducing walking and waiting times for public transport;
- Reducing the need for motorised travel (especially private motorised travel) by ensuring origins and destinations are closer together (dealt with separately under 'development densities and mix');

It is the demand impacts of this instrument can be as follows, all of which would reduce vehicle kilometers travelled:

Change of destination: Use of public transport will cause the 'best' destinations to undertake particular activities to be re-appraised, making shorter journeys possible;

Fewer trips: Better public transport accessibility will encourage shift to walk or cycle (destinations are now closer)and cause the number of car trips to be reduced;

Change mode: Change of mode to public transport is expected to occur (the main objective of the instrument) and cause the number of car trips to be reduced;

Sell the car: Better public transport will make the ownership of a car (or a second car) less important. Also, where the instrument makes a greater range of destinations available within a short distance, a car may become less necessary.

Time scale for demand impacts

Though appropriate land use changes can potentially be a very effective way of promoting a modal shift to public transport, land use instruments are also the ones which take the longest to implement and thus to bear fruit. The greatest opportunities for change are in the circumstances of entirely new development, when land use densities and mixes may be specified in advance. Even in these conditions however, results will take years to materialise.

Level of response to this instrument

The amount of mode shift to public transport in response to land use instruments will depend on:

- the scale of the land use changes;
- the design and type of the changes, in terms of density and mix;
- the speed with which the changes are effected.

One study of travel patterns in a North American suburb found the elasticity of transit (public transport) mode split with respect to land use density to be +0.10 to +0.51, depending on type of land use. This means that each 1.0% increase in density increases public transport use by 0.1-0.51% (VTPI, 2002)

Supply impacts

The direct and indirect supply implications of this instrument are as follows:

- Higher density and appropriately planned development should improve conditions for public transport and thus encourage greater public transport supply;
- There will not be an increase in the supply of road space from land use instruments per se;
- If the land use policies are implemented on a regional scale, there could be a nett reduction in the need for road space (compared with doing nothing) in line with the decrease in the amount of travel;
- Reduction in private motorised travel could encourage an increase in the supply of cycle and pedestrian facilities;
- Any increase in public transport use and reduction in car ownership would reduce the need for residential parking supply;
- Increase in the use of public transport would reduce the need for non-residential parking supply.

Financing requirements

Though the costs of new development are considerable and land use solutions are, at their most extreme, the most expensive of the policy instruments contained in these pages, the cost usually falls in the main on the private sector (through investors, developers and occupiers). However, local authorities may have to bear some additional indirect costs (provision of extra traffic control, parking, public transport interchanges, etc).

Though it is difficult to cost this instrument, the range of possibilities being so large, some comments on cost can nevertheless be made.

Firstly, regarding individual developments, it has been estimated (Lucas, Marsh and Jones, p.19) that if development conforms to a standard to reflect sustainable development, construction costs will rise typically between 5 per cent and 20 per cent. Unfortunately the proportion of this extra cost related solely to the planning needed for better public transport is not known but it is likely that there would be some additional cost.

The main way of financing the extra costs of achieving a transport-friendly development policy, particularly where the extra cost would normally fall on the local authority, is through developer contributions (including commuted payments).

VTPI (2002) refers to work by Kockelman (1997), Lewis and Williams (1999), Diaz (1999) and Weinberger (2001), who indicate that public transport friendly land use planning can often increase property values in an area. As a result, such projects can often be funded through "value capture" strategies, in which the costs of improvements are paid through the additional tax revenue or a special local tax assessment in the affected area.

If development costs are looked at region-wide, an alternative picture on costs, in which costs are actually lower overall, may occur. This is illustrated in the following table (costs in Canadian dollars) (VTPI, 2002)

Form of development	**Spread**	**Nodal**	**Central**
Residents per Ha	66	98	152
Capital Costs (billion Canadian $ 1995)	54.8	45.1	39.1
Op & Maint Costs (billion C$ 1995)	14.3	11.8	10.1
Total Costs	69.1	56.9	49.2
Percent Savings over status quo option	0	17%	29%

Table: Estimated 25 Year Public Costs for Three Development Options (Source: Blais, 1995)

The table shows substantial public savings for higher density land use patterns associated with transport-friendly development.

3. Evidence on performance

Though there are many case studies of schemes intended to encourage public transport use by land use planning there are few, if any, case studies which have quantified the real effect. The main reason for this is the difficulty of comparing before and after conditions for an instrument that takes so long to implement and for effects to be felt.

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