The role of transport planning in the 90s

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Abstract:

Transport planning studies in Australia have had varying degrees of success. Lack of success can, in some cases, be traced to an inadequate understanding of several key issues. This paper discusses the interplay between these issues and how they relate to the characteristics and components of a successful study.

It is suggested that successful transport planning in the 1990s will depend on maintaining a balance between the various components of the planning process. Examples where this balance has and has not been achieved are discussed.

The paper concludes by defining those issues most likely to confront transport planners in the 1990s.

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Introduction

Transport planning studies in Australia over the last 25 years have had varying degrees of success. Lack of success may be traced, at least in some cases, to inadequate definition and understanding of:

- why the study is being undertaken
- the relevant questions to ask
- the scope of the answers being sought
- the available analytical techniques and tools

This paper addresses these issues through a review of available analysis techniques and their use in previous transport planning studies in Australia.

Why plan?

One definition of the need for planning is provided by Cook et al (1989):

> "The essential purpose of transportation planning is to improve conditions for the flow of goods and people. Transportation planners should examine rights-of-way, vehicles, and methods of operation, and its effect on the environment."

However, transportation and the adequacy or otherwise of transportation planning has wider impacts in associated sectors such as tourism, employment, export pricing, the environment, as well as in our cities and the Australian economy in general.

Over the past decade, Australia's level of economic productivity has fallen below that of other OECD countries. While a number of factors have been identified as contributing to this fall, The Australian Roads Outlook Report (NAASRA, 1987) suggests a number of ways through which increased levels of road funding could contribute to a stronger national economy. As the first step to maximising the potential benefits of increased funding, appropriate transportation planning can help identify those projects or strategies that will provide the greatest community benefits. In many, although not all, cases this may equate to those projects which yield the highest economic return.

Recent organisational change in the various state road and transport authorities in Queensland, Victoria and New South Wales has reinforced the need for a unified approach to transport planning, at least within each state. Now more than ever, road and highway based projects compete for available funds against rail and public transport based projects.

In addition, expenditure in state transport portfolios must compete with expenditure in other areas of government responsibility. In this environment, a comprehensive and believable approach to transportation planning is vital to provide state transport authorities, governments and the community with a clear understanding of the benefits and costs of transport projects. The adoption of clear and defensible analysis techniques will provide planning authorities with a rigorous basis for planning and developing the transport system. Without such clear and defensible analyses, not only will funding for transport projects not be forthcoming, but the community may elect to spend the available funds elsewhere, in response to louder or more articulately voiced arguments.

There are of course, other reasons for planning. Young (1990) identifies basic changes in the fabric of Australian society as significant in their impact upon land use-transport interaction. Transport planning can provide an insight into how changes of this type impact upon our community. In an environment of change such as this, soundly based transport planning can help shape the future of our cities.

Characteristics of a successful plan

While measuring the success or otherwise of particular transport plans and policies may be difficult (Young, 1990), Neilson (1990) suggests that it can be measured against six evaluation criteria:
Operational effectiveness: Will the programme improve transport operations?
Technological feasibility: Can it be easily introduced?
Economic viability: Is the programme a good economic investment?
Financial feasibility: Are funds available or can they be generated?
Environmental sensitivity: Does the programme take into account and provide for environmental needs?
Political acceptability: Will it achieve political and community acceptance?

While the first three characteristics listed above are important in terms of a plan's technical correctness and achievement of goals, the last three are crucial to the success of the planning process. Commonly, the last three characteristics determine the scope and detail required of the study. This point is reinforced by Hensher (1978):

> "The Sydney Strategic Study conducted in 1975 is one amongst many examples of thousands of dollars allocated to produce a few numbers which have never been used in any policy formulation, and which were arrived at after much frustration with the transportation study data which, because of its structure and narrowness, limited the transport options."

Through the early identification of financial, environmental and political limits, transport plans and policies can be developed to maximise their potential for success. To do so requires an appreciation of the current economic and political climate of the region under review.

For example, a low key, low cost alternative with marginal returns may have a greater chance of implementation than a higher cost alternative with greater returns, but more substantial impacts. In many cases, the low key alternative represents a better choice as it maximises the opportunity for something positive to be achieved.

Components of a successful plan

The basic components required for the successful development and implementation of a transport plan are:

- analysis methods
- data
- analysis skills
- political support

It is crucial to the success of a plan that the demands of the analysis methods employed do not exceed the supply of data, analysis skills or political support. Accordingly, an understanding of the last three components should be an intrinsic part of the choice of analysis method. This has not always been the case.

The four components are discussed below, through attention to some previous Australian transport planning studies. Table 1 lists some of the transport planning studies conducted throughout Australia between 1964 and 1989. While this list is not exhaustive, it does provide a broad perspective of our transport planning history.

Table 1 Transportation study characteristics

Study	Year	Conducted By	Conducted For	Base Year	Fut Year	Surveys Conducted HI	RI	TC	TT	CV	TX	PT	LU	NP	Analysis Method 1	2	3	4	5	6	7
Hobart Area Transportation Study	1964	Wilbur Smith & Associates	Department of Public Works Hobart City Council	1964	1985	*	*			*					?						
Brisbane Transportation Study	1965	Wilbur Smith & Associates	Main Roads Department Brisbane City Council	1960	1981	*	*	*	*	*		*	*		*	*					
Metropolitan Transportation Study Travel in Melbourne	1965	Wilbur Smith & Associates Len T Frazer & Associates	Metropolitan Transport Committee	1964	1985	*	*	*	*	*	*	*			*	*					
Toowoomba Transportation Study	1966	Main Roads Department	Main Roads Department Toowoomba City Council	1964	1985	*	*			*	*				*			*			
Townsville Transportation Study	1966	Rankine & Hill	Main Roads Department Townsville City Council	1965	1985	*	*	*	*	*					*		*				
Metropolitan Adelaide Transportation Study	1966	De Leuw Cather & Co Rankine & Hill Alan M Voorhees & Co	Highways & Local Government Department Adelaide City Council	1965	1986	*	*				*	*			*	*					
Redcliffe Transportation Study	1968	Rankine & Hill	Main Roads Department Redcliffe City Council	1967	1987	*	*	*	*	*					*	*					
Launceston Area Transportation Study	1968	PG Pak Poy & Associates	Department of Public Works	1967	1987	*	*	*	*	*	*				*		*				
Perth Regional Transportation Study	1970	Alan M Voorhees & Associates Harris Lange-Voorhees De Leuw Cather of Australia Maunsell & Partners	Main Roads Department	1966	1974 1989	*		*				*			*	*					
Sydney Area Transportation Study	1971	De Leuw Cather of Australia Public Transport Commission Department of Motor Transport	Public Transport Commission Department of Motor Transport	1970	1980 1990 2000	*	*	*		*	*				*	*					
Ballarat Transportation Study	1971	Harris Lange-Voorhees	Country Roads Board	1970	1991	*	*			*	*				*			*			
Bendigo Transportation Study	1972	Rankine & Hill	Country Roads Board City of Bendigo	1970	1991	*	*	*		*	*	*	*		*		*				
Rockhampton Transportation Study	1972	Rankine & Hill	Main Roads Department Rockhampton City Council	1971	1991	*	*			*	*		*		*	*					
Cairns Area Transport Study	1976	Main Roads Department	Main Roads Department Cairns City Council Mulgrave Shire Council	1975	1990			*					*	*	*			*	*		

Table 1 (cont.)

Study	Year	Conducted By	Conducted For	Base Year	Fut Year	Surveys Conducted HI	RI	TC	TT	CV	TX	PT	LU	NP	Analysis Method 1	2	3	4	5	6	7
Bundaberg Traffic Investigation	1977	Main Roads Department	Main Roads Department Bundaberg City Council Woongarra Shire Council Gooburrum Shire Council	1975	1981 1990			*					*		*			*	*		
Townsville Transportation Study Review	1979	Main Roads Department	Main Roads Department Townsville City Council Thuringowa City Council	1976	1985 1995			*					*	*	*	*			*		
Gold Coast Area Transportation Study	1980	Main Roads Department	Main Roads Department Gold Coast City Council Albert Shire Council	1976	1983 1993	*	*			*	*	*			*		*				
Noosa Shire Traffic Study	1981	John Wilson & Partners	Noosa Shire Council Main Roads Department	1980	1990			*						*							*
Sunshine Coast Road Network Study	1984	Main Roads Department	Main Roads Department Landsborough Shire Council Maroochy Shire Council	1982	1988 1993		*	*												*	
Ipswich Road Network Study	1986	Main Roads Department	Main Roads Department Ipswich City Council	1984	1991 1996			*											*		
Mackay Road Network Study	1987	Main Roads Department	Main Roads Department Mackay City Council Pioneer Shire Council	1985	1996		*	*												*	
Gold Coast Area Transport Study Update	1987	Denis Johnston & Associates	Main Roads Department Gold Coast City Council	1986	1991			*	*						*			*	*		
Cairns Area Transport Study Update	1989	Main Roads Department	Main Roads Department Cairns City Council Mulgrave Shire Council	1986	1996 2006	*	*	*						*	*			*			
Townsville & Thuringowa Road Network Study	1989	Main Roads Department	Main Roads Department Townsville City Council Thuringowa City Council	1986	1996 2006	*	*	*							*			*			
Maryborough Road Network Study	1989	Main Roads Department	Main Roads Department Marybrough City Council	1988	1996		*	*							*			*	*		

Table 1 (cont.)

Study	Year	Conducted By	Conducted For	Base Year	Fut Year	Surveys Conducted HI	RI	TC	TT	CV	TX	PT	LU	NP	Analysis Method 1	2	3	4	5	6	7
Bundaberg Traffic Study	1989	Beard and Holland	Main Roads Department Bundaberg City Council	1988	1998			*						*					*	*	*
Brisbane Traffic Study	1989	Bornhorst Ward Veitch	Main Roads Department Brisbane City Council	1986	2006	*	*	*							*		*		*		

Surveys Conducted :

HI - Home Interview
RI - Roadside Interview
TC - Traffic Count
TT - Travel Time
CV - Commercial Vehicle
TX - Taxi
PT - Public Transport
LU - Land Use
NP - Number Plate

Analysis Method :

i - Traditional Four Step Model
2 - Detailed Public Transport Forecasts
3 - Aggregate Public Transport Forecasts
4 - Public Transport Ignored
5 - Using Transferred Relationships
6 - From Observed O/D Data
7 - From Observed Traffic Count Data

Analysis methods

An Australian perspective on the changing approach to transport modelling is provided by Richardson (1990). He summarises the local experience into the following five eras:
The aggregate modelling era, which matches the classical transport planning period.
The disaggregate travel demand modelling era, which concentrated on the utility characteristics of the goods, rather than the goods themselves.
The behavioural travel choice modelling era, which attempted to model individuals perceptions of alternatives and their ensuing choices.
The activity modelling era, which was responsible for the development of the Household Activity Travel Simulator model.
The microcomputer revolution, which has been responsible for the return of the traditional four step modelling approach, as well as vast improvements in the way land use and transport related data are displayed and analysed.

The extent to which practical analysis efforts have mirrored these changes in Australia is limited. There are few examples of dissaggregate or behavioural models being used for transport infrastructure programme development purposes.

Table 1 identifies the shift in transport modelling away from the all encompassing models of the 1960s and 1970s, which examined both road and public transport demand in detail, towards purely road travel demand models.

Even the study names changed from 'Transport(ation)' studies to 'Road Network' or 'Traffic' studies as part of this shift. Road Network or Traffic studies, as their name implies, rarely examine the demand for public transport in any detail, even at an aggregate level.

Thus, while the traditional four step transport modelling approach has had, and still maintains, wide acceptance in Australia, it is rarely used in the detailed analysis of public transport travel demand. Some would argue that this is a good thing:

> "It should perhaps be noted that the complete land-use /transportation model is a cumbersome, time-consuming and expensive device, and is not always well-suited to some of the problems for which it has been used." (Langdon, 1981)

There are also numerous examples where transport plans have been prepared without the use of traditional computer based modelling techniques. Such studies are typically completed using a manual assessment of future travel demand. Manual techniques are best suited to small areas, or areas exhibiting low growth in travel demand. In such cases manual forecasting techniques may be all that is required and so prove the most cost effective approach.

Table 1 also shows the steady decrease with time in the planning horizons adopted for the studies listed. This is clearly revealed by Figure 1.

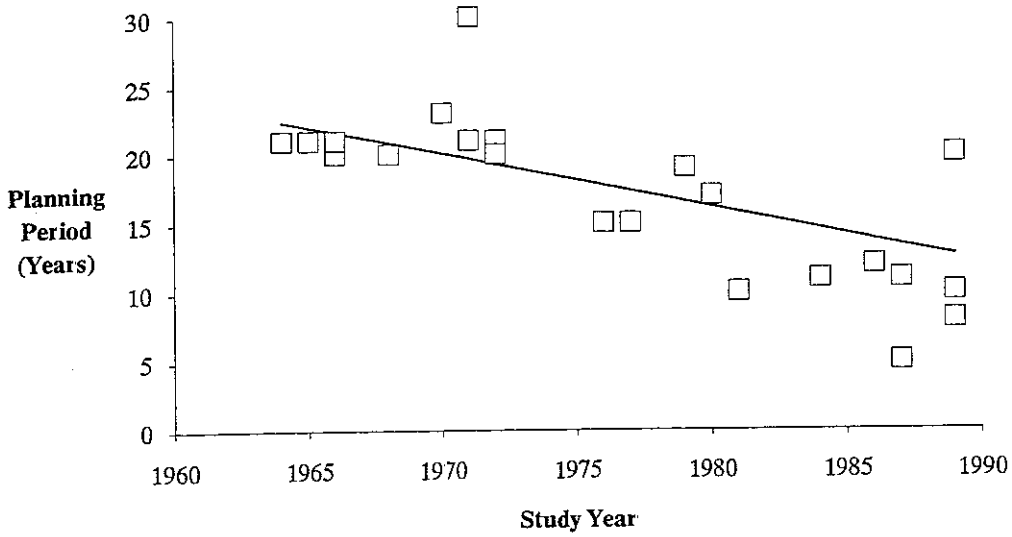

Figure 1 Planning period v study year

Several factors may contribute to this trend, namely:

- as our understanding of transport planning models and their limitations has increased, the degree to which we are prepared to 'go out on a limb' has decreased.
- the need for plans and policies to be realistically related to anticipated funding levels, which are themselves almost as difficult to forecast, has made practical planning horizons shorter.
- as with the effect of limited funding, fluid political environments serve only to shorten practical planning periods.

Data

Data is a basic ingredient in the development of transport plans. These data may include observed travel data obtained from detailed home interview surveys, roadside interview surveys and simple traffic counts, demographic projections and even estimates of available funding. The significant investment in observed travel data for those studies conducted in the 1960s and early 1970s is shown in Table 1.

A clear trend to smaller data collection programmes and an increased reliance on data and relationships developed for other urban areas or projected from earlier surveys is shown in Figure 2. This trend has been brought about by a number of factors, not the least of which is likely to have been the high cost of data collection.

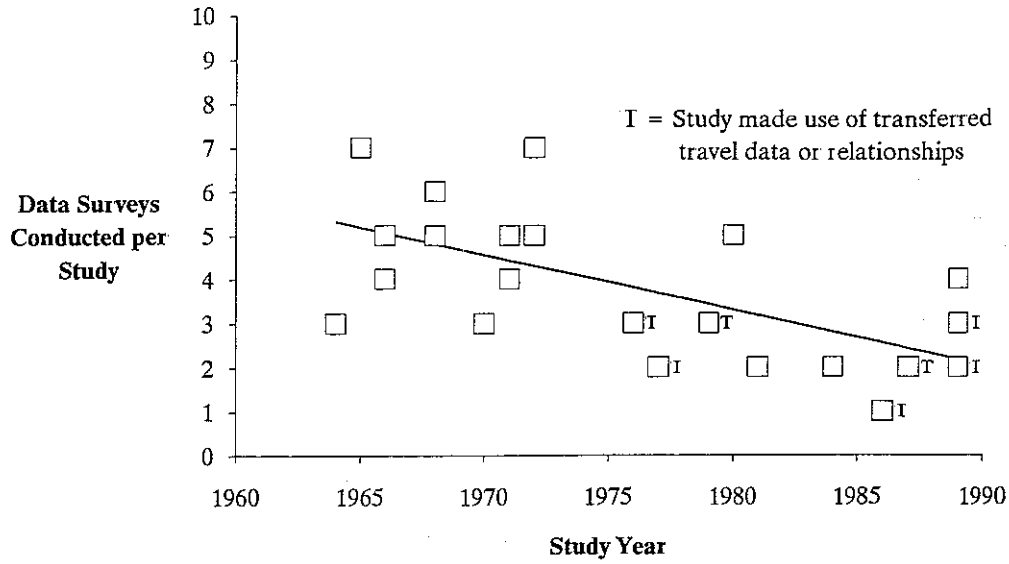

Figure 2 Data surveys v study year

In the face of higher data collection costs, the reliance on existing data or limited new surveys is understandable. However, as data sets age, their usefulness decreases and further reliance on them calls into question the value of the subsequent analysis.

Accordingly, it is crucial that efficient data collection techniques be adopted that are closely matched to the data needs of the chosen analysis methodology. Furthermore, the analysis methodology should be chosen to maximise the usefulness of limited data sets.

In this context, it is interesting to note that the Victorian Ministry of Transport has, while designing major travel surveys for the Melbourne area to update aging data sets, recently gone to some lengths to identify current and likely future data needs of a broad spectrum of likely users. Conversely, it is disturbing to note that the Australian Bureau of Statistics contemplated deleting various transport related questions from the 1991 Census because of budget limitations. This would have removed a primary source of data used for transport planning.

Analysis skills

The early transport planning studies were often undertaken by transport planning consultants, on behalf of state road or transport authorities and local councils, as shown in Table 1. A working group, or steering committee was in many cases established to oversee the project, and often a separate policy committee was involved in resolving 'higher order' policy matters.

The involvement of local planners and engineers in these studies gave these authorities the opportunity to develop their own in-house transport planning expertise. This expertise was often put to use in study updates or new studies instigated and run by the authorities themselves.

That expertise has been maintained, although necessarily in a limited form. In some cases (and understandably) the skills available within the authorities have been limited to analytical techniques that are not entirely appropriate to many modern day situations. The choice of analysis method, which is a reflection of available skills, can in some examples be traced as the root cause of the subsequent lack of success of a planning exercise.

Political support

While Table 1 gives no indication of the political acceptability of the studies listed, the political and community response to these studies has in many cases been negative (Hensher, 1978; Neilsen, 1990). Responses to the earlier transportation studies conducted in this country were typified, firstly, by a lack of acceptance by the community of the extensive highway networks often recommended and of the subsequent environmental impact and social upheaval that accompanied these schemes and, secondly, by the inability of the responsible planning authority to implement many of the recommended projects due to the high capital costs involved.

More recent times have seen the level of community consultation in transport planning studies, particularly those related to public transport, increase significantly. This increase can be seen as a direct consequence of the response to the earlier transportation studies.

The importance of community acceptance of transport plans is also reinforced through the political arena. History has shown that few politicians will support a transport plan, no matter how technically correct it is, if it does not in turn have the support of the wider community.

It is this last point which is often overlooked in the definition and conduct of transport planning studies. As noted above, an appreciation of the current political climate will assist in the preparation of a realistic transport plan. It provides the analyst with another set of constraints just as significant as those relating to financial or environmental considerations.

Computational tools

Taylor (1989) identified a hierarchy of analytical needs:
Sketch planning, regional or corridor level analysis.
Strategic planning, traditional travel demand analysis of the urban network.
Local area planning, analysis of a section of the urban network.
Specific site analysis, assessment of individual links or junctions.
Transport system impact analysis, assessment of environmental impacts.

No single analysis method or tool is appropriate to all of these needs. However, with the increasing power and sophistication of microcomputer hardware and software, it is likely that better integrated analysis models will soon appear. Clearly, it is necessary for the successful completion of any analysis task that the correct tool be chosen.

However, there is another dimension to the choice of analysis approach provided by the constraints and opportunities of data availability, analysis skills, time and budget and the political environment.

For example, there is little point embarking on a detailed traditional four step transportation modelling exercise if limitations of data availability prohibit effective model calibration. Similarly,the development of a detailed simulation model may be the 'best' technical solution to a particular problem, but may be hopelessly inappropriate given constraints imposed by time, budget or staff resources. Conversely, a sketch planning approach may not be able to yield outputs of sufficient detail to answer the questions being asked, whereas the commitment of greater resources to the development of a more detailed model may provide the necessary outputs.

Various projects undertaken in Australia illustrate this point well. These relate in particular to the first three of Taylor's groupings outlined above.

A good example of the value of sketch planning techniques is provided by Arup Transportation Planning's regular use of the QRS sketch planning package in subdivisional design. Such an application demands speedy if only approximate estimates of traffic volumes on roads within a subdivision in response to a variety of road network options. The QRS package, and the quick response estimation approach on which it is based, allows the adoption of reasonable default values for a wide range of model parameters and so allows the normal modelling process to be accelerated.

Melbourne's METRAS (Metropolitan Arterial Road Access Study) project illustrates some of the issues encountered in using such models. The project was undertaken to provide a ten year programme for the development and management of Melbourne's arterial roads. At the time of inception, it was estimated that only three to six months was available for the modelling exercise (although the modelling ultimately spanned two years). Accordingly, it was resolved that no new model could be developed, but that the existing UTPS-based model would be used for the project despite its shortcomings. The data on which the modelling was based was, in some cases, rudimentary - population forecasts, for instance, were little more than back-of-the-envelope estimates.

Ultimately, however, the accuracy of the modelling process was of little importance; questioning regarding the proposed road investment plan centred on political issues rather than the accuracy of the traffic forecasts. The economic worth of the various road network options tested was not prominently used in the analysis, even though this output was a major benefit of the modelling approach adopted. Similarly, it has been noted that the only numbers in the MetPlan final report (the public transport sister study to METRAS) were the page numbers at the foot of each page! The lack of numbers in MetPlan - and by inference, the modelling process - was never called into question.

Strategic level analyses undertaken by Arup Transportation Planning have ranged in scope and approach. They have included the development of traditional four step models, such as that developed for the current Port Moresby Roads Needs Study. Other projects have involved adaptation of existing metropolitan wide strategic models for analysis of geographic sections, such as the Werribee and Redlands Road Hierarchy Models adapted from the Melbourne and Brisbane strategic models respectively. In some cases, an approach centred on manual methods has been used in response to time and budget constraints and to promote acceptance of the results amongst those involved in the study or using the analysis outputs. The recent Mornington Peninsula Arterial Road Strategy and Bellarine Roads Study are two examples of this approach at a strategic level.

Local area planning can be undertaken in a variety of ways. VicRoads' recently completed North Fitzroy area study, identified in METRAS as an area requiring detailed assessment, provides an interesting example. Analysis for that study was originally intended to be undertaken using SATURN. Indeed, the SATURN network was built and the model nearly calibrated. However, careful review of the objectives of the study indicated that acceptance of the analysis outputs by the public was of paramount importance in the study and that a 'black box' approach, no matter how accurate or correct, could not provide that acceptance. Accordingly, an approach that depended on traffic counts and number plate analysis to show current traffic patterns in the area and manual traffic assignment to show the effects of possible management actions was adopted. This analysis approach was accepted by the public and so can be regarded as a success.

The SATURN analysis of Camberwell junction, undertaken to provide a basis for deciding the appropriate scale and nature of development in a congested suburban district centre in Melbourne, provides an example of the problems avoided in the North Fitzroy study. With too little time available for development and calibration of the model, inevitable errors were found and the whole analysis process was discredited as a result.

Arup Transportation Planning's experience in local area planning parallels these examples. The firm's recently completed Campbelltown Town Centre Study was undertaken using the NSW Road and Traffic Authority's NODELAY model. This model is able to discriminate between different road investment options on the basis of economic worth, taking into account construction, maintenance, travel time and vehicle operating costs. This was a necessary output of the analysis process and one able to be provided by the model.

In contrast, analysis approaches adopted for the Geelong Central Business District and the Melbourne Central Activities District reflected the needs of the respective studies and the time and budget constraints that applied.

Today's issues and tomorrow's problems

Transport planners are today confronted with a variety of issues ranging from the local impacts of traffic generated by major developments, through to the regional impacts of sustained metropolitan growth. An examination of current issues, coupled with recent community trends provides a guide to the likely issues that transportation planners of the 1990s will need to tackle. A summary of these issues, and how these will affect us in the future follows:

Community involvement: The trend for increased community involvement in transport planning and policy formulation is likely to continue. The planner will need to enhance communication skills and be able to incorporate community feedback into subsequent plans.

LATM and RSM: The recent increase in Local Area Traffic Management and Residential Street Management schemes will continue as the community becomes more aware of the potential benefits of such schemes.

Demand management: There is already the beginnings of a shift in the basic thrust of transport planning from supply management towards demand management. This shift has been brought about partly by community opposition to proliferation of the urban freeway network and partly by a real lack of funds to undertake such works. This trend is likely to gain significant momentum in the 1990s.

Public transport: Coupled with the concept of demand management is the increasing importance of public transport. The main factor contributing to the 're-discovery' of public transport is as discussed above: the community's response to adverse environmental impacts of the private motor car. However, while our society as a whole appreciates the benefits of increased public transport usage, individuals are reluctant to make the change to public transport. This reluctance may prove a significant barrier to increased public transport usage.
Improving transport efficiency: There is a increasing trend towards improving overall transport efficiency, brought about mainly by the competition between modes for limited transportation funding. The planner will therefore be required to justify transport plans against a wider range of alternatives than in the past.
Transport equity: The need for new plans to define and cater for the transport disadvantaged will gain in significance as communities strive for transportation equity.
Better models: The transport planning models and techniques of the 1990s will need to be sensitive to policy initiatives. Given the limits to future infrastructure expansion discussed above, matters of policy will form a significant component of future transport plans.
Environmental impacts: Future transport plans will need to take account of the environmental impacts of their implementation. Increasingly, environmental analyses will become an intrinsic part of transportation planning studies.
Transport funding: Transport planners are now and will continue to be faced with the problem of inadequate levels of transportation funding. Viable alternatives to existing sources will need to be examined and tried.
Return of long range planning: The re-emergence of long term regional transportation planning has already been noted in the United States by Menendez and Cook (1990) and it must be expected that the same will occur in Australia.

There is little chance for a unique solution to each of the above problems for all urban areas throughout Australia. Furthermore, the interactions between these issues are likely to result in competing solutions, with the final decisions being made either directly or indirectly by the community affected.

Conclusion

While the range of potential issues facing transport planners in the 1990s is somewhat daunting, the key to successful transport planning in the coming decade lies in:

- defining the real problem
- asking the right questions
- choosing the appropriate analytical tool

A balanced approach to transportation planning is needed. To achieve this balance, transport planners will need to appreciate a number of factors when preparing plans for the 1990s:

- the characteristics and limitations of available analytical tools
- the high cost of data versus data requirements
- the analysis skills necessary to design and prepare transport plans
- the need to maintain political support, both at government and community levels, during all phases of the planning process

Current community expectations demand that physical, economic and environmental welfare not be compromised purely for the sake of progress. More than ever before, transport planners will need to be able to defend their analyses on a number of levels. The success or otherwise of future plans may very well depend on how convincingly this can be done.

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