WILD SCHEMES, FOOTSHOOTING AND FUNDING

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ABSTRACT

This paper discusses the perennial conflict between logic, represented by economic analysis, studies of operating practice and planning on the one hand, and equity issues represented by the actions of representative government and the pressure of a variety of interest groups, on the other.

In considering how the researcher can best reconcile these conflicts the following topics are discussed

- *economic evaluation prerequisites*
- *the role of change on the quality of policy advice*
- *the best manner of using consultants*
- *retrieving the lost ground of premature policy announcement*
- *the importance of consultation and teamwork*
- *the place of marketing philosophies and techniques.*

The topics are discussed in an historical setting drawing upon the experience of the periods of the 1970's and 1980's in both Victoria and New Zealand.

Policy approaches developed and offered to policy makers are described, with a discussion of the research bases, methods and models underlying the alternative policies in those periods towards capital investment, corridor planning and subsidisation of urban services.

The reasons for the adoption or lack of acceptance of the approaches are also discussed.

1. INTRODUCTION

There must be few who are, in their own experience, personally unaware of the perennial conflict between logic, represented by such things as the application of economic analysis to proposals, studies of operating practice and general or specific planning on the one hand, and equity issues represented by the actions of representative government and the special pleading and pressure of a variety of interest groups, on the other. Each holds sway at different times, logic, the natural domain of the bureaucrat, being limited at times to the consideration of how policy may best be delivered, at other times, actually decisively influencing the policy chosen.

How can the researcher best reconcile these conflicts, in such a way that his work is not only of the greatest interest and value to the policy maker and implementer, but that they act upon it?

In this paper, the following topics are discussed, in the context of the very different experiences of the authors, in the hope that others, whether researchers or policy makers, may benefit from our failures and successes.

1. **The conditions necessary for the conduct of conscientious economic evaluations.**
2. **The role of personnel, organisational and methodological change on the quality of policy advice and its eventual impact on the struggle.**

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3. The proper place of and best manner of using, consultants from outside an organisation.
4. The difficulty and costs of retrieving the lost ground of premature policy announcement, which rigorous analysis and proper advocacy may have averted.
5. The need for the industry to open its mind to marketing philosophies and techniques.
6. The importance consultation and teamwork do, and will, play in the future of the transportation industry.

The topics are discussed in an historical setting drawing upon the experience of the periods of:

- the States Grants (Urban Public Transport) Acts when capital funds were granted in return for evaluative information through the mid 1970's throughout Australia
- the changes and reformations which occurred in Victoria in the late 1970's and again later in the mid 1980's;
- changes which are now occurring in Christchurch, NZ in the 1980's.

A number of analytical approaches developed and offered to policy makers some years ago are also described along with a discussion of the research bases, methods and models underlying the alternative policies in those periods towards, capital investment, corridor planning and subsidisation of urban services.

The reasons for their adoption or lack of acceptance in practice are also discussed including the viewpoints of now retired Permanent Heads for whom the work was prepared.

The paper concludes with recommendations:

(a) for more effective use of the efforts of the researcher, and
(b) to help the researcher develop more realistic expectations of the policy decision maker.

2. HOW TO GET ECONOMIC EVALUATION TAKEN SERIOUSLY

There are two distinct aspects. One relates to the analysis and

the analysts themselves, the other to the incentive of the most senior management.

2.1 The Analysis and the Analyst

The acknowledgment of the authority of the analyst in the field precedes the acceptance of him or his views by management or peers. You need to be good at your work AND confidently accepted by the decision maker. In addition when the new decision maker arrives, he must have heard of you or he may not wish to hear from you.

2.1.1. The Role of the Transport Researcher in the Current Changes Now Occurring in New Zealand

The two spheres of activity within which the researcher must involve himself are economic evaluations and social research.

In 1987-88 Travers Morgan were commissioned by the Urban Transport Council (UTC) to undertake the Urban Bus Study (1) which was aimed at improving the efficiency and effectiveness of the 4 major municipal bus operators in New Zealand. In Christchurch this led to a reduction in operating costs through more effective use of resources with minimum inconvenience to the bus passenger. Studies such as the Christchurch Traffic Screenline Study (2) and the Annual Monitoring Report (3) although not always presented in dollar terms nevertheless have strong implications for considered economic evaluation and ultimately in the quest for funding. It is relevant to note the present New Zealand (Labour) Government's commitment to, what in broad terms could be described as a "user pays" philosophy. Policy guidelines are very different from even one decade ago and currently changes towards achieving this are taking place rapidly. The researcher must therefore of necessity be able to understand and apply economic evaluations in order to substantiate proposals.

Social research should be complementary to economic evaluations in the transport field, particularly since the trend is towards subsidy reduction. The corridor study which looked at Public

Transport Requirements in a particular corridor in Christchurch (4) is a good example of this technique. Not only were "numbers" investigated but also attitudes.

2.1.2 The role of the Transport Researcher in a Corporate Public Transport Operation

Not only are environments changing, so are departments and corporations. The researcher must:

- know all the relevant facts and figures which are the outcome of such "economic" research exemplified above;
- also be able to understand attitudinal and motivational factors which influence the use of public transport;
- be able to communicate the understanding of the whole picture to senior management.

In other words, in order to get proposals taken seriously the researcher must understand economic and social aspects and their interaction. He must in addition be able to communicate the whole picture in an understandable fashion.

2.2 Sticks and Carrots

Between 1973 and 1978 the Federal Government offered Urban Public Transport Grants for capital upgrading of the Australian States' transport systems. This was a time when a big effort was made to do high quality economic evaluations. Millions of dollars were granted to the States by the Commonwealth Government for new investments in trains, trams, buses and infrastructure, provided a Bureau of Transport Economics scrutinised evaluation was supplied.

TABLE 1: EXPENDITURE ON VICTORIAN RAILWAY AND TRAMWAY PROJECTS (excluding MURLA) AND FEDERAL GRANTS $M

	Commonwealth Grants	Works Expenditures
1973-74	..	19.8
1974-75	18.9	43.1
1975-76	9.3	41.9
1976-77	15.9	59.2
1977-78	9.8	56.4

Source: Victorian Budget, 1985 Transportation Plan, BTE Reports (13),(14),(15),(21).

At the end of the 1970's nearly all major railway, tramway and bus proposals had received an evaluation on a roughly comparable basis. The Victorian Ministry of Transport and Treasury received reports of higher quality than previously principally because another level of government had made grants (for only a portion of the cost - usually 2/3) conditional upon evaluation. Outside the urban system loans to assist mainline railway upgrading projects were made. Again, a condition of being prepared to lend was the conduct of a BTE scrutinised evaluation.

3. HAVE WE CHANGED FOR THE BETTER, OR HAVE WE JUST CHANGED?

3.1 Victoria

Few advances in practical technique seem to have significantly altered the balance between economic and political influences. However the past decade in Victoria has been one of immense organisational change, and this has made a difference.

The following table shows some historical data covering the two decades of the 70's and the 80's (roughly) which in Victoria were periods of political stability and change respectively. Although never dominant, planning and economics were more significant in the earlier period, the Government in the latter. This is not necessarily to suggest a preference for one era over the other, but there was a certainly conscious effort on the part of the Government of the 80's to bring public administration under firmer Government control. For those most influential in capital works planning and funding we see:-

CHANGES DURING THE QUINQUENNIUM	1976-1980	1983-1987
Minister	1	1
Director General of Ministry	0	2
Chief Executive		
Street Transport and Metropolitan Railway	0	2
Mainline Railway	0	1
Chief Planner		
Ministry	1	2
Street Transport and Metropolitan Railway	0	1
Mainline Railways	3	0
Manager Capital Program Ministry	0	3

RESEARCH AND POLICY

At the centre of policy, the Transport Ministry, the change is even more marked. In the later period the department is bigger - it has more responsibilities. But a greater change is in the nature of the organisation. Finance and policy has replaced planning and evaluation here also.

STAFF ENGAGED PRIMARILY IN	Dec 1978	May 1988
Research, Planning and Economic Evaluation	24	8
All Other Activities (including Policy Development, Administration, Finance and Accounting)	29	127
TOTAL	53	135

Source: Government Gazette and Departmental Staff lists.

Another patently obvious change is in the standard of infrastructure and equipment of the railway and public transport systems. The system has become more modern. Less obvious are the concomitant costs and industrial implications. Railway staff numbers (and thus eg labor cost/tonne) especially, have fallen. Though hard to establish from published sources (20), the bulk of the reduction seems to have been in railways rather than the street public transport system.

Railways and Tramways at June 1977	STA and MTA at June 1987
24,171	18,777

Capital costs have risen. So much so, that the railways and public transport system accounts were eventually relieved of the burden of debt (net of Consoliated Fund advances) which grew from $550m in 1981-82 to $2,061 in 1985-86. The figure is now tucked away in the Budget along with the debts incurred elsewhere in the public sector. The railways brief period as a corporation is over - they are a department once again.

The system is more modern. It operates with a higher total cost. The process of beating labor cost swords into interest cost ploughshares is plainly intentional as can be seen in the 1985 V/line Draft Corporate Plan(7).

	1983-84 Actual	1988-89 Estimated	Changes
Staff Numbers.	14,200	11,860	- 16.5% decrease
Finance Charges	$27.9M	$99.2M	5.5 fold increase
Labor & Labor Related Costs ($83/4)	$285.5M	$320.7M	12% increase

Source: Tables 1, 3, 4, 7.2 and 8.3 and Section 7.

These are remarkable changes, both in organisation, operation and style and different research needs must be met. Let us look a little more closely at the rather parallel changes which have been occurring in New Zealand.

3.2 Public Transport in Christchurch, New Zealand

3.2.1 The Past

In 1902 the Christchurch Tramway District Act empowered an elected Board to run trams within the district and levy rates to subsidise this. It was noted then that local body control at the turn of the century led to upgrading of public transport in Britain.

During the early fifties, the trams were replaced by diesel buses and the Tramway Board became the Transport Board.

3.2.2 The Present

Partly in anticipation of the Transport Law Reform Bill which was introduced into Parliament in May 1989, senior management at the Christchurch Transport Board have also been pursuing an internal reorganisation programme. One result of this is the present structure of four Business Units which has existed since October 1988. At the same time a Voluntary Redundancy Package was introduced. While initially the Transport Board had the power to levy its own rates and was partly subsidised by the Urban Transport Council since 1988 the subsidies have been handled through the Canterbury United Council (the Regional Council).

When discussing the question of whether we have changed for the better, it is relevant to ask ourselves "for whom are we changing". There is little doubt that the changes taking place within the

Christchurch Transport Board are for its own good, but whether the end user (the passenger) will have a better service is the challenge for the future.

The passenger transport industry is to be deregulated along the lines of the recent UK deregulation. The intention is that all "commercial" routes, i.e. those that operators are prepared to run without any financial support, will be required to be registered with the relevant local authority. It will then decide which additional services are required, and these will be put out for tender, with financial assistance being granted on the basis of the lowest tender. No services will be protected from competition.

At the time of writing the Transport Law Reform Bill is at the Select Committee stage. It is expected to become law later in the year with the bus industry being deregulated in July 1991. There will be a unified Passenger Transport Operator Licensing Regime. Anyone holding a licence under this system will be licensed to carry passengers by any means. Emphasis will be placed on safety and high standards of performance.

At present, public transport companies operate as departments of local government. The proposed future system requires that companies in the new environment be incorporated. Mr. Gerbic also noted that one result of this system will be that:

> "Marketing and customer services will become of crucial importance to an industry that will have to go out and sell itself to the general public to a degree that it has not had to do in the past."(5)

3.3.3 The Future

The Transport Law Reform Bill suggests a completely new system for the future. It proposes an amalgamation of the Urban Transport Council and the National Roads Board into a body to be known as "Transit New Zealand". This authority will work closely with local government structures which are also to be newly established. The following two quotations give an indication of what the policy makers may be trying to achieve:

- "to allow all transport decisions to be made by one body, and to provide funding from a single source - road users"(5).

- "decisions affecting land transport are the best that can be made ...'best,' in this context, means not only in economic terms but also in terms of social opportunity for all New Zealanders"(6).

The former quote(5) is taken from an address by F.M. Gerbic, the Under Secretary for Transport and the latter(6) from a Travers Morgan report entitled "Subsidisation of Urban Transport".

Prior to the implementation of this system local government reform bills have to be enacted; this will mean larger and consequently fewer regions. The broad purposes of the system include:

- To ensure (either by direct provision or by contract) the provision of local public goods to their communities.
- To enable communities to make choices between different local public goods.

4. GETTING REAL HELP

In Australia in the 1970's Planning and Research Assistance Grants from the Commonwealth Government funded many State projects. Consultants were employed in many instances. Sometimes they worked on specific projects which planners and analysts couldn't get round to, sometimes, though not funded federally, working directly on policy issues when departmental people needed an external and "independent" authority.

Major consultancies were associated with the implementation of the Underground Rail Loop in Melbourne in the 1970's too, without which the project could not have been completed or financed. There were not the experienced people within the Victorian system at the time to undertake the task.

In the 1980's the consultancy budget is smaller with a larger share going to direct policy advice rather than to technical assistance.

In New Zealand consultants are alive and well as preparations for the next decade are made. This is principally because of the rapid changes which almost every part of the economy is facing. Reorganisation, restructuring, corporatisation, deregulation, de-licensing are all situations which provide opportunity for consultants. They are to be found within the highest echelons of central government through to the local government level and also within the private sector. This section addresses two questions - What is the proper place and best manner of using consultants from outside an organisation?

4.1 Where should consultants fit into the organization?

The issue of why the consultant is commissioned must be raised along with this question. Broadly speaking there are 3 situations which may call for a consultant:

4.1.1 Where in-house expertise is lacking. This situation has arisen in Christchurch because the changing economic climate has meant that the company has had to develop new skills to react to reduced subsidies and to survive in a competitive market. For the consultant to work effectively in this scenario there must be communication with staff and management concerned explaining the consultant's presence. The consultant should not pose a threat but should work alongside employees.

4.1.2 Where in-house resources are not available at the time.

An instance of this is the writing of computer software which does not in itself justify employing a permanent staff member.

4.1.3 Where for one reason or another, an independent party is required to do the job.

Situations where this may arise are where the information from the project has to be shared between several organisations, where the consultant is used for recruitment purposes or where the client company requires anonymity (eg market research

projects). In such circumstances, there may be no choice but to use a consultant.

4.2 What is the best manner of using consultants?

Where consultants are hired because in-house expertise is lacking, part of the consultant's brief should be that he must in the final stages of his contract adopt the role of a teacher. He must pass on knowledge of the techniques he used to arrive at his solution. Whereas at the beginning of the project, management and staff have to invest their time in the consultant to ensure he has the knowledge of the company to do the best job, towards its completion the consultant must allow time to communicate with his client. A written report is not enough. Consultants should offer "after sales service".

Using consultants instead of in-house resources is a harder situation to manage because staff may become resentful of the consultant's presence or may see the project as an ad hoc happening when in fact it should be integrated.

Market research consultants can be usefully employed as the front persons in the situation where the respondents should not know who has commissioned the research.

Over the years the Christchurch Transport Board has used a variety of consultants. Have they been a "real help"? In some cases where specific dollar savings have been achieved as a direct result of the consultant's work the question is answered positively. Some projects however are harder to measure in dollar terms especially if the consultants findings were not implemented, either because of a change of manager or because of their unacceptability. The most technically complex computer based consultant project was the most expensive and least successful. Reasons for this were both the inherent difficulties of computer jargon and the fact that the consultants did not work closely enough with staff.

In short, consultants have to be managed.

5. FOOTSHOOTING

There will always be some proposals which are so blatantly the special interest of one group or individual or which have so little intrinsic merit, that almost no matter how they are implemented a general loss will occur. Here the outright prevention of Government endorsement (or worse, public announcement) must be the aim.

5.1 Victoria

In Victoria a system of evaluation and consideration by Cabinet sub-committees is the chosen method of defence against slips of this sort. In principle, the system is impressive. Extensive evaluation guidelines(8) define the "adequate" evaluation, and the unevaluated are not to be considered. Ultimate success of the system depends on the

(i) will of the administration and the
(ii) quality of the technical work supporting any disinterested investigation.

Few major proposals are evaluated to the standard of the guidelines.

Earlier we remarked in the section on change, that Victoria now had a more modern public transport system. Staff costs had been lowered and the savings roughly matched with capital costs, not however visible in the portfolio's accounts. This better - dearer system is what the public want. The unintended effects however become tomorrow's problems. Someone else can have a go at them.

For example on the Ringwood line (the most densely trafficked suburban railway line in Melbourne) crowding at the height of the morning peak has led to the suggestion of using doubled decked trains. Over the period of traffic growth (to the present point of crowding) real fare levels have fallen over 25% and new carparks have been built at the stations at the extremity of the line where residential population growth has been considerable. In submissions, the "by products" of debt cost, declining cost recovery, and an even lower than present level of off peak ridership to capacity (the

single deck trains sometimes run nearly empty) are not planned for. Someone else's task. The immediate demand would be met by such a suggestion, but not as part of a comprehensive plan. Actually completed projects such as:

(1) the Webb Dock railway, where traffic flows are extremely small relative to the forecast or,
(2) the extension of the suburban railway to Laverton via Altona, which was actually the alternative proposal to a costly electrification undertaken only 5 years earlier on an alternative route between the same terminals,

fall into the same category.

It is 20 years since a Government endorsed plan was published in Victoria (21) and 10 years since a draft plan(12) was released for public comment. No subsequent documents have committed the Government explicitly, although operating authorities have issued fairly detailed forward plans(9),(10).

5.2 New Zealand

The Christchurch Transport Board is an elected body which meets approximately once a month. Such meetings are reported in the local press, the extent of the other news often having a bearing on the length of the report. Some items are discussed "in committee".

It is unfortunate, not to mention costly, that on more than one occasion services have been implemented where careful research may have indicated that they should not. Two examples of such schemes are both connected with "Shopping By Bus". In the first instance, the request was made for a suburban connection to a brand new shopping mall - this service ran for a month before being discontinued. Average loadings per trips were 0-1. An even grander service (different suburb, different mall) with a hostess on board to help with parcels and children was similarly discontinued because of poor loadings. Both of these situations were time consuming and expensive planning exercises which were embarked upon purely as a result of pressure group influence.

It should be noted however that there are schemes with similar origins which have enjoyed a measure of success. With careful research in particular into financial and timing issues, almost invariably however the return would have been greater. A good example in Christchurch was a double decker tour of the city which

appeared to be very successful from its instigation. In the final analysis however it ran at a loss; research (into ticketing costs in particular) may have avoided this.

It is to be hoped that the new operating environment ahead, where there will be financial accountability, will go a long way towards avoiding some of these situations.

5.3 Thinking Makes The Difference

If all this sounds familiar, it should. Especially in hard times, research budgets will take a cut. There are however, two things which can make a big difference and don't cost all that much. They are covered in the next two sections.

6. THE NEED FOR THE INDUSTRY TO OPEN ITS MIND TO MARKETING PHILOSOPHIES AND TECHNIQUES

6.1 Why the Transport Industry needs to be market driven

Although public transport dominated in New Zealand up until the 1950s, the gradual development of suburban growth and private transport has left us to face a nationwide decline in public transport patronage coupled with an increase in private car travel. In Christchurch the weather (mostly dry) and the terrain (mostly flat) encourages people to adopt yet another means of transport - the bicycle. The influence of a worldwide trend towards "healthy living" should not be discounted either.

Rather than allow this decline to continue unchecked, it is critical that marketing concepts be applied. The public transport company must formulate a marketing plan which takes account of the following points.

There must be an understanding of the customer and a realisation that he is a focal point of planning and action. Decisions on matters pertaining to the service, pricing, marketing communications (ie advertising, promotions, PR etc) and distribution (ie route planning in the case of buses) must not be made in isolation of one another.

Specifically, the purpose of marketing (public transport) should be to reach the user market and to increase the markets' use of the system and to reach potential markets to expand the system. We should be aiming for profitability through customer satisfaction and in the long run we have to improve the image of public transport.

6.2 How to meet the needs of the market

The main objective of the marketing plan must be to segment the market. This means dividing the population into subgroups which the organisation could possibly serve. The UTC's publication "Market Targeting in Public Transport" gives the following example of how market segments might be described.

"The qualitative research identified four target markets as 'vulnerable' to public transport usage because of their life-cycle situation and their perception of public transport youth, young families working mothers and retired people."
A full description of these segments is attached as Appendix A.

Having defined the market and its needs, we must then communicate the advantage of using the system both to current users and to those non-users who fit the profile of the current users. In other words, to communicate how the service can meet their needs. This is largely done by advertising and promotions.

Finally, in the long term we have to use public relations to create a more favourable overall attitude towards public transport.

6.3 How and where the researcher fits in

Market research in the form of customer surveys, both qualitative and quantitative, must be given a high priority, as the research will

form the base on which the marketing plan is built. It should be carried out in parallel with operations research and economic evaluations.

6.4 Can we influence the behaviour of the market?

Before we can influence the behaviour of the market, we must understand the attitudes of the public to all the aspects of public transport. (Attitudes are made up of the information people have, their feelings of liking/disliking and their intention to behave.) Good market research will help us to do this in a scientific manner. The market researcher then passes his findings to and works with the communications experts (advertising, PR people) to influence how the market behaves.

6.5 Should we influence the behaviour of the market?

Not only should we influence the behaviour of the market, but we must.

It may be that in order to be totally effective, public transport operators should get together on an even broader basis to market their services. In New Zealand and Victoria, each with a population of just over 3 million, this is an option which could be considered.

7. TEAMWORK

Consider the coach who chooses the players because they are skilled in one position and who trains them individually so that they each become the best in that position. Contrast that situation with the coach who works at training his team to play together. Think about the team with the crowd right behind it and compare it with the team which has no supporters. Now consider the team that trains on the well tended pitch with tackle in tip top condition and compare it with the team who has to guess where the goal posts are. Finally give a thought to those whose coach didn't even enter them in the competition because he didn't know it was on.

This is no lighthearted analogy. Just as the successful sports team is built around a thorough understanding of the dynamic interaction between people and circumstances, the successful future of the transportation industry will to a great extent depend on a similar depth of understanding.

The researcher must therefore consider the following factors:

7.1 External Factors

Largely the economic and social factors which have already been covered (earlier sections describe the necessity for knowledge of customers through research) and issues related to government policy. A thorough knowledge of "the rules" must be maintained.

7.2 Internal Factors

Industrial relations are the most important internal factor In the public transport industry it is the operators (eg. bus drivers) who are in the front line. If either they do not know where the goal post is or alternatively do not feel part of the team, then the chance of success immediately plummets. There is a role for the researcher to use his skills towards understanding the workforce.

7.3 Equipment and Technology

Decisions on equipment must be made within financial constraints however there must be built into this, consultation (in the case of public transport) with both the passenger and the driver. Computer based technology is part of our future and must be part of the team.

7.4 Spectators

This category can be divided into the participating spectators who are paying customers (the more they become involved the better as they are an invaluable source of research data) and non participating spectators. Within this latter category are those who pay taxes but do not use the services. Research tells us that a significant proportion of Christchurch people in this category feel a social responsibility and do not object

to contributing to a system they do not use. These people add to the morale of the company and may have a part to play in the long term future of public transport.

Teamwork as described could be said to be a holistic approach. The dictionary definition of holism is "a philosophy in which the whole is greater than the sum of its parts". Opening the industry's mind to marketing philosophies and techniques and understanding the interactions between the industry's elements will protect the participants from costly failures of the sort well known to us all.

8. RUNNING HARD, BUT NOT VERY FAST? - THREE CASE STUDIES

It remains to consider three methods developed at the Victorian Ministry of Transport during the 1970's but not generally useful to the administration of that period, and to consider the reasons for this. The methods were each at the time strongly supported by the then Permanent Head of the Ministry. They are:

- a Corridor Planning model which estimated the maximum level of benefit for given (feasible) changes in travel cost and time, which level was then used to search for feasible solutions (in terms of cost), corridor by corridor. Of course it tended to "sieve out" the more extravagant schemes early in the piece since, if the maximum attainable level of future benefits was only $X m (NPV), proposals with costs of $2X m or $3X m were out right from the start. It was like a type of cost-benefit analysis which looked only at the benefit side to begin;
- a Subsidy Scheme similar to that used (but since abandoned) by the London Transport Executive(11) in which a planning goal of implementing proposals, capital or service variations, which could attain an increase in passenger kilometres per $ outlaid of some particular level, were almost automatically guaranteed a place in the annual plan. Such a rule of course tends to include the best value for money suggestions and so is likely to be popular with operators and Treasuries, but not always with Government;

a framing of the Railway's capital works program as a Linear Programme so as to maximise the net present value of returns subject to technical and resource restraints, and indirectly, to estimate the costs of departures from the optimal solution of Governmentally favoured projects which would not normally enter the solution at some given funding level. The "costs" of a favourite project entering a programme and displacing "better" items could thus be estimated and the Government so advised.

8.1 ANALYSIS OF THE RAILWAYS WORKS PROGRAM AS A LINEAR PROGRAMME

In mid 1981, in preparation for the arrival of the VicRail application for funds for the 1981-82 Works Program, a special investigation using methods developed gradually over the preceding 10 years was undertaken within the Ministry of Transport. The objectives of this investigation were to consider -

- By what means might the economics of the VicRail submission be assessed?
- How might it be advocated to Treasury?
- What would be the economic consequences of alterations to the Vicrail proposal which either the Transport Minister or the Treasurer may have required?

8.1.1 Formulating the Problem

The problem was analysed as a type of linear programme with the aim of maximising the returns of expenditures on a variety of activities, subject to a number of technical constraints and a budget restriction.

Solution of such a model would yield an economically optimal answer and, as a by-product, "shadow prices" which represented the opportunity costs of departing from that optimum. The method had been proposed some 10 years earlier and discussed then with the State Co-ordinator of Works at the Victorian Treasury.

The returns (objective function coefficients) were the ratios of benefits to costs discounted at 10% as established in cost benefit studies previously undertaken or where no study was available, estimated on the basis of studies of similar activities. Without the large number of comparable evaluations brought to hand by the

States Grant Act in the preceding period, and discussed elsewhere in this paper, such an analysis would have had to wait, and indeed has not been attempted since.

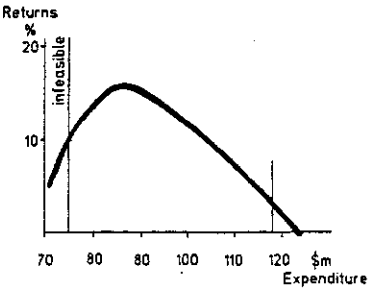
Only a small number of technical relationships were modelled. These were of two types, restriction (mainly upper/lower bounds) on expenditures on particular types of resources, and relationships between expenditures on related activities (so as to ensure the balance needed for successful railway operation).

8.1.2 The Scale of the Program

The following table and figure show the manner in which returns varied with the scale of the capital works program. With a budget restraint less than $75M, infeasible programs resulted. Beyond $119M physical and technical factors bound the solution.

The best program in terms of return seemed to be at around $80M. Beyond that level less worthy projects entered the program, bringing the overall percentage return down.

Expenditure $M	Return %
75	12
80	17
90	15
100	12
119	2



Three non-railway alternative projects with average to good economic returns were also included in the analysis for comparison.

8.1.3 Variations from Economic Optimality

In addition and given the assumptions made for the model, estimates were made of:

(a) the effect on total returns, of departing from an optimal solution;

(b) and the opportunity costs of individual variations. For the program with the best return (17% at $80M) the following table displays the effects of increasing effort on items beyond their estimated optimum levels.

	EFFECT ON NET PRESENT VALUE OF RETURNS OF SPENDING ANOTHER $100,000 ON EACH OF -	
	Increase NPV $'000	Reduce NPV $'000
Signalling	30	30
Geelong Duplication	*	30
Ringwood Duplication	110	*
Nonurban Locos or Carriages	*	50
Mainline Upgrading	383	*

Obviously an extension of effort on projects which reduced the returns is not economically sensible. However, among those which increase returns, only Mainline Upgrading and the Ringwood Duplication matched the cost of the additional outlays and seemed therefore an economically worthwhile enlargement.

If, however, for other than economic reasons a project were selected or accelerated and additional new finance could not be found, the "shadow prices" described above could also be used to choose which activity to curtail and still maximise returns. If, for example, in the instance above, the Geelong line duplication were to be proceeded with (and in fact it was) reducing the Mainline Upgrading program would be the least economically sensible manner of finding the money to make this otherwise economically undesirable adjustment.

It is also interesting to note that the naive (but common) practice of making up programs of projects by listing the items in priority order of economic merit and then exhausting the available budget will generally produce similar results to this sort of analysis, but not

always. For example, when finance is critically scarce, in this case around $75M, it would be economically optimal (given the general tightness of all the constraints) to have proceeded with the Geelong line duplication because of the infeasibility of what is not really an optimal solution. Once the extreme financial pressure was

relieved this project stayed always at its lower bound, and the whole process gives thereby a quaint demonstration of the proposition that priority is not always invariant to the scale of the program, and that the marginal project at one scale may not even be part of a subsequently enlarged program.

8.1.4. Theory and Practice

The actual VicRail proposal once received could hardly be judged economically optimal by the model outlined above. The "costs" of the decision to depart from the theoretically economic optimum for a program of that scale stand out clearly in the following table. Ignoring items leased, the VicRail application totalled $93M and promised returns of some $105M.

The Model Program emphasised Signalling and General Works (Item 1) chiefly at the expense of the two projects on the Geelong line for both of which $7M was sought by VicRail in 1981-82.

TABLE 3: OPPORTUNITY COSTS OF DEPARTURES FROM THEORETICALLY OPTIMAL PRACTICAL SOLUTIONS ($M)

	VicRail Application $M	Model Program of $93M $M	Practical Program of $93M $M
Item 1	7.1	10.0	6.5
Bridges	5.1	5.0	5.0
Agency Works	2.0	2.0	2.0
Wagons	7.3	6.25	5.0
Relaying	-	1.25	2.0
Signalling	3.8	6.0	6.0
Trains - New	31.0	32.75	35.0
- Refurbished	10.5	10.0	10.0
- Deferred	6.0	6.0	6.0
Ticket Machines	2.6	2.5	2.5
Geelong Duplication	3.0	0.25	3.0
Warribee Electrification	4.0	0.75	4.0
Ringwood Duplication	3.8	4.0	-
Sth. Dynon Terminal	1.6	1.25	3.0
Mainline Upgrading	3.7	5.0	4.0
Other Items	1.0	0.0	0.0
MAXIMUM NPV OF RETURNS	105.26	106.55	95.8
SIZE OF PROGRAM 1981-82	93.0	93.0	93.0
Implicit Program Return	13%	15%	3%

In fact, of course when the model restraints were applied to a $93M program, total returns fell sharply to a mere 3%. When the Geelong duplication and the Werribee electrification were forced into the solution, for example, many items sank to their lower bound and a net loss of $10M is the "cost" of reductions in more economically worthy activities. In particular the Ringwood duplication was the economically recommended sacrifice.

Finally it appeared that the enlargement of the scarce resource constraints, in the model at least, would not necessarily result in a greater return. The reason for this is probably due to the shortage of projects with really handsome returns relative to the resource and financial restraints and in particular the relative abundance of the resource, Way and Works labour.

The results of this work were discussed with Treasury officials only unofficially and had no evident influence in the selection of projects, nor was the scale of the program restrained. The actual program was $102 million in 1981-82. The worst and the best were funded.

8.2 CORRIDOR ANALYSIS PROCEDURE

As part of the development of the 1978 Transport Plan(12) the economic consequences of the implementation of a number of alternative policies for eleven corridors in Metropolitan Melbourne carrying the highest peak travel volumes were investigated by estimating the benefits of reducing travel times and trip cost by varying amounts (singly and in combination) in each of the corridors. The level of benefit so established was translated to a warranted program of works and finance required for each corridor. The operational characteristics of actual project proposals for the improvement of public transport facilities in the corridor were thereby related to a "ceiling" of justifiable capital expenditure, in advance of the development of distinct improvement proposals and in contrast to the conventional approach of individual project evaluations. At the time this was a revolutionary step. Before we consider the manner of its application, some description of how the

Corridor Analysis Procedure was conceived by the planners and estimated in practice by the economists, is required.

Taking corridors to be sets of competing metropolitan transport routes, both road and rail, a substantial change on any of which causes a significant corresponding change on the others, we may by removing vehicles from the forecast road traffic stream, estimate the benefits to the community represented by the costs of the journey saved and the reduced congestion for the remaining users, if that journey were transferred to the suburban rail mode.

The method was developed to aid the policy maker and the operator assess the economic impact of variations in the two key variables, journey time and cost, changes in which would to some extent influence modes and route choice. For example, trip times can be reduced by building and operating railways over third express tracks, by reducing headways (and hence waiting time) and travel costs can be affected by changing fare levels and introducing special road charges.

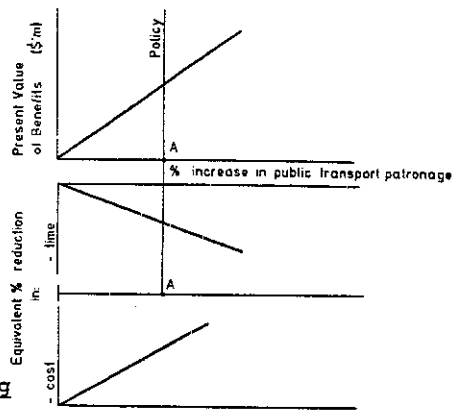
Knowing the relationship between such policy variables, and the numbers converted following a change in relative times or costs, represented by perceived values, made possible the estimation of a ceiling of warranted expenditure in money terms for each corridor for each policy option quite independently of a consideration of actual specific projects which may be capable of achieving that goal. The aim was then to set the guidelines within which the operating authorities could realistically propose investments or changes in operating practice in pursuit of Government policies.

Estimates were made of the present value of costs (capital, operating and parking) avoided by those car travellers with a choice who were induced by the policy to travel by public transport. The costs were summed for the period of the analysis and discounted at 10% and 7%.

The numbers of converted travellers were increased by 10%, 25% and 50% in three separate passes through the procedure. The results of all the calculations of vehicle cost savings and road decongestion were summarised in simple representations such as the diagram below.

In actual application the detailed calculations were much more involved than this brief account implies, and when disaggregated to produce the benefits of a particular policy (A) by the geographical area of origin of the car traveller, were plotted against a range of those policies (10%, 25% and 50% increase in public transport patronage), in the top part of the graph. Similarly from the mode split analysis a disaggregated plot by geographical area for the time and cost functions was prepared for the lower section of the graph relating changes in cost and time to travel mode choice.

The ceilings estimated were conservative as a considerable number of spillover effects were not quantified nor included. These primarily fell into two groups. First, there is a group which stubbornly defies quantification (noise, air pollution and a number of other environmental effects). Second, there are benefits for which quantification methods were not then available (e.g. calculation of benefits from the improvement to traffic flow on routes crossing the corridor as a result of the decongestion of the corridor road route itself). Later, methods were developed to do this.



The method also presented the policy maker with a useful tool for determining the relative priorities of investments in public transport as compared even with other areas of government spending. From the graph it is possible to determine the capital required to achieve any desired improvement to public transport patronage(*), so

(*) An investigation of past evaluations shows that capital requirements were 60%-80% of the present value of benefits of a project depending on whether it was a capacity upgrading or vehicle replacement program respectively.

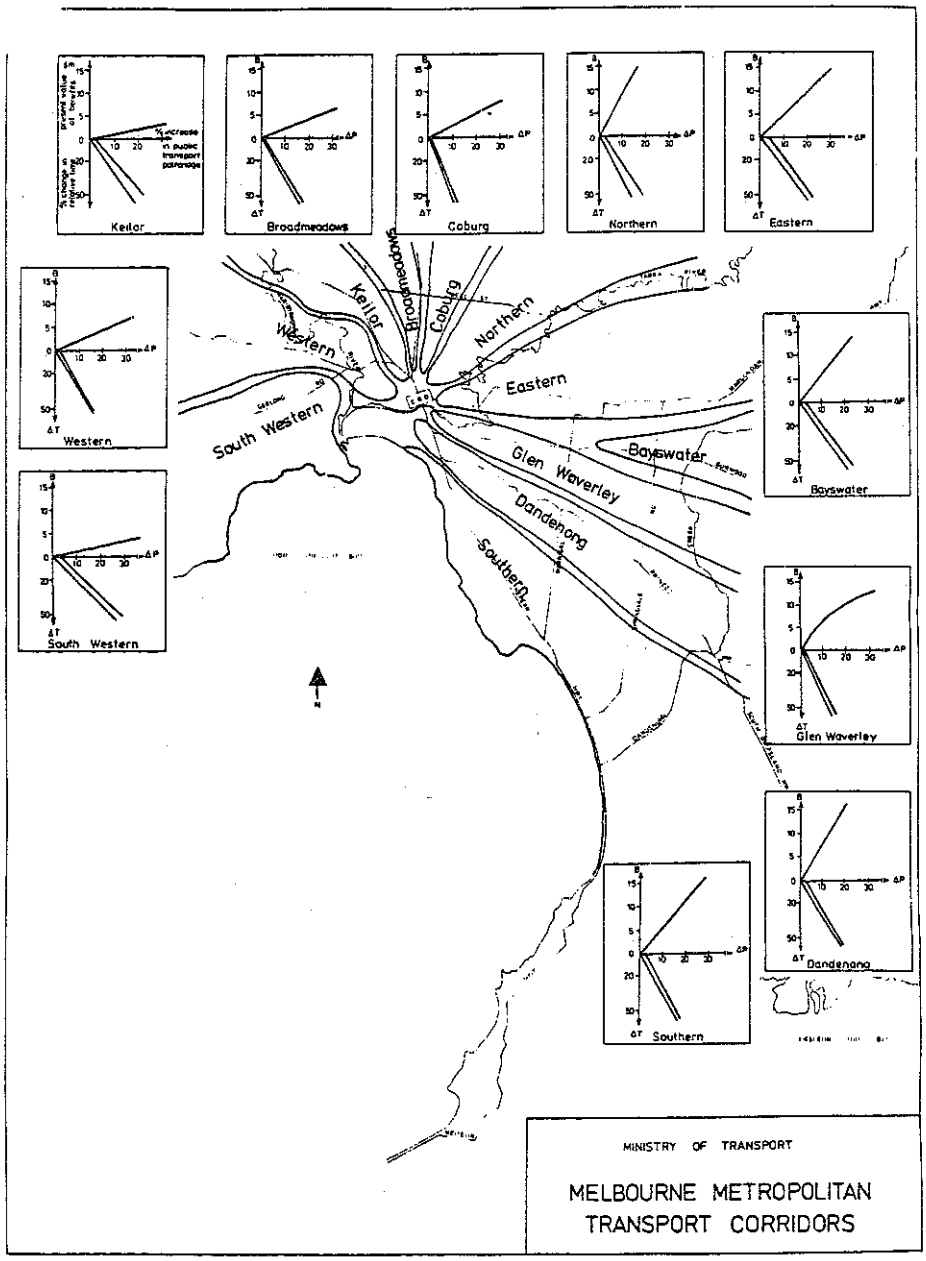
that a choice could be offered between pursuing a policy of increasing public transport patronage by say 5% for a certain amount of capital or some greater percentage increase for some greater amount of capital.

Nor is the ceiling of benefits absolute. It represents all those quantifiable benefits directly attributable to the road journey avoided. Many projects themselves contribute to the overall community welfare quite separately from the benefits of the avoided road journey. Changes in operational practice may bring about an improvement in the service level offered and accordingly attract more travellers to public transport, but equally importantly these changes may result in reduced costs to the operating authority. These reduced costs were to be considered as additional benefits of a specific project proposed and were of course added to the benefits derived from the method, at the stage when distinct and specific proposals were considered.

8.2.1 The Warranted Projects and Justifiable Capital Outlays

Having derived the total benefits of the project it remained to determine the costs of practical schemes to achieve the estimated changes in time and travel costs and compare these with the benefit ceiling. It was recognised that sometimes no single authority could generate a project which attains a given Policy. This does not mean that projects cannot be found at all but that operating authorities would search together for combinations of projects which may achieve the desired result. For example, an increase in the frequency of feeder buses together with co-ordination of bus/rail connections, quicker access to station gates, interchangeable tickets, fare reductions or road pricing policies may together reduce the time and cost of the public transport journey sufficiently to be consistent with the Policy aim when a feasible line haul railway upgrading project alone did not.

Though developed as a planning tool the economic evaluation module of the set of programs was always the most commonly used. Attempts to get planners within individual authorities to "think backwards" were


Keilor
Broadmeadows
Coburg
Northern
Eastern
Western
South Western
Bayswater
Glen Waverley
Dandenong
Southern
MINISTRY OF TRANSPORT
MELBOURNE METROPOLITAN
TRANSPORT CORRIDORS

not successful and the impression at the time was that it was both unfamiliar and frustrating to them to consider a transport problem, the solution to which may well have lain in someone else's patch.

8.3 OPTIMISING PUBLIC TRANSPORT SUBSIDIES - PROVIDING THE MOST TRANSPORT WITHIN A FIXED BUDGET

When, in 1979, the Metropolitan Transportation Committee (not the 1964 Transportation Study Committee) was established, an investigation of the methods then in use by the London Transport Executive(11) to assist the allocation of funding across the metropolitan public transport providers, suburban railways, tramways and bus operators, was conducted.

A well developed set of documents was prepared and a program of presentations given to disseminate what was at the time an unfamiliar idea. Its essential features are quite simple, quite logical. Policies and projects which change either revenue or passenger kilometres, cuts or extensions, are compared for the passenger kilometres generated or lost for each dollar of revenue gained or lost, and a set of projects is chosen which maximises passenger kilometres within a fixed budget.

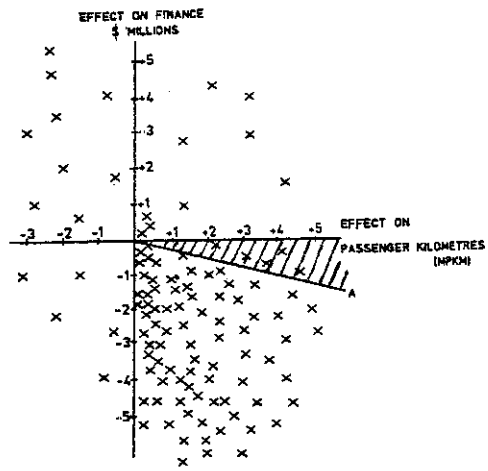
The last project admitted would define the "passmark" for the admission of variations in the coming year, and future changes should either

- gain both traffic and revenue or
- lose less traffic per dollar of financial gain than the last admitted project or
- gain more traffic per dollar of financial loss than the last admitted project.

Here, surely, was economic rationality par excellence, wherein the "passmark", a certain number of passenger kilometres gained or lost per dollar outlaid, is automatically fixed once the level of funds is chosen by the Government.

The "passmark" is approached when the acceptance of a project increases the level of service and still meets the financial constraint. The derivation of the "passmark" which can be visualised in the following diagrams is based on relationships between the different outcomes of projects represented by crosses falling in different quadrants of a plane showing gains or losses of money or passenger-kilometres.

True to the assumption of economic rationality, one normally assumed that no project would be proceeded with which fell into the "south-west" quadrant. However, in some cases these projects may be included if, in the longer term, the outcome would move to one of the other of the specified outcomes, or if an otherwise social goal could be afforded. The average long term effect of a project would be plotted as a net present value if a variable annual effect were forecast.

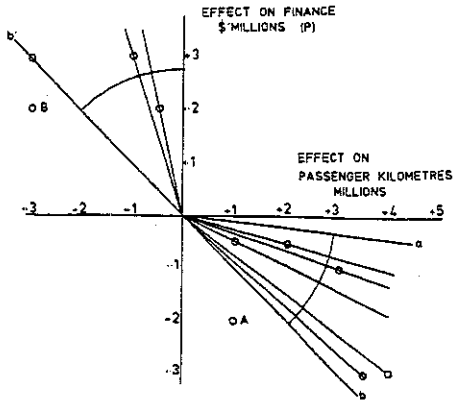


8.3.1 Proceeding to an optimum

All projects in the "north-east" quadrant, the shaded area in the diagram above, would be expected to proceed.

For returns to be maximised, projects should now be pursued which gain passenger kilometres until finance is exhausted. These projects are represented by the shaded area of the diagram above.

Even though finance had been exhausted in this manner there may be still more projects which can be done without affecting the final financial outcome. Pairs of projects can also be traded off from the second and third quadrants, which, when taken together, have a balancing effect on finance but would increase passenger kilometres. The rest is mere geometry. Trading off can be continued until the last pair of projects form a straight line through the origin as represented by the line b'ob in the diagram. The traded projects are those in the shaded area

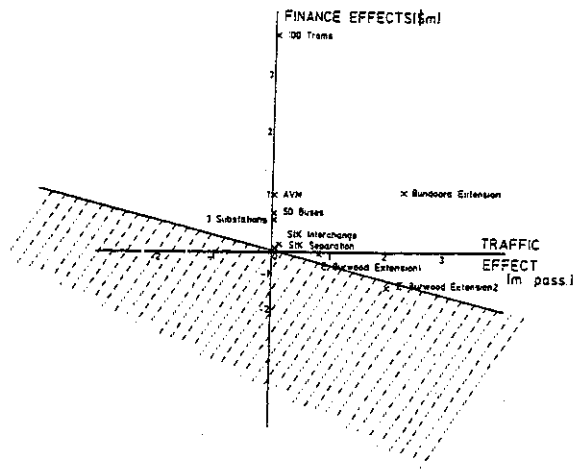


There are going to be numerous orientations of the "passmark" line depending upon the fare level and level of subsidy but there is no orientation which will accept what the London Transport Executive referred to as "disastrous mixtures"(11) such as is represented by the combination of projects A and B, say, shown in the diagram directly above and so commonly found in practice. The slope of the line measured in passenger kilometres/dollar so determined defines the "passmark" for projects for the year and ensures that within the financial constraint, the sale of passenger kilometres will be a maximum.

It would not always be necessary to define the "passmark" or marginal projects so. Marginal projects are constrained by projects in each of the trading quadrants which are the subject of the decisions taken each year by the Government with respect to the triangular relationship of fares, level of service and subsidy. In 1972-73, for

example, a fare increase would have lost about 25 passenger kilometres for each dollar gained, so that the marginal level of service project with a fare increase to be consistent with the aim and avoid "disastrous mixtures" would have to have yielded 25 passenger kilometres for each dollar lost.

By similar reasoning in a year without a fare increase, level of service would control. Investigation of decisions during the 1970's showed projects at the margin to yield about five passenger kilometres per dollar outlaid which would of course constrain finance yielding projects to five passenger kilometres lost per dollar gained. The "passmark" could then be expected to range between five and 25 passenger kilometres per dollar.
The following figure shows an array of capital projects proposed in the late 1970's by the Melbourne Metropolitan Transport Board arranged so as to display their relative aim worthiness.



Variants of this idea have been popular from time to time. Faced with runaway deficits Treasuries have seen this sort of approach as at least "capping the flow". Under pressure of general budget stringency, Transport Ministers have supported a form of this

approach as a way of defending their budget share. The idea of using savings from public transport staff reductions to fund service extensions has been most recently advanced in METPLAN. (10) Perhaps the best reason for not embracing such a system is that rarely voiced view - that the next best place to apply the savings of one portfolio may not be in that area at all, but in some other field altogether, never forgetting those ever present but often overlooked alternative projects, a cut in taxes or the repayment of a debt.

8.4 HAVING A BIGGER IMPACT

Hundreds of manhours and thousands of dollars went into these investigations (and others like them) yet their impact on decisions of the time seems small. The thinking of senior policy advisers to Government was affected of course but the immediate effect on Ministers and Cabinets must have been slight indeed.

In discussions with former departmental heads it became clear that three practical issues were at least as important as technical fine points.

An important issue is timeliness. Being either early or late can spoil a good piece of technical work. The analysts ability to control the rate at, or the topics upon, which he works is severely limited. Having a reserve of partly completed material can be somewhat of a buffer to the unexpected ministerial request.

Getting the message out and about is also important. But this can take a while - up to a decade. Some of the research and planning developments occurring in the 1970's were not ready on time, nor were most being discussed in professional circles at the time and by the early 1980's other demands and changes were emerging.

A final feature to stand out in these discussions is ambience.

Nothing can satisfactorily be considered in isolation and sometimes only the Minister, and sometimes not even he, has the full picture. Great technical work can be rendered useless not only by being late

(as remarked above) but by naivety on the analyst's part or incompleteness of his vision.

Nor does it seem that some of these phenomenon we have been discussing are merely local or confined to transportation. Students of recent American public administration may have discovered in David Stockman's(16) excellent first hand account of the budgetary difficulties of the Reagan administration, a very similar version of the same struggle. The political pressure to add is scarcely matched by the economist's urging to save. It seems likely that, the tools described above and the thinking that spawned them, were never part of the Victorian Government's own plans in the 1970's.

9. CONCLUSIONS

1. Conscientious economic evaluation of projects and proposals only seems to occur if the threat of withholding funding is a condition and is taken seriously. Victoria is starting to do this again after a 10 year hiatus, through the insistence on "evaluations before approval", the evaluation having to conform to a standard prescribed in a quite detailed manner. Christchurch, on the other hand, is just beginning to experience such threats. This coupled with the approach of deregulation and "stand alone" companies is providing the impetus to take the situation seriously.

2. Continual change of personnel or methods reduces the chances that fully researched, logical and economically sound solutions would be selected in a contest with "wild schemes". How to stop change once it has started or to keep control once the goal has been attained is still very much an issue in Victoria and New Zealand. Victoria currently shows few signs of the pace of organisational change slowing and in New Zealand it continues to gather momentum. In such an environment planning will be very short term (or even absent).

3. Consultants have the potential to make you weak. Though useful as teachers and innovators, as people with few other demands on

their time and attention, consultants are valuable, but unless properly managed they can be enervating to an organisation.

4. Consultations and teamwork will play a vital role in the future of the transportation industry.

5. Poor advice to the Minister and Government leads to "foot shooting". Retrieval of the lost ground may be very difficult. Sometimes the taxpayer just puts up with the additional cost.

6. Finally, the industry and the technical adviser must open their minds to marketing philosophies and technologies otherwise much effort will count for little.

APPENDIX A - MARKET SEGMENTS

Youth: This segment is composed of young people who are in transition to independent living in a new household. Transport is mainly required for trips to work, sport and socialising. Low levels of car ownership mean that they rely on public transport and other people's vehicles more than other groups

The principal marketing task with this group is deferral of car purchase. The main opportunities lie in work trips and city-centre based entertainments. The main selling proposition relates to the cost of vehicle ownership and operation. Existing services could be enhanced by measures which enable the bus to better emulate a car such as "flyer" services on the work trip. The main new service options in satisfying the non-work travel needs of this group are "specials" and charters.

Young families: This segment are by financially stressed and all face considerable lifestyle changes adapting to parenting. The principal marketing opportunity for this group is the work trip by the salary or wage earner especially trips to the central business district where congestion is a constraint on the use of private cars. The main selling proposition is the benefits to the childminder of the use of the family car. New service options include shopping and kindy specials

Working mothers: This group is drawn largely from the mothers of school children. The journey to work is characteristically a multipurpose trip, combining shopping and work, made late in the morning peak and in the mid-afternoon.

The principal marketing task in this segment is to discourage purchase of a second car The main opportunity lies in catering for the off-peak multipurpose trip. Catering for this segment therefore requires an extended peak service, linking work locations with shopping centres. The selling proposition to this group is the cost savings of buses compared with a second car. Existing services of this type are enhanced by the ability to transfer between buses or continue on the same fare after a break in the journey. New service options include distributor services based on suburban hubs, and inter-hub services which avoid the central city.

Retirees: This is the last target market. While most of these households have access to a car, the pace of life is often reduced and they will leave the car at home in favour of a more relaxed journey by bus, especially to the city centre.

The main task with this group is to encourage people to leave their cars at home or to sell them. The principal opportunities arise from off-peak trips to shopping (convenience goods) for social purposes, and to appointments. The main selling propositions are cost savings and lack of stress. Enhancements to existing services for this group focus on information. They range from timetable information for people with impaired eyesight to widespread dissemination of services to doctors, hospitals and other health facilities. New service options include "specials" to entertainment and sports venues

Public Transport's Market: Public transport has its biggest market shares in journey to work (around 10% of trips made) and to education (from 10% to 25% in households with school-age children).

Public transport demand is heaviest for the three lifecycle groups with school-aged children reflecting the predominance of education trips in these groups Public transport's market share was also high among older couples whose children had left home. This is mainly due to the relatively high use of public transport by this group for shopping trips and may reflect a combination of increased leisure time and a generalizational reluctance to drive to busy centres. The relatively high use of public transport for shopping and other purposes by retired people indicates a continuation of these tendencies.

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