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Integrating Cycling into Sydney – Mission Impossible?

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Abstract

It is often assumed that cycling in Sydney is gradually being squeezed out by competing modes due to the vulnerability of bicycle users and increasing affordability of motor vehicles. This paper examines the future of bicycle use in Sydney based on available information on cycling and a SWOT analysis. It uses two case studies to illustrate the possibilities and problems for integrating cycling into the transport infrastructure. The first case study is the rail-trail development between Parramatta and Liverpool. This is an example of the possibilities for low cost bicycle provision where political momentum overcomes regulatory and institutional inertia. The other case study is the Eastern Distributor project. At first glance, this project has very negative implications for a number of bicycle links to the East and South of the Sydney CBD. Proposed development of route alternatives may in fact enhance the demand for certain types of bicycle use. Based on the models described and supported by the case studies, there is room to conclude that bicycle use may persist – even in Sydney – given appropriate facilities and incentives!

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Introduction

Mission impossible is not only a popular 1970's action drama. It is also the popular conception of high levels of bicycle use in Sydney. What must be remembered is that what is popular today may be flares tomorrow and visa versa. Fashion is one aspect of social change. Fashion in transport is a function of technology, geography and economics as well as that indefinable, unpredictable element that made chocolate brown *the* winter colour last year

Applying management "theory" to transport products

Fashion is also a common focus in management. Our business schools and professional advisors, prompted by requirements to publish or perish, are quick to adopt new fashions in management theory. They may expand upon new theories of organisational behavior for citation purposes, for teaching, marketing and for commercial partnerships. The Druckers, Coveys, Porters and Moss-Kanters of the management world, like the Armanis, Laurens and Versaces of fashion, have the ability to sell their ideas well beyond their immediate circle.

It is appealing to try to apply the management "theorems" (if they can truly be said to warrant that term) to transport policy and planning. This paper tries to consider cycling in Sydney as a product and then adopts a management consultancy approach to positioning, developing and marketing that product. It uses classical management consultant procedure by citing two case studies to flesh out a theoretical approach.

Many of the management theories are breakdowns of the practices of successful individuals and organisations into steps that are readily copied by others. Frequently formulaic approaches come up against unforeseen obstacles, hence one of the most important first steps in many management consultancy exercises is to try to step back and examine the context of operations. One of the longer standing acronyms in management theory is SWOT analysis (strengths, weaknesses, opportunities and threats). This is designed to do just that – identify the context of an operation to allow selection of appropriate strategies.

SWOT analysis is a checklist that is readily applied to cycling and will be the end point for the first part of this paper which looks at the potential for exploitation of the bicycle. Before getting to this end point, it is necessary to examine cycling trends in Sydney and behavioural issues affecting bicycle use. The literature on these subjects is examined in the next two sections.

A sustainable transport solution?

What motivates this paper is a determination to investigate what products are actually capable of being successful elements in creating sustainable transport solutions. Sustainable transport is generally considered to require less use of private motor vehicles. This is typically seen as coming about through a combination of less urban travel and modal substitution. Modal substitution is generally assumed to have greater welfare benefits than reduced travel as economic theory categorises travel as a derived demand. It enables increased consumption and hence greater "utility".

One obvious modal substitution involves cycling trips to replace motor vehicle trips. Is this realistic? The answer from most people currently living in Sydney is "no". This answer may be viewed as per Brög (Brög and Erl 1982) as the product of objective and subjective factors with constraints and perceptions in between. Figure 1 illustrates his analysis of cycling potential in a small city in Germany based on detailed activity diaries. He identifies a potential for cycling of 30% of trips in that city after allowing for trip lengths, other constraints, perception of routes and times and subjective factors.

Some objective factors limiting bicycle use are existing travel patterns. Residential and workplace locations in Sydney and many other urban centres often mean long commuting, recreation and shopping trips. Modern gender roles often involve complex trip chaining to meet household transport needs. These trip chains often involve segments with the principal purpose of ferrying children, transporting shopping, going to work, going on a business trip etc. If even one of these segments is unsuitable for bicycle use, then the whole of the trip chain may be unsuitable for bicycle travel.

Other factors often cited in Sydney include difficult riding conditions – the existing street-scapes are noted for their high traffic volumes and narrow lane widths. These may be characterised as objective or subjective factors depending on whether alternative routes are available upon closer scrutiny.

Subjective factors are often difficult to categorise. They include feelings of vulnerability on a bicycle, concern at the effort required relative to motorised transport, perception of appearance on a bicycle. They also encompass image factors associated with motor vehicle use and bicycle use, the "look" of bicycling clothes and helmets and concern about mechanical issues associated with bicycle use – ability to deal with a flat tyre etc. These sorts of factors have been considered in a number of studies (Spectrum Research 1987; Datacol 1992; Katz 1996), but their impact is difficult to quantify. Policies to address these factors are also outside the typical toolkit of transport professionals.

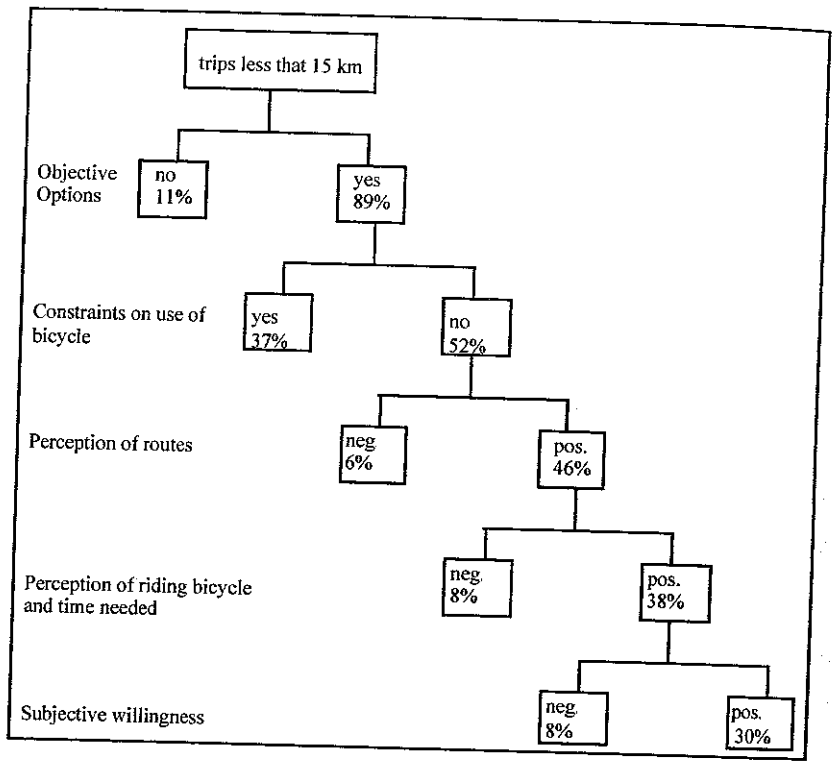

Figure 1 Situational analysis of potential for bicycling per Brög 1982

Cycling trends in Sydney

A sensible first step in carrying out a strategic analysis of cycling in Sydney is to identify the current levels of cycling and to see if there are any obvious trends in bicycle use. Hopefully this task will be made easier in the future as the new Australian Cycling strategy (Austroads 1999) is implemented One of the major elements of that strategy is the collection of good data on bicycle use across Australia.

The best current information collected on cycling in Sydney is the Transport Data Centre's 1996 Home Interview Survey (HIS) Unfortunately, this data has not yet been released and the next most recent data set (1991) has been subjected to only limited analysis. That analysis is described in last Christmas's issue of Data Developments (Transport Data Centre 1998).

The overall number of trips made by bicycle in 1991 was 142,700 per weekday. This is a substantial number of trips – 0.8% of all trips – and involved a substantial number of people (39,800). Slightly more bicycle trips were made on the average weekend day (147,900). This constitutes 1% of all weekend trips. Measures of average daily participation in cycling can be compared with "regular" participation as measured in a 1988 ABS survey (Australian Bureau of Statistics 1989), arguably the best information

compiled on cycling in NSW but clearly out of date. That survey showed over 1 million people in the Metropolitan Sydney Region rode bicycles in the last year. Of these half a million rode weekly, 165,000 rode monthly and 340,000 rode less often.

The HIS figures show a dominant profile of bicycle users is a person under 20 years of age (63% of all trips) who is male (82%). Most trips (61%) are ten minutes or less, with 88% under 20 minutes, and 95% under half an hour. The longer trips were more likely to be made by older cyclists.

The most common trip purpose was social / recreational, followed by shopping and education. The HIS identified approximately 7,000 bicycle trips to work (about 0.5% of all HIS work trips on an average week day). This is slightly less than the figure identified in journey to work data collected as part of the Census. The comparable 1991 data identified 10,642 bike trips while 1996 data showed 11,434 bike trips to work (approx. 0.7% of all Sydney metropolitan work trips) suggesting the HIS undersampled cyclists.

Interestingly, cyclists were under represented in lower income categories (adult income up to $16,000). This may be correlated with gender but may also reflect income effects observed to influence recreation participation (Adamowicz 1994).

Behavioural issues

Are Sydney people different?

Sydney has significantly lower levels of bicycle use than other cities in Australia. The title of this paper begs the question of whether it is the people of Sydney that are different or whether it is the place that is the problem. The stated preference surveys conducted by Katz (1996) suggest that Sydney people (albeit a very limited sample but probably representative) would use bicycles much more if given a different physical environment. Indeed, figures close to those observed in the Brög study (*op cit*) would not be out of the question if given different conditions.

A benefit of the stated preference methodology used by Katz is that discrete choice models can be estimated with parameters for individual variables. Figure 2 shows the form of the deterministic component of an MNL model incorporating; constant terms, the coefficients (b), and the variable names. The variables include each of the key attributes in the experiment as well as variables representing various attitudes, gender and existing use of a particular mode.

The results and a description of the variables in the model is shown in Table 1. The model has a very good fit and the variables are virtually all significant and of the expected sign.

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V (auto) = CARC + bCARCOST + bTRAFSPD + bCARTRIP + bFUTRIP
V (bus)  = BUSC + bBUSCOST + bFREQ + bBWALK
V (bike) =        bBIKECOST + bDIST + bPATH + bTRIPEND + bTHRILLS
                  + bENVIRO + bDIGNITY + bGENDER
V (taxi) = TAXC
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Figure 2 Deterministic component of MNL model

Table 1: Multinomial Logit Model including attitudes, trip making and socio-demographic variables

Variable	Description	Beta	z = β/se
CARC	Car specific constant	1.70	1.72
TRAFSPD	Average Traffic Speed - four levels from 10 to 40km/h	0.15	1.99
CARCOST	Cost of car 4 levels from $2.50 to $10.00	-0.72	-8.77
CARTRIP	Made first trip on day of survey by car; 'yes' =1, 'no' =0.	1.19	6.93
FUTRIP	Expected future trip making; 'much less'=1 to 'much more'=5	0.74	6.96
BUSC	Bus specific constant	5.31	5.61
BUSCOST	Cost of bus- 2 levels $1.00 and $2.00	-0.27	-1.89
FREQ	Bus frequency- 2 levels 10 and 20 minutes	-0.37	-2.51
BWALK	Walk distance to bus stop - 2 levels 5 and 10 minutes	-0.28	-1.92
DIST	Commute distance - 4 levels from 3 to 12km.	-0.73	-7.76
PATH	% bike path - 4 levels; 90, 60, 30 and 0% of trip	-0.45	-5.10
BIKECOST	Cost of bike - 4 levels from a subsidy of $2 to $1 cost	-0.17	-1.94
TRIPEND	Shower and parking facilities - two levels; yes = 0 and no = 1.	-1.05	-5.21
THRILLS	Gets thrills from riding	0.34	2.46
ENVIRO	Bikes good for the environment	0.78	4.43
DIGNITY	Concerned about dignity riding a bike	0.92	5.68
GENDER	Male = 1, Female = 0	1.38	6.64
TAXC	Taxi alternative specific constant	-	-0.09
		12.74	

Notes: Log likelihood -733.03
Adjusted Rho-squared 0.44

Variables of particular importance from a transport planning viewpoint and with a SWOT analysis in mind are PATH (availability of bike paths), TRAFSPD (traffic speeds) and costs of alternative transport modes.

The conclusion from this study is that Sydney people are not inherently different to people in other locations but their physical environment is different. There is a clear preference among the sample for designated bike routes. This is most likely to be motivated by a concern about conflict with motor vehicles. Dutch planners have developed a concept of a stress - comfort continuum in planning for bicycles and use matrices of traffic speeds and separation requirements for bicycles (Centre for Research and Contract Standardisation in Civil and Traffic Engineering 1993). This concept has been taken up by US researchers (Sorton and Walsh 1994; Sorton and Walsh 1995).

There is also a hip pocket aspect that is represented in concern about travel costs of alternative modes. If tolling or parking charges are increased throughout Sydney to levels already observed in some areas, there is likely to be a significant interest in bicycle use given provision of suitable facilities. As traffic speeds fall, the relative cost of bicycle use is also seen to fall. In this sense congestion is positive for bicycle use by increasing the relative speed of bicycle travel and decreasing the perceived severe injury risk as a result of lower speeds.

The model does not explicitly incorporate some of the positive features of bicycle use such as a health dividend from bicycle use and a better body image. These are becoming increasingly important considerations at a time when heart disease is a major killer and obesity is causing significant overall health problems. Programmes such as Active Australia are raising awareness of the benefits of exercise and may place greater weight (no pun intended) on fitness coefficients in future modelling.

SWOT analysis for cycling

The review of available information above provides the necessary background to carry out a SWOT analysis for the notional product "bicycle use". Just some of the major items to come under each heading are:

Strengths

- The new cycling strategy for Australia (Austroads 1999) provides a blue print and performance measures for promoting cycling.
- Significant numbers of people currently own bicycles and cycle regularly
- Environmental and health messages are being accepted in transport. There is a move to consider transport and health together as studies suggest that health is linked to transport behaviour (Hillman 1992; Roberts, Owen et al. 1995).
- Economic rationalist dogma suggests cycling will become more popular if costs of substitutes increase – with congestion and pollution being major costs and unlikely to abate without drastic policy changes or technological breakthroughs the prospects for promoting cycling are good.
- Potential alliances with complimentary transport modes – especially train, and ferry – and other groups with coincident aims e.g. environment and health advocates could increase political power

Weaknesses –

- There is a clear concern about vulnerability as individual users of bicycles.
- There are competing trends in personal recreation towards easily available electronic entertainment.
- The environment for cycling may appear to be worsening as car domination increases. This is manifested in declining legitimacy of bicycle use as measured in a survey of road users conducted annually on behalf of the RTA (Frank Small and

Associates 1995; Frank Small and Associates 1996). The later study suggested that only 50% of respondents believe that bicyclists have just as much right to use traffic lanes as cars and trucks (down from 54%). The same surveys did however suggest that the RTA should have as a priority education about the rights of bicyclists and that the RTA needs to strengthen its performance in relation to provision of bike ways

- The bicycle using community is fragmented with poor organisational ability and relatively small industry support.

Opportunities

- Joining in on promotional campaigns directed at health and environmental improvements
- Strategic alliances with more powerful lobby groups that share a common aim e.g. the trucking industry may be joined in seeking provision of road shoulders. These benefit trucks as well as cyclists and reduce road maintenance costs on heavily trafficked roads. Also new rail rolling stock may be obtained that provides for carriage of bicycles.
- Reductions in average trip distances through medium density development and other policy settings designed to increase urban density.
- Road pricing initiatives that seek to internalise externalities of other transport modes.
- Major projects offering the possibility of provision for cycling where there was none previously.

Threats

- Major projects that sever bicycle links or do not provide for cycling can reduce the potential of exploiting the bicycle product
- "Safety" treatments designed to improve safety for motor vehicle occupants may reduce safety or amenity for cyclists.
- Degrading air quality and aesthetic environment
- Cost reductions to motorised vehicles can make alternative modes relatively more attractive e.g. diesel fuel tax reductions can be expected to increase the numbers of heavy vehicles and particulate mater on urban roads.

The future of cycling in Sydney can thus be seen as being determined by the success or failure of the "product managers" in exploiting cycling's strategic strengths and opportunities and countering its weaknesses and threats. Product managers in this sense includes a very loose coalition of planners in the Roads Authority and Department of Transport, bicycle advocates and industry. Needless to say these managers do not always see themselves as part of a product management team and there is often conflict regarding implementation of particular projects, however adoption of the product manager model could well provide some clarity of purpose in planning for bicycles

The two case studies described below are illustrative of how opportunities can be exploited and threats countered. The first case study describes the development of a rail trail between Parramatta and Liverpool. This demonstrates that with a certain amount of political will, reinforced by argument based on the strengths of cycling, a major piece of cycling infrastructure can be created. This required liaison with rail authorities and development over time of significant technical expertise.

The second case study illustrates the more difficult situation of a major road construction project that potentially poses a major threat to cycling through severance of existing routes and inducement of traffic. The challenge in this situation is to ensure that improvements in conditions for cyclists at least match those for motorists. Given the disparate nature of cycling activity, this is a difficult task. However, the Eastern Distributor Cycleway attempts to do this, again exploiting the strategic strengths of cycling to overcome organisational hurdles

The case studies of current major projects confirm that nothing is impossible and we may well see a cycling Sydney in twenty years time. It will however require professional product management to capitalise on strengths and opportunities and counter weaknesses and threats.

Case studies

Case study 1: Parramatta to Liverpool Rail Trail

In early 1998 the Roads and Traffic Authority, at the request of its new Minister, Carl Scully, contracted Sustainable Transport Consultants to determine the feasibility of building a mostly off-road cycleway between Parramatta and Liverpool by using an existing active railway corridor. As Minister for both the rail/transit and roads agencies Minister Scully encouraged a "can-do" approach from his public servants and this set the tone early on for the generally positive course of negotiations which followed.

While active and disused railway corridors have been used for bike tracks in other states and overseas this project represented a first time opportunity for NSW.

The STC study team was well positioned to quickly and efficiently determine feasibility of the project proposal. One of its key members was Bruce Ashley who had recently completed a major study for the Department of Transport on the use of railway corridors for bicycle and pedestrian facilities. The STC team, led by its principal, Warren Salomon, who has over 20 years practical experience in bicycle facility policy and design, recommended in its Stage 1 Report that the proposal was feasible and should proceed to concept design and budget costings stage.

The Stage 2 project team brought in additional skills and experience of: planner, Contessa Hajinikitas (who has been responsible for up to 17% of the bikeplanning

undertaken in the Sydney Region to date), Jim Longworth, the Natural Services Manager with Rail Services Australia (an expert in the operation of railway corridors both for active rail lines and maintenance activities), geographic information systems expert James Goodwin and retired railways engineer Ross Best.

The SIC team carried out extensive field and documentation surveys of the corridor before determining the most suitable location for the 2.5 metre pathway. Early in the project it was recognised that the key issues to be resolved if the project was to gain the support of the rail agencies was the preservation of existing access by railway maintenance vehicles and the minimum disturbance of railway operating infrastructure, in particular the signal wiring ducting and ancillary buildings.

To a large extent the project simply involved the relocation of the 1.8m chain wire railway boundary fence 3 metres inwards to build a 2.5 m reinforced concrete pathway on land now combined with the existing roadway easement. Different solutions had to be devised to route the cycleway around railway stations, over creeks and through busy strip shopping centres adjacent to some sections of the rail corridor.

As a major north/south regional route the cycleway had to be well integrated to the local bicycle network and make all possible east/west connections as well linking to all popular trip destinations adjacent to the corridor.

The diagrams and photographs on the following pages illustrate some of the solutions devised to solve problems encountered in the concept design process. SIC completed the second stage concept designs in 1998 and early this year the RTA called for tenders to design, construct and maintain (for a 10 year period) the 17km cycleway. The successful tenderer Austin Arenco Australia has commenced work on the project and is expected to complete the work by March 2000. SIC principal, Warren Salomon, has been sub contracted to provide technical advice during the construction period.

Case study 2: The Eastern Distributor Cycleway

The Eastern Distributor is a major upgrade of Sydney's urban motorway system and provides a major north/south regional road link between the Sydney Harbour Tunnel and Sydney Airport and the Princes Highway further south. With the planned completion of the M5 East Motorway in 2002 the Eastern Distributor will also provide a linkage through to the Hume Highway.

The Eastern Distributor is located in a corridor with parklands and industrial developments which creates a natural north/south barrier between the Eastern Suburbs and the rest of Sydney. East/west access across this corridor is also very important.

The Roads and Traffic Authority's policy is to provide access to bicycle users on newly constructed major roads and upgrading works. European and World best practice is to provide a high quality (similar level of service) alternative facility when volumes

exceed 60km/h and 5,000 vehicles/day. The motorway upgrade will provide similar bicycle facilities (use of break-down lanes and wide kerb-side lanes) to the existing roadway but within a much busier environment

With an increase in traffic volumes and the size of the road development the cycling environment may suit "main roads" cyclists but will not be attractive to the bulk of the cycle owning public.

To provide as well for the general community bike rider an alternative continuous/coherent cycleway route will be identified and built (off the motorway tarmac or on-road using parallel local roads) to provide for the bulk of the community who want to use their bicycles for transport and recreation

Both types of cycle facilities have been designed to provide excellent connections to the local and regional bicycle network and improve local and regional access along and across the corridor. Both types of Eastern Distributor cycle facilities will take advantage of new and proposed developments adjoining the corridor as well as existing disused easements and access-ways.

The proposed regional cycleway also complements other planned or existing cycleway projects in or near the region. Local bikeplans have been prepared during the past decade for all local councils and these plans have identified a number of on-road routes which have been incorporated into this design study either as part of the route or as linkages.

Concept design work and budget costings for this project were carried out by Sustainable Transport Consultants' Principal, Warren Salomon. A key approach in designing a major regional bicycle route was to utilise the large number of direct connecting local streets running parallel with the Eastern Distributor and to recommend the type of engineering treatments needed to make the route a safe, easy to follow alternative to the normal arterial road system.

The illustration below (Case studies – page 7) shows the symbolic method developed by STC to quickly detail a regional bicycle route. Note that in a low-speed, low-traffic-volume environment very little needs to be done to streets mid-block. The intersections, however, need to be carefully designed to provide operating space for cyclists and a clear indication of where the route is placed. The illustration on the following page is a generic example of how an intersection may be treated to allow safe passage across a busy arterial road for cyclists using the regional bicycle route.

The photographs which conclude the section illustrating the project provide three examples of the type of riding environment to be experienced by users of the regional route once constructed. The mixture of existing off-road with predominantly on-road in local streets will provide a low stress facility able to be used by a wide range of bicycle users.

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