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Singapore's Urban Transport: Sustainability by Design or Necessity?

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1. Introduction

Singapore has been held up as an exemplar of 'sustainable' urban transport policies (Ang 1993a; Newman and Kenworthy 1999; Schwaab and Thielmann 2002) or as a 'sustainable transit metropolis' (Cervero 1998). The chapter first examines the meaning of sustainability or sustainable development as applied to urban transport and briefly evaluates Singapore's system in light of these ideas. It finds a measure of broad similarity between Singapore transport policies and relevant sustainable transport ideas. However, there are also some significant deviations.

This raises questions, such as why have Singapore's urban transport policies resembled purported 'sustainable' ones? Was this an accidental alignment? Or are there underlying connections between the idea of sustainable transport and the particular imperatives that prompted Singapore's policies? And how can we account for the deviations?

The chapter therefore examines the motivations behind the policies that established Singapore's reputation. A review of these reveals a range of rationales, some familiar, some slightly surprising. Locally-focused, mainly non-environmental imperatives are revealed as dominant, with no obvious connection with motivations usually associated with sustainable development.

However, there are some less obvious resonances between sustainable development and Singapore's approach to transport. Furthermore, the limits of these provide insight on the reasons for the deviations from policies that would usually be expected if sustainability were a key motivation. These findings prompt some final reflections on the prospects for pursuing 'sustainable' transport policies elsewhere.

2. Sustainable Development and Urban Transport

2.1. Defining sustainable development

'Sustainable development' has proven challenging to define precisely but some authors, such as Dryzek (1997) and Meadowcroft (2000) among others, embrace this ambiguity in seeing the term as a useful 'meta-concept' or aspiration rather than a specific operational objective. As Dryzek comments, ideas such as god, democracy or justice can be compelling and spur action despite being difficult to pin down precisely.

A number of prominent themes run through the notion of sustainable development. A key one is the marrying of contemporary equity and inter-generational equity by the Brundtland Commission (WCED 1987). Another is the pursuit of balance between three vital dimensions of development - social, economic and environmental – as has been adopted as reference point for this book. Similar to this is the idea that sustainability demands a holistic vision of developmental success in which we need to attend to multiple dimensions simultaneously. The sustainable development literature also often emphasises attention to multiple scales in both time and space. These various notions can be combined to express sustainable development as the aspiration for success simultaneously in all three vital dimensions (economic, social and environmental/ecological) in both the short term and long term, and at every scale from local to global.

By contrast with these rather complex expressions, a heuristic perspective for those emphasising *ecologically* sustainable development is to see it as simply requiring us to *'do better with less'*. This neglects some important dimensions of the notion but does capture the idea of containing impacts while also achieving success in

development. Later in this chapter I will examine which, if any, of these sustainable development themes find an echo in Singapore's urban transport planning.

2.2. Sustainable transport as low-impact transport?

Moving now to the arena of transport, it is clear that urban transport systems often involve significant environmental effects that are harmful at a various scales. Those most often emphasised involve fossil fuel-related pollution. This narrow focus sometimes prompts a narrow policy effort, focused primarily on 'tailpipes' or on reducing these impacts per vehicle kilometre, neglecting a wide range of diverse impacts, many of which correlate with the amount of vehicular traffic rather than the characteristics of vehicles or fuels (Litman 2005). A slightly more sophisticated approach is expressed by the ASIF acronym, which points to the potential for improvements through: lower impacts per unit of fuel used (F); less intensive use of fuel per vehicle kilometre (I); structural changes to increase the role of transport modes with lower impacts per passenger kilometre, such as high-occupancy public transport or non-motorised transport (S); and reducing the overall level of transport activity (A) (Schipper at al. 2000).

2.3. Dimensions of 'success' in defining sustainable urban transport

It should be obvious however, that a narrow focus on fossil fuel impacts is incomplete and neglects the wider dimensions of the idea of sustainable development. To begin with, it neglects the full range of impacts, such as economic impacts (congestion, crash costs, infrastructure costs, etc.), social (equity, health, community impacts, etc.), and wider environmental impacts (including noise, habitat and water cycle effects) (Litman 2005). It also begs the more difficult question of what positive contributions of urban transport that should be kept or increased even as we tackle the impacts. If reducing impacts comes at too great a cost to general well-being then we would struggle to label such policies sustainable development.

Which movement-related indicators best correlate with 'success'? This is not as obvious as might be assumed. In fact, it has been the focus of an important ongoing debate (Cervero 1996; Handy 1993; Levine and Garb 2002; Saloman and Mokhtarian

1998). For example, as explained by Litman (2003), transport planning often slips into assuming a ‘traffic focus’ in which success is seen purely in terms of vehicle movement. This can be seen as confusing ends with means. A ‘mobility focus’ does better by concentrating on moving people and goods in space-efficient and resource-efficient ways. This prompts an emphasis on public transport. Going further, it can be argued that even movement is not fundamental. Instead it is reaching the purposes of trips that is really important. This leads to an ‘access focus’ which prompts efforts to make movement less necessary through, for example, ‘planning for proximity’ and a focus on short trips.

Both access-focused and mobility-focused thinking resonate with the idea of sustainable development by pointing towards ways to do ‘better’ (moving people and goods or reaching things) with ‘less’ (movement). A shift in our movement-related notions of success from a ‘traffic’ focus to ‘mobility’ and then toward ‘access’, can be seen as a shift towards a more ‘sustainable’ approach. This involves priorities that, compared with traffic-focused planning, tend to involve reduced emphasis on private cars and increased emphasis on public transport, walking, and bicycle use. A mobility focus on moving people and goods, not vehicles, has become mainstream in many places. However, practitioners have often found it difficult to routinely measure (or even clearly define) accessibility and to integrate access thinking into everyday operational practice (Litman 2003).

2.4. ‘Sustainable transport’ and the long term

In evaluating an urban transport system in terms of sustainable development it is important to consider long-term development trajectories. Of course, a long term perspective is inherent in the idea of sustainable development itself. Furthermore, an access focused vision of success, as discussed above, inevitably involves a long-term perspective, since land-use patterns cannot be rearranged quickly. Urban transport/land-use systems, with their numerous large, long-lived, fixed investments, can be viewed as complex adaptive ‘Large Technological Systems’ in which path dependent (or ‘increasing returns’) processes are common, with the associated tendency for development trajectories to exhibit ‘lock-in’ (Unruh 2000; Arthur 1994).

Awareness of evolutionary processes in the urban transport literature is most prominently reflected in warnings of the danger of 'automobile dependence'. This can be defined as the extent to which a city possesses a set of characteristics, systems and institutions that encourage, reinforce and entrench very high levels of private motor vehicle use and low usage of alternative modes of transport (Newman and Kenworthy 1999: 60; Victoria Transport Policy Institute 2002). Conversely, and more 'sustainably' perhaps, urban land-use and transport systems can also become 'locked in' to high levels of mass transit usage, creating a so-called 'transit metropolis', which is particularly relevant to the Singapore case (Cervero 1998).

Simply having low car use may not necessarily involve being firmly set on a sustainable development pathway however. For example, urban transport systems in low-income cities may have significant roles for walking, bicycles and buses in mixed traffic but these can be vulnerable to slight increases in vehicle ownership if not adequately protected by infrastructure. In evaluating sustainability, we will therefore also have to examine the extent to which a city's systems have begun to lock in high private vehicle use or whether they are really entrenching the roles of lower-impact alternatives such as public transport and non-motorised modes (Barter 2004).

2.5. Multi-dimensional approaches to sustainable transport

Many also apply a multi-criteria notion of sustainable development to sustainable transport definitions. Such an approach presents sustainable transport as about achieving balanced success across multiple dimensions of development. It goes beyond simply reducing specific impacts and offers a more profound antidote to any business-as-usual focus on the economic development role of transport. However, it involves many difficult judgements over the choice of measures to be included in any list of sustainable transport indicators. There have been various proposed sets of such indicators, involving variables across the economic, social and environmental dimensions (see for example, Jeon and Amekudzi 2005; Black et al. 2002 or Litman 2005).

A widely-used definition of sustainable transport that arguably addresses most of the definition concerns raised so far in this chapter is that promoted by Canada's Centre

for Sustainable Transportation, and which has also been adopted (with minor changes) by the European Union's Ministers of Transport. This definition can serve as a reference point for 'sustainable transport' with which to compare Singapore's approach. In this definition (Centre for Sustainable Transportation 2005), a sustainable transportation system is one that:

- Allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations.
- Is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy.
- Limits emissions and waste within the planet's ability to absorb them, minimises the consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, reuses and recycles its components, and minimises the use of land and the production of noise.

3. Singapore as Exemplar of Sustainable Development in Urban Transport?

This section briefly evaluates claims that Singapore's urban transport system is an exemplar of a sustainable approach, at least in general terms. It begins with impacts but also considers the extent to which Singapore's urban transport can be seen as a success more generally, in line with multi-dimensional notions of sustainable development. It also quickly describes the policies that are credited with creating the results widely described as sustainable. It then considers the extent to which Singapore's long term urban transport development path is entrenching 'virtuous' patterns. Finally, the section notes some interesting departures from policies usually associated with sustainable transport.

3.1. A low-impact urban transport system?

As noted earlier, various commentators have held up Singapore's urban transport policies as an example of sustainable transport policies. The chief observations flow from its successful effort over several decades in containing the growth of overall traffic and vehicle ownership, and in expanding the role of public transport, even as incomes have risen.

Singapore's level of motorisation has been kept remarkably low despite rapid economic growth throughout much of the last four decades. In particular the rate of private car ownership remained at only 92 per 1000 persons in Singapore in 2005 (LTA 2006). Although the vehicle fleet has grown considerably since the mid 1970s, this growth has only marginally exceeded population growth (Willoughby 2000). Currently, only approximately one third of resident households own a motor car (Singapore Department of Statistics 2001). By comparison, nearby middle-income Kuala Lumpur has for some time had much higher car and motorcycle ownership rates (Barter, 2004). In 2004, mass public transport's share of daily trips was 48 percent (LTA 2005), which is much higher than in most other rich cities, except for a few others in eastern Asia (Kenworthy and Laube, 2001).

The features above mean that Singapore's passenger transport system is relatively energy efficient (Ang 1993b). In 1995, motorised passenger travel in Singapore resulted in overall energy use per person of 12,098 MJ per capita, much lower for example than the 30,000 MJ or more that was typical of Australian cities, slightly lower than the levels seen in most rich European cities, but slightly higher than other high-income eastern Asian cities considered in that study (Kenworthy and Laube 2001). The energy use figures (and hence contributions to greenhouse gas emissions) are perhaps not quite as thrifty as might have been expected from a 'sustainable transport exemplar' and considering how firmly car ownership has been contained. Explanations for this will be mentioned later. Nevertheless, Singapore can be considered to have relatively low impacts from urban passenger transport despite being a wealthy consumer society.

3.2. What policies were used?

Three policy settings can be seen as crucial (and interdependent) in the transformation of Singapore's transport scene and creating the results described in this section. These were: 1) the explicit choice to pursue a transit-oriented and compact urban structure; 2) the vigorous restraint of private vehicle ownership and usage; and 3) the commitment to the steady improvement of mainstream public transport. All three emerged in the early 1970s and have, in general terms, been adhered to ever since.

A key influence on these choices was the State and City Planning (SCP) project conducted with the help of the United Nations Development Programme (UNDP) and Australian consultants between 1967 and 1972 (Rimmer 1986; Dale 1999). This resulted in the 1971 Concept Plan which, although never made public, provided strategic guidance for large-scale spatial priorities for two decades. Specifically, it called for a high-density, corridor-based, strong-centred urban structure. The 1991 and 2001 Concept Plans that succeeded it have retained its central features.

The SCP predicted that vehicle ownership and usage trends would quickly become incompatible with its compact spatial strategy and with any feasible programme of road construction (Pendakur et al. 1989; May 2004). It therefore recommended demand management of car travel to the city centre. This led in 1975 to the Area Licensing Scheme (ALS) (a world first) which required the purchase of a ticket to drive a motor vehicle into the central area. After many small modifications, the ALS was replaced in the late 1990s with the existing Electronic Road Pricing (ERP) system.

The SCP also called for restraint of vehicle ownership (Rimmer 1986) and by 1972 the Government had begun to act vigorously on this, beginning a step-by-step set of increases in purchase taxes and ownership taxes. These were effective and arguably more influential in the long run than the better-known ALS. These measures culminated in the Vehicle Quota Scheme (VQS) in 1990, under which Certificates of Entitlement (COEs) are auctioned. Each COE confers the right to register a vehicle for ten years. Under the VQS the vehicle fleet's growth is limited to no more than three percent per year (Toh and Phang 1997).

Public transport improvements were also important. It would be easy to jump to the conclusion that it was the rail-based Mass Transit System (MRT), Singapore's metro, that was most important, since both the urban structure strategy and the ability to contain traffic would seem to depend on the success of the MRT. However, it is important to note that the decision to build MRT had not yet been taken in the mid 1970s. The initial improvements to public transport focused on buses. Key steps included: forced mergers of the bus companies then the imposition in 1973 of professional management on the unified company; two major reorganisations of

routes; the banning of pirate taxis; allowing non-corporate 'supplementary' services to help with peak demands; and the creation of a network of bus lanes on major corridors (Pendakur et al. 1989; Rimmer 1986).

3.3. A 'successful' system across various dimensions?

As mentioned earlier, we also need to consider the more elusive question of whether the transport system also delivers 'success' in all three key dimensions. Certainly, for goods transport and the third of households who have been willing and able to pay the high costs involved in owning a private car, a high level of service is provided on the roads (May 2004). The system offers predictable travel times and generally serves Singapore's broad economic development goals (Chin and Foong 2006).

However, there is a common perception of elitism associated with demand management policies that have created a rather sharp divide between those with cars and those without and a large gulf in the level of service offered to the two groups. The willingness of motorists to pay high prices presumably reflects in part a perception that alternatives are far inferior. Over the years, there have been questions about how well those without access to cars have been served by Singapore's policies (for example, see Chua 1996). In the 1970s and 80s there was also some concern that Singapore's decentralisation of population had proceeded too quickly and had resulted in long public transport travel times for a significant proportion of workers (Willoughby 2000). Recent data suggests that this problem may have been ameliorated to some degree (LTA 2006). Recent soft demand for cars, reflected in low COE prices may, in part, reflect improvements in the alternatives to car ownership, such as the growing MRT network. Survey results on public transport in recent years have tended to show a rather high level of satisfaction, albeit with persistent concerns over waiting and travel times (Public Transport Council 2006).

There are also persuasive arguments that Singapore's urban transport strategy has been progressive in its equity outcomes (Asher 2002; May 2004; Willoughby 2001). Singapore's vehicle taxes have operated as luxury taxes and have involved large payments from the wealthier third of the population. Important elements of the taxes are also levied as a percentage of the value or size of the vehicle, thereby introducing

an element of progressiveness among motorists (Barter 2005). Moreover, the revenues from all of these sources enter general revenue and are spent in ways that involve significant transfers to low and middle-income residents. So, despite the concerns mentioned above, urban transport policy has arguably delivered quite a socially, environmentally and economically successful system.

3.4. Is a 'sustainable' urban transport development pathway well entrenched?

The three key policies identified above complemented each other. Furthermore, their interactions involved positive feedback processes that enabled their results to become entrenched in long-lived systems in ways that will be difficult to reverse.

The decision to deliberately slow down traffic growth was an important factor in allowing public transport to build its role, even as incomes increased. It gave Singapore a window of opportunity during which it was able to build up the usage of its newly efficient bus-based public transport system until mass transit became affordable (Barter et al. 2003). The MRT initial system was eventually built in the mid-1980s after vigorous debate. Public transport improvements also helped make the car restraint policies politically viable.

Both, the deliberate slowing of traffic growth and the successful improvement of public transport played key roles in allowing the high-density corridors and strong city centre to succeed. In turn, this urban structure helps lock in a high role for public transport which is well suited to such development patterns. The MRT also has long term implications. As a large, immobile investment the country is highly committed to its success. It will provide high quality transport services that will remain immune to congestion even if other policy settings should change. Furthermore, its integration with land-use planning is such that it will continue to reinforce transit oriented land use patterns.

However, there are policies and outcomes in Singapore that might undermine our confidence that the path described above really is highly entrenched. Several involve deviations of Singapore's experience from a notional ideal of sustainable transport and are discussed in the next section.

3.5. Differences between 'sustainable transport' and Singapore's priorities

The story so far has been of a reasonably close correlation between Singapore's transport outcomes and those called for by a vision of sustainable transport, conceived as seeking to minimise a broad range of impacts while also delivering success across environmental, social and economic spheres. Nevertheless, there are some important differences between most visions of sustainable transport and Singapore's approach. These provide some puzzling anomalies that sometimes disappoint visiting transport experts who expect to find an exemplar of green transport.

For example, on certain impacts Singapore may not be doing as well as was suggested earlier. For example, large numbers of homes and several important activity centres are located close to heavy (and sometimes high-speed) traffic flows (May 2004). This likely results in considerable noise, community intrusion and possibly localised air pollution impacts. Road deaths are low by world standards reflecting the role of public transport, which is very safe (Kenworthy and Laube 2001). However a high proportion of the deaths are reportedly motorcyclists and pedestrians, suggesting room for improvement on the protection of vulnerable road users.

A high priority is generally afforded to high-speed traffic flows, often at the expense of local public realm and the convenience and safety of non-motorised modes. Road building and capacity expansion, including an ongoing expansion of the expressway network gathered momentum in the 1980s as the nation's financial capacity grew and has not yet abated. It is also noteworthy that the predominance of a Corbusian 'towers in the park' style in most public housing estates leaves surprisingly generous spaces for large roads. A relatively dense network of six lane arterial roads has been created. A number of the most major arterials are being converted to 'semi-expressway' status in which flyovers or underpasses remove most traffic light delays. Such an emphasis on roads would seem to run counter to the goal of promoting public transport by eliminating any speed advantage that MRT could potentially have (Barter et al. 2003).

Do these road-related priorities undermine the sustainability of Singapore's transport? Such policies would usually not be considered compatible with the definition of

sustainable transport adopted for comparison earlier. Nevertheless, in per-capita terms the supply of high-speed traffic capacity remains relatively low. In fact, low road capacity per capita is almost inevitable given Singapore's high population density of over 100 persons per hectare within the urbanised area. Moreover, strong land use planning and tight control on the vehicle fleet mean that, so long as these policies remain in place, there is little risk that road expansion will induce traffic demand or stimulate sprawl (May 2004).

However, if such planning policies were relaxed then Singapore's roads may yet prove problematic in the future and help entrench traffic patterns that would be difficult to reverse. For example, a recent planning decision allowing 'hypermarkets' (with generous parking provision in car-oriented locations in a peripheral zone of the island) might seem a worrying step towards car-oriented patterns. However, this should be kept in proportion, since it would take many more car-oriented developments to significantly alter the predominantly transit-oriented retailing scene, especially given Singapore's spatially constrained context (Tor 2006).

There are also several perverse outcomes of the Singapore approach to capping car ownership. Remarkably high levels of car use per private car are due in part to the low level of ownership (Ang 1993b) but also probably to the high costs of ownership (Barter 2005). As mentioned earlier, high car use per car and the unusually large taxi industry (which complements low car ownership and high public transport use), mean that the energy use and greenhouse contributions of Singapore's passenger transport are only slightly lower than the levels typical in European cities (Kenworthy and Laube 2001). These are much higher than might be expected of a dense city with such an explicitly transit-oriented strategy.

Ownership restraint may also serve to perpetuate a tendency on the part of the public transport industry to assume that their customers are 'captives', who do not own and cannot afford a private car. This is seen in a surprising lack of effort (so far) by public transport operators in Singapore to market to choice customers and the stalling of progress towards true excellence in customer-oriented, highly-integrated public transport planning (Barter 2006; 2007). Recently worries have also been mounting that public transport improvements have yet to produce a system that is perceived as

sufficiently attractive to maintain its market share against increasing car use. This would become a serious problem if car restraint policies were relaxed.

This assumption that users of non-car modes are captives and that the market for these modes is a fixed 'pie' is also reflected perhaps in another surprising divergence between Singapore's approach and the usual visions of green transport. There is a marked lack of attention to planning for bicycles as a mode of transport, notwithstanding some efforts to provide for leisure cycling. Bicycles are a small but visible feeder mode to the MRT in certain parts of Singapore, and fear of competition with buses (for customers and space) may be a factor in an unwillingness to promote bicycle use.

Singapore's policies clearly deviate in significant ways from what would usually be seen as sustainable transport. However, a transport development trajectory involving a moderate role for private cars and a substantial role for public transport does still seem to be relatively securely 'locked in' for the foreseeable future and is still clearly more 'sustainable' than most other high-income cities around the world. To understand this conclusion better, we need to turn to the motivations behind Singapore's policies.

4. Rationales for the Key Choices: Any Connections with Sustainable Development?

This section seeks to understand the connection between the priorities that prompted Singapore's approach and the notion of sustainability. In the literature on Singapore's experience with urban transport there seems to have been little analysis of why such a connection should arise.

First, the section reviews prominent motivations in Singapore's transport policy priorities, at least as they have been presented discursively, since the 1970s. The key themes identified in Singapore are then compared with the central ideas behind sustainable development. Not surprisingly perhaps, these show little or no explicit connection with sustainable development itself. However, the subsequent analysis

does identify some underlying resonances or analogies that connect Singapore's explicit priorities and those that would be expected under a sustainable development driven set of priorities.

4.1. Reasons behind the key policy choices?

This section seeks to identify the arguments that have appeared over the years to justify the three main policies identified earlier. Sources drawn upon here include both original policy documents (at least those that have been made public), a review of Straits Times news reports from 1971 to 1974, and various later overviews and analyses. Recent observations draw on my familiarity with contemporary debates on Singapore's transport policies. Italics are used to highlight important tropes in the discussion below.

Road space arguments, especially the *infeasibility of expanding road capacity fast enough* to cope with potentially rapid increases in traffic were a key justification for the demand management efforts introduced in the 1970s (Pendakur et al. 1989). This theme has also, since 1973, consistently been paired with portraying *rapid growth in vehicle numbers* as a fundamental cause of congestion problems and was later a central argument for introducing the Vehicle Quota System. Arguments in the 1970s for traffic demand management also showed concern over the *opportunity cost of the road building* programme in the face of other pressing developmental priorities (Sharp 2005). It was only from the late 1970s that Singapore's road budget expanded beyond a modest level (Willoughby 2000).

Since the 1990s, road space arguments have changed subtly. The *ultimately limited future expansion of roads* has become a frequent theme in the justification of Singapore's car restraint and promotion of public transport. Since at least the 1996 White Paper, the 12% of the island's land area devoted to roads has repeatedly been mentioned, with the argument that significant further expansion will be difficult and increasingly expensive (LTA 1996). Remarkably, according to May (2004), spatial constraints on road building are now more emphasised by Singapore's policy makers than the *financial limitations*.

In the early 1970s, public statements asserting the need to solve *city centre congestion* were more prominent than more abstract arguments about its underlying road-space causes. The desirability of avoiding congestion is an argument that spans the decades. Congestion has often been equated with economic paralysis in Singapore, sometimes to the point of exaggerating its effects and costs perhaps. The early focus on congestion in and around the city centre has gradually changed to concern over the *wider threat of congestion on various roads*. The contemporary-sounding argument that those imposing social costs on others should pay for them was made explicit as early as 1973. Congestion was clearly identified as the primary social cost being focused on.

The congestion theme has often been closely linked to a consistent emphasis on *economic efficiency* and arguments closely related to it in envisaging success for the system. The role of 'free flowing roads' in economic competitiveness has also been emphasised many times, including the specific objective of maintaining efficient access to the ports. This economic efficiency theme was also prominent in justifying an *'efficient' transport system* more generally, including also the considerable efforts from 1972 onwards to reform and improve public transport.

Although less prominent later, a consistently strong theme in the early 1970s was to see success as closely associated with a *more orderly and less chaotic* transport system. This was a prominent trope in reported pronouncements against pirate taxis, poorly managed bus operations, and various other manifestations of 'indiscipline', such as haphazard parking, jaywalking, and such like. Order was associated with efficiency and modernity.

In many ways, the transport shake-ups of the 1970s mirror the *PAP Government's developmental approach to reform* of various key sectors in the early post-independence period. By 1970 it had a high degree of confidence as a 'developmental state' deriving legitimacy from 'delivering' development (Perry et al. 1997). It had already tasted success with major reforms in several economic arenas, such as housing, industrial development and enhanced foreign private direct investment. The transport reforms of the 1970s shared a number of common features with other efforts, including: concerted government action that often imposed strong supervision;

appeals to an ideal of modernity and willingness to sweep away the old; a tendency to sideline existing local business and land-owning elites; shallowness or absence of public participation; and pragmatic determination to deliver dramatic, even if austere and functional, improvements quickly (Trocki 2006; Rodan 1989). Some of these features can be seen in the forced merger of the bus companies followed by the imposition of a 'professional management team' and later dilution of shareholdings with a public float (Rimmer 1986) and the willingness to impose on the car-driving elite extremely robust demand management through pricing.

Perhaps surprisingly, *air pollution* has been a rather minor theme, although not totally absent. An anti-smoky-vehicle campaign emerged in the late 1960s. It was not focused on cars however, but on smoky diesel vehicles, buses, trucks, and pirate taxis and reflected wider frustration with the inefficient state of the public transport system. The subsequent demand management and public transport reforms of the 1970s also helped address the most obvious air pollution issues by dramatically slowing traffic growth and producing a younger vehicle fleet (Ang 1993a; Chin 1996). These were of course complemented by more explicit anti-pollution policies but arguably on a relatively leisurely schedule (Hayashi et al. 2004).

Energy thrift is a strong theme in sustainable transport agendas and has been highlighted as an advantage of Singapore's approach (Ang 1993b; Kenworthy and Laube et al. 2001). However, this was hardly presented as a motivation. An exception was during the oil crisis of 1973, which prompted a fuel conservation campaign to be launched. It should be noted that the oil supply shock hit soon after Singapore's first important steps in traffic demand management. It cannot be seen as a cause of those choices and was hardly mentioned subsequently in justifying them.

The *choice of spatial strategy* for urban development in Singapore under the 1971 Concept Plan was a very strong influence, constraining various other choices. However, the fact that the strategy did involve a choice, with more than one possible alternative, seems to have been publicly downplayed. As discussed earlier, alarming transport scenarios emerged from the study. The initial MRT study in the mid 1970s confirmed the soundness of the land-use strategy, which was consistent with an MRT-based public transport strategy (Rimmer 1986). Thus, despite the fact that the Concept

Plan was never given the force of law, it did provide powerful guidance to all spatial decisions (Dale 1999). Its land use parameters apparently left little choice but to adopt a space-efficient transport strategy.

The spatial strategy therefore also had strong implications on *planning for the public transport system*. On the SCP's recommendation, detailed investigations of MRT began immediately (May 2004). The plan for a strong concentration of office employment in the city centre under the spatial strategy was a significant factor in the victory in the early 1980s of the MRT-and-bus option over the all-bus alternative in the so-called MRT debate (Phang 2003). Only MRT, it was argued, could avoid unacceptable bus congestion and nuisance in city centre streets such as Orchard Road (Sharp 2005). 'Bus Rapid Transit' (BRT) had not yet been demonstrated successfully at that time, but even if modern BRT could somehow have been an option it would probably have required a revised spatial strategy, with more numerous, but somewhat less intensely developed, public transport corridors, and a less intensely developed central area.

Wider national-level spatial constraints, which has provided a frequent argument for space-efficient transport priorities since the 1990s, as mentioned above, were already apparent much earlier to the SCP team, with its 1992 time horizon, and to the policy makers who implemented its recommendations. It seems clear that awareness of these constraints influenced the choice of a spatial strategy involving high density housing in strong, mass-transit-based corridors.

A theme of *excellence* and of aspiring to be *'world class'* has been prominent since the 1996 White Paper produced by the newly-formed Land Transport Authority (LTA), which called for a 'World Class' land transport system. It should be noted that this is also a malleable notion, depending on which characteristics and international examples are held up for comparison. The White Paper presented a world class transport system as providing '… commuters with highly efficient, comfortable and convenient rides in free-flowing traffic. Having a world class public transport system is a key component of this system.' (LTA 1996: ii). The 'world class' theme can be seen as similar to, but more compelling, positive and more responsive to community aspirations, than the earlier theme of efficiency. However, it

continues to be carefully framed in the context of the reality of constraints. The pragmatic but austere policies that emerged in the mid-1970s were by the 1990s presented as virtues, and key planks in the set of policies that would help provide 'the world class transport system that Singaporeans deserve' (LTA 1996: viii).

4.2. Interpretation: coincidental resemblance to sustainable transport?

The analysis above found that Singapore's policies were justified and driven by a combination of a keen focus on efficiency, a desire for modernity and later, excellence, faith in state activism, and short-run and long-term awareness of spatial limitations at both local scales (such as in the city centre) and city-wide (national) scales. Was it merely a coincidence that these priorities prompted strategies that somewhat resemble 'sustainable transport' policies?

We have seen that none of the most prominent justifications had much to do with environmental or community quality-of-life emphases usually prominent in sustainable transport agendas, at least not in any explicit way. For example, until recently, the terminology of sustainability had in fact been absent from official justifications of transport policy. This is not surprising for the 1970s and 80s but, given the popularisation of the idea from 1989 onwards, it is more surprising for the 1996 White Paper. Only very recently does the term seem to be entering official urban transport policy rhetoric in Singapore, as for example in a recent speech by the Minister of Transport, Raymond Lim, entitled 'A Sustainable Land Transport System for Singapore' (Singapore Government 2006).

We can interpret Singapore's experience and motivations in terms of the 'traffic, mobility, access' framework on success in urban transport that was discussed earlier. Singapore's spatial realities meant that in practice this translated into a focus on moving people and goods as efficiently as possible – in other words, a strong 'mobility focus'. This was complemented by some effort to also minimise the need to travel. Any shift away from traffic focused planning towards a mobility focus, or even better, an access focus, will tend to resemble sustainable development priorities, even if prompted by rather different motivations, as in Singapore.

Singapore's transport priorities were also clearly about 'doing better with less'. However, in this case, neither environmental impact nor energy consumption were the focus of the 'with less' imperative. Rather, spatial constraints and the related focus on congestion played this role and prompted a similar policy response. In a sense, they occupied the environmental corner of the sustainable development triangle.

Let us consider more carefully each corner of the sustainable development triangle. The economic developmental corner is certainly prominent in the focus on efficiency and transport's contribution to economic success. This can be seen in the unusually conscious and explicit attention to articulating what is considered to be success in Singapore's urban transport policies. The social dimension was rather Spartan but nevertheless there was a functional contribution by urban transport to the social contract in Singapore, with non-car owners being offered a basic, efficient and gradually improving public transport system. However, the environmental corner of the sustainable development triangle received surprisingly cursory explicit attention. This is so despite the fact that the same policies did often have results that have been found to have offered environmental benefits.

Although many of the specific objectives or indicators that are usually associated with sustainable transport are absent from Singapore's priorities, it did have to work hard at balancing various difficult-to-resolve objectives simultaneously. This certainly resonates with multi-dimensional approaches to sustainable transport, even if it does not match perfectly and even if some of the most important objectives being balanced against each other are not those seen in most definitions of sustainable transport. A further important parallel between sustainable transport, as usually understood, and Singapore's policies lies in the rather long term perspective to planning that has been taken in Singapore.

It may now be possible to better understand the surprising deviations of Singapore's priorities from those more usually associated with sustainable transport to interpret them in light of Singapore's motivations. For example, the priority given to high-speed traffic can now be understood, as May (2004) points out, as compatible with Singapore's focus on efficiency and on preventing congestion.

Tolerating the perverse effects of the vehicle ownership controls also seemed odd but also reflects Singapore's rather 'hard' priorities. The approach to traffic speed above can also be seen as 'keeping faith' with Singapore's motorists in return for the very high price they pay for the privilege of owning and using their vehicles (May, 2004).

The surprising neglect of bicycle policy has also been explicitly explained in Parliament in terms of space efficiency and the priority given to mass movement in public transport, combined with the claim that there is not enough space for provision to be made for bicycles. This and several other deviations discussed in this chapter it also reflect a lack of focus energy as a priority as well as neglect of the more subtle, liveability and choice-related dimensions of sustainable transport as emphasised elsewhere, such as Europe.

5. Implications and Conclusion

This chapter has shed some light on the meaning of sustainable development as applied to urban transport and interesting ways in which Singapore's urban transport priorities have both resembled and differed from such an agenda. I have argued that Singapore's urban transport and land use outcomes have entrenched a trajectory that is similar, although not identical, to a sustainable transport trajectory. It seems well placed to continue to entrench and maintain a high role for public transport. It has mostly avoided locking in significant 'automobile dependence'.

These pathways were the result of policies prompted by a range of priorities, especially local spatial and economic efficiency-focused imperatives, not by environmental, energy, or most of the other prominent elements of a typical sustainable transport agenda. The alignment is thus far from perfect and Singapore's policies have diverged from the ideal of sustainable transport in important and interesting ways.

Nevertheless, this chapter argued that the resemblance between Singapore's approach and a 'sustainable' one is not entirely accidental. There are underlying fundamental parallels which help us to understand the similarities. Both Singapore's efforts and sustainable transport, as commonly understood, involve the need to 'do better with

less' and in both cases this is understood to involve both the short term and the long haul. It has taken multiple objectives seriously in transport policy, even if the specific goals were rarely identical to those seen in multi-dimensional notions of sustainable transport. Furthermore, the imperative to be thrifty resulting from such a balancing act provoked an effort to develop sophisticated understandings of what exactly it means to succeed in urban transport planning. This prompted Singapore to shun traffic-focused visions of success in favour of conceptions in which moving people and goods and enhancing ease of access, with reduced need to travel, become the key priorities.

The findings may offer lessons for those seeking to promote a more sustainable approach to urban transport worldwide. Singapore did not require a global perspective to embark on a 'sustainable transport' agenda. However, it did need an unusually long-term perspective and a willingness to face up to difficult trade-offs, especially those related to spatial constraints that were perhaps unusually compelling. Singapore's experience suggests that it can be useful to be alert to locally relevant motivations that may parallel sustainable development priorities. It is obvious that acting out of urgent and local necessity is likely to be more persuasive than remote global concerns or an abstract ideal such as sustainable development. Cities with large populations and already high urban densities can learn directly from Singapore's success in confronting its space constraints. Hong Kong's and Seoul's experiences here are relevant (Barter et al. 2003).

However, few cities have such obvious space constraints as Singapore. And few have such a strong, single-tier government with so much power to effect dramatic reform and to shape the public discourse. For decades, such observations suggested that others could not hope to emulate Singapore's approach. However, recent urban transport success stories in more complex and liberal democratic governance contexts suggest that Singapore's experiences may indeed be of wider interest. London's and Stockholm's congestion pricing initiatives are examples. Even more dramatic are recent public transport, public realm and car restraint reforms in Bogotá and Seoul (Pucher et al. 2005; Wright and Fulton 2005). These large cities also faced up to difficult local trade-offs (albeit different in detail from Singapore's) and embarked on sets of policies that also resemble sustainable transport.

In 2007, Singapore will see two major transport policy reviews. It will be interesting to see if old familiar local constraints and newly emerging imperatives will continue to drive Singapore's urban transport policies to parallel those of sustainable transport. It will also be interesting to see if a sustainable development agenda may soon begin to drive transport planning and policy more explicitly.

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