5

Singapore's land transport management plan[1]

Teik Soon Looi[2]

This chapter explores Singapore's system of land transport management, describing what we have done and why. As many international observers have noted, Singapore is often regarded as a global exemplar for its management of the city-state, but transport management involves very complex issues and we have had to 'shift the debate' in our own jurisdiction to achieve sustainable change.

I begin by asking how Singapore fares today. We have just celebrated 50 years of nation-building since independence. We are a compact city-state with one level of government, unlike Australia, which has a federal government and different states and territories. This makes things easier for us—decision-making is faster and centralised—but it also brings problems, which I will share. Our population is 5.5 million and still growing. Our land area is limited and housing already consumes 14 per cent and roads a further 12 per cent of the available land mass. We realised some time ago that we cannot go on building roads; this is a reality we had to face.

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1   All data and figures used in this chapter come from the Land Transport Authority, Singapore.
2   The views expressed herein are the author's responsibility and may not reflect the views of the Land Transport Authority, Singapore.

Singapore has changed enormously over the past 50 years, from a city of congestion and overcrowded, unreliable buses in the 1960s and 1970s to an efficient, sustainable urban transport system today.

So how did we do it? First, we put public transport at the core. We also made a deliberate choice to make public transport affordable, comfortable and reliable; and we wanted public transport to be viable or financially sustainable for the long term.

The statistics on our high-density transport system tell us that 7.7 million trips are taken daily—comprising 1 million taxi trips, close to 3 million rail trips and close to 4 million bus trips every day. The rail-based rapid transit system remains the backbone of the transport system, supplemented by the bus system. Buses provide comprehensive coverage, with more than 350 routes and 4,552 buses in operation. We now have three bus service providers or operators, including two longstanding large operators, SMRT Buses and SBS Transit. In addition, we recently opened up the industry through a competitive tender process and the third provider, Tower Transit, started operation in early 2016. Bus fares and services are regulated as we transition to a bus service contracting model over the next two years.

Rail transport is the backbone of our system because it offers high-capacity rapid travel along the major corridors. Today we have two operators, SMRT Trains and SBS Transit. We retain two operators because we believe in competition and want to do benchmarking comparisons of performance. Our rail system is still expanding; we started with 67 lines, we now have 182 and we are going to double that to 300-plus. Again, fares and services are regulated, and we have a competitive tendering regime in place to allow operators to compete for operating licences for rail services.

Figures 5.1 and 5.2 indicate how we compare against other major cities in terms of usage and convenience of buses and rail, as well as our preference for public transport and low private car ownership (in terms of private cars per person and measured against gross domestic product (GDP)). These indicate that Singapore (circled in red) is unusual in many ways, especially compared with Sydney and Melbourne (shown circled by broken lines).
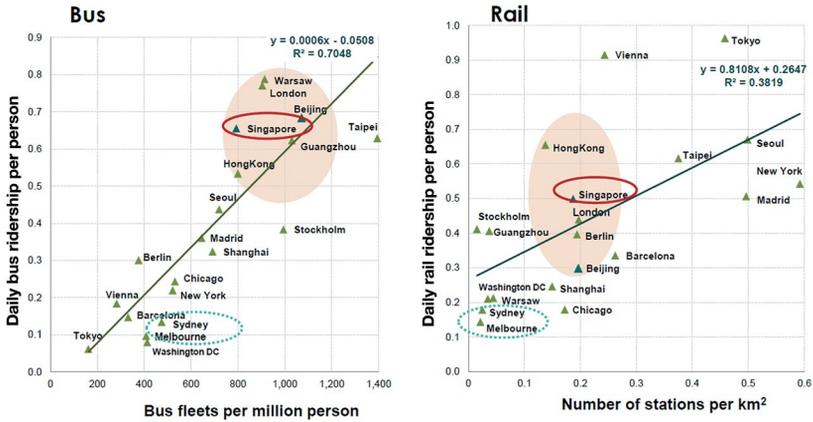
Figure 5.1 Public bus and rail usage

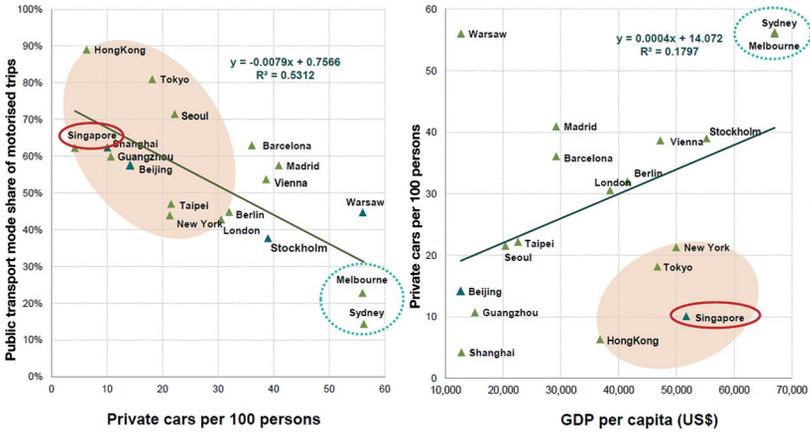Source: Local Transport Authority, Singapore.

Figure 5.2 Mode sharing versus private vehicle use

Source: Local Transport Authority, Singapore.

Singapore's standing on these charts is a result not of chance, but of judicious planning and sound policy interventions. In Singapore, we control the growth of the number of vehicles and vehicle usage, and we have congestion pricing as a major component of traffic demand management. After Hong Kong, Tokyo and Seoul, Singapore is one of the heaviest users of public transport—and, again, Melbourne and Sydney are outliers.

But we still have challenges. Our population is projected to grow from 5.5 million to 6.9 million by 2030—a figure we use for infrastructure planning. In undertaking future planning, we have to know the size of the market for which we are going to cater, so this expected increase in population is one of our key challenges. As mentioned, our land area is limited, so there are many competing demands and many trade-offs are necessary. We often try to design multiple uses for strategically located land (surface use as well as aerial and underground uses), which requires us to debate with the city planning authorities on land use allocation when we are planning transport facilities. We have to design our system to be commuter-centric and not planner-centric; people have changing needs and preferences and they seek to be engaged in decision-making. This desire for greater engagement has been raised in commuter surveys quite frequently in recent years. Another challenge we face is the issue of whether to operate public transport enterprises on a for-profit basis or on a desired performance basis. We are quite market driven in the provision of public transport services and the operations are profitable. But we have been debating how we can better balance the issue of profitability vis-à-vis the kind of performance the community wants to see—a kind of social obligation that may be expected from these public transport service providers.

Planning for transport management

So how do we plan in practice? In transport planning, our strategy is to use integrated land use and transport planning based on a 'hub and spoke' concept. It is quite straightforward (Figure 5.3). We have dormitory towns and new (or Housing Development Board (HDB)) towns where people live, and we service these with local feeder buses, which link to transport hubs and on to longer journey corridors, including the commute into the central city. We bring people via the feeder 'spokes' to the hub, and then into the city. There are great efficiencies here. We also use buses on long-haul journeys in corridors that are not yet served by mass rapid transit (MRT) trains. The most important thing here is that the transfers are seamless, and we focus on taking care of the first and last mile of the transport journey to complete commuter convenience.

HDB Towns **Transport Hub** **City**

Town A

Town C

Town B

• **Feeder/MRT journeys**
• **Long-haul journeys in corridors not yet well served by MRT**
• **Serve local needs or short journeys**

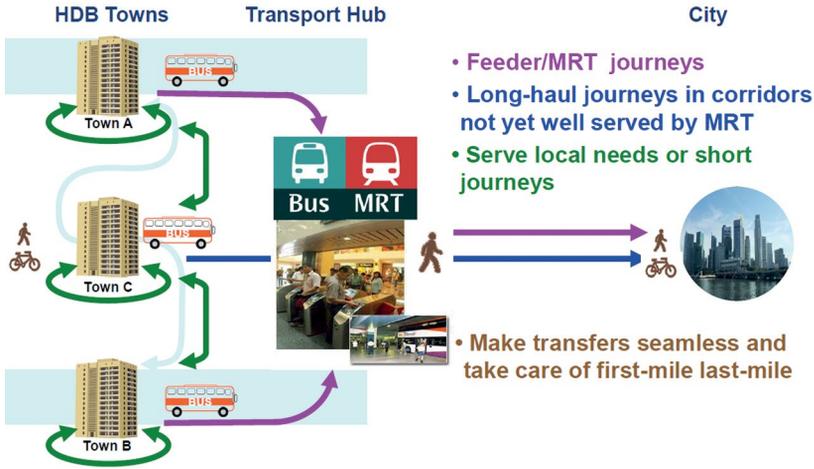• **Make transfers seamless and take care of first-mile last-mile**

Figure 5.3 An integrated hub-and-spoke network
Source: Local Transport Authority, Singapore.

Our overall concept dates back to the 1970s; we refresh the plan every 10 years, with the latest plan now developed for 2030 and beyond. Much of the central planning is coordinated by five key government agencies. The Land Transport Authority (LTA) is in charge of all land transport matters, while the Urban Redevelopment Authority (URA) is the central city planner. The Housing Development Board plans housing estates or towns, the Jurong Town Corporation (JTC) develops industrial and business parks and the National Parks Board is in charge of making Singapore a city in a garden. With these key players in the government's service, it is easier to organise coordination. Not that we don't have problems; it is just that coordination becomes easier because these are the largest determiners of transport and land use planning parameters.

We believe a strategic long-term view is very important. Our planning horizon is 30 to 40 years, supplemented by mid-term master plans running out to 10 to 15 years. The near-term plans run for five to 10 years and are sometimes called planning feasibility studies. From these cascading plans, we in the LTA develop our rolling five-year road development program, the rail lines master plan and the bus network plan.

I have been asked many times: why does Singapore do such long-range planning? There are three main reasons. First, such planning makes economic sense as it helps us to maximise 'value capture' in the system. Because we plan ahead, we can promote high-density transit–oriented

development, optimise our land take and enhance overall system viability. Second—and probably most importantly—we can shape the travel patterns of commuters in terms of meeting transport demand with supply, and we can provide more travel options and reduce car dependency through better transport interconnectivity. Third, we also get the chance to safeguard our plan for future transport corridors by making provisions such as setting aside land and connecting facilities.

Let me provide two examples, which those who have been to Singapore may have seen in operation. Sengkang Town transport hub is a high-quality integrated development. It has good connectivity and transport choices: Light Rail Transit (LRT), heavy rail or MRT, buses and taxi drop-offs for passengers. Another example is the giant interchange facility at Dhoby Ghaut—something like one might see in Hong Kong or Tokyo. With five underground levels, the station connects three rail lines (the north–south, north–east and circle lines). Costing some S$268 million (A$259 million) and opened in 2003, it was among the first integrated transport hubs. The LTA developed a substantial commercial property above the station, including an 18-storey office tower, to capitalise on the value capture.

In planning transport facilities, we can be very obsessive about minimising the land take. As a road planner, every time I proposed adding an extra lane, I would be asked: 'Why are you doing that? If you don't need that, don't do it! If you take one more lane, it's less space for others, the shop frontages may have to go, the green planting strips will go.' In the planning authority, we have a mechanism called the Master Planning Committee, which brings different agencies together to deliberate on land use allocations and to discuss options and trade-offs.

Land transport master plan

In the LTA, we have had three major planning rounds: 1995–96 saw our first white paper produced (the LTA was formed in 1995); in 2008, we revised the plan and called it the 'Land Transport Master Plan (LTMP) 2008'; and we issued a further LTMP in 2013. We are well into the 2013 LTMP and are talking about the next version, due in late 2018. The five-year plan keeps changing because circumstances change quickly and we have to anticipate and plan ahead, as transport facilities are lumpy projects that take time to be realised. Currently, we have a set of clear

objectives aimed at enhancing the travel experience. These objectives are more connections, better service, liveable inclusive communities and a reduced reliance on private transport. These are then supported by specific and measurable targets to drive transport management: 75 per cent of journeys to be made on public transport; 85 per cent of journeys of less than 20 km to be completed in less than 60 minutes; and 80 per cent of households living within a 10-minute walk from a train station. These targets paint the picture, and we have to deliver them by 2030.

More connections

In terms of increasing connections, our rail network has expanded to more than 150 km, and we are building more rail lines very aggressively. The rail network is becoming denser in terms of the interconnectivity of rail corridors, the latest being the Downtown Line, which will be completed in stages, from the north-west to the city centre and extending further to the east.

We have not forgotten buses, however. During the 1980s, when we were opening many new rail lines, we questioned whether we should discard or curtail bus routes because of the efficiency of rapid rail transport. We used the term 'bus service rationalisation', and reduced bus routes to avoid duplicating the rail lines and used them as feeders to the train stations. We are now returning buses to some corridors because they offer more choice, and people still want them.

Greater interest has also emerged in 'active mobility'—more walking and more cycling, especially for the first and last mile of a journey. Singapore is a tropical city, so we are building a lot of covered walkways through the 'walk2ride' program. These ideas are gaining a lot of traction and public acceptance and we are looking at how best to engage people and promote such movement.

Better service

As we expand our rail facilities, we also need to consider renewing and enhancing the existing network. Presently, we are changing our signalling systems to add capacity in terms of allowing more train trips. But we cannot build train lines overnight to meet immediate demands. Train lines are lumpy infrastructure and take about six to 10 years to be realised. So, while waiting for new lines to be built, we have decided to ramp up

our bus services. Through the Bus Service Enhancement Program (BSEP) launched in 2012, an additional 1,000 buses were added to do three things: improve connectivity in the interim, ease crowding and increase reliability. Besides adding more buses to increase capacity and create new services, we also introduced the Quality Incentive Framework, using market mechanisms to incentivise the operators to do better. This idea, taken from London, sees operators encouraged to overperform to gain additional payment for services, while, if they underperform, their service payment will be reduced.

While we have the BSEP in place, we need market signals to tell us whether the operators are efficient and whether we (and consumers) are paying the right price for the services. We are therefore moving to a bus service contracting model. We announced this decision in 2014; we introduced the first of two bus service contracting packages in 2015, which gave us some price information for the third package, awarded in 2016. Such information will enable us to negotiate with bus operators as we transition the remaining packages into the contracting model.

Another measure we have introduced is to shift behaviour in terms of managing peak demand. Peak-hour travel is always going to be a problem, but one way to deal with it is to incentivise commuters to travel outside peak hours—for example, by offering free travel before morning peak times. In economic terms, we are experimenting with the 'power of free' to change commuter behaviour. Currently, we offer free rides if commuters arrive in the city from selected stations. If commuters exit the stations before 7.45 am, they qualify for a free ride; they receive a discount on the normal fare if they are just outside that time (7.45–8 am). Leveraging on our ticketing system—which is a closed system using 'tap in/tap out' monitoring—we have implemented a scheme called the Travel Smart Reward, which allows commuters to earn points, much like a loyalty program. Off-peak travellers can play a game and win prizes, and this has proven to be a successful innovation.

Liveable and inclusive community

In terms of inclusivity, we have been making our trains and buses more accessible to the aged and people with disabilities. We recognise that Singapore has an ageing population who will need assistance with access. We also have to educate other transport users about the needs

of our elderly or disabled communities—even with simple things such as pedestrian crossings that are designed to make drivers slow down and give way to those seeking to cross.

Reducing reliance on private transport

In relation to private transport, we have sought to change the narrative from 'I want a car' to 'why would I want a car?'. This is a real challenge, but it will eventually be achieved. Some years ago, when I visited Copenhagen, the 'cycling city', I asked locals, 'Would you ever consider owning a car?' The question had not even occurred to them. They said: 'Why would I want to own a car? Cycling is fine by me.' So, in Copenhagen—even with a lower population density than Singapore—locals do not seek to own cars and prefer bike riding. In contrast, Singapore, with its higher density, has developed public transport as our preferred strategy to reduce private car ownership and congestion.

We control vehicle ownership through the vehicle quota system, which has been in place since 1991. As can be seen from Figure 5.4, we have significantly cut the rate of growth in vehicle ownership through use of the quota system. If a person wishes to own a vehicle, they must place a bid in a public auction for a Certificate of Entitlement (CoE), and only if they are successful can a vehicle be bought. As the supply of CoE reduces in tandem with controls on the vehicle growth rate, the auction price increases. Today, Singaporeans have to pay about S$70,000 (A$67,600) just to secure a piece of paper entitling them to buy a car—an increase from S$10,000 (A$9,700) in the mid to late 2000s—while the quota of new CoEs has fallen from 2,500 per bidding exercise to just 500. The cost of a CoE is therefore two to three times the price of a medium-sized car.

To further constrain vehicle usage, we use Electronic Road Pricing (ERP), which began as a manual Area Licensing Scheme (ALS) in 1975, and has been in place since 1998, when the technology became available. Our system is a usage charging system based on a cordoned area and a point along a road. One of the benefits of going fully electronic was that it eliminated the need to staff the gantries to check on vehicles passing through. Our narrative with this policy is very clear: ERP is about congestion pricing; it is not about collecting tolls for road maintenance or repair.
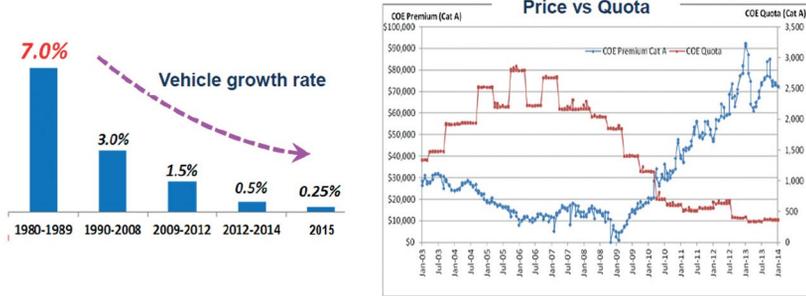
Figure 5.4 Ownership restraint: Vehicle quota system
Source: Local Transport Authority, Singapore.

Setting the appropriate ERP rate is very important. Our rates vary according to the time of day and location. Rates will increase or decrease depending on whether the speeds along the road are more or less than the defined speed ranges, as illustrated in Figure 5.5. We review the charges every three months. This is to ensure we are setting the right price signal. Motorists can read the amount to be charged every time they pass through the ERP gantries, with each deduction accompanied by a sound effect that reminds the driver they are paying for that trip.
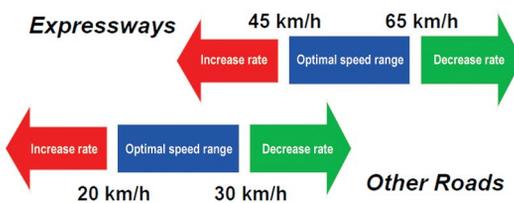

Figure 5.5 Spatial and temporal flexibility in Electronic Road Pricing
Source: Local Transport Authority, Singapore.

The defined speed ranges are determined by the speed flow curves and correspond with the optimal level of service (LoS) for traffic flow. Figure 5.6 shows the speed flow curve for expressways. If the average speed decreases (meaning more congestion), we increase the ERP rate; similarly, if it increases, we decrease the rate. We believe we have to be very clear about the rates and by how much and when they are adjusted.
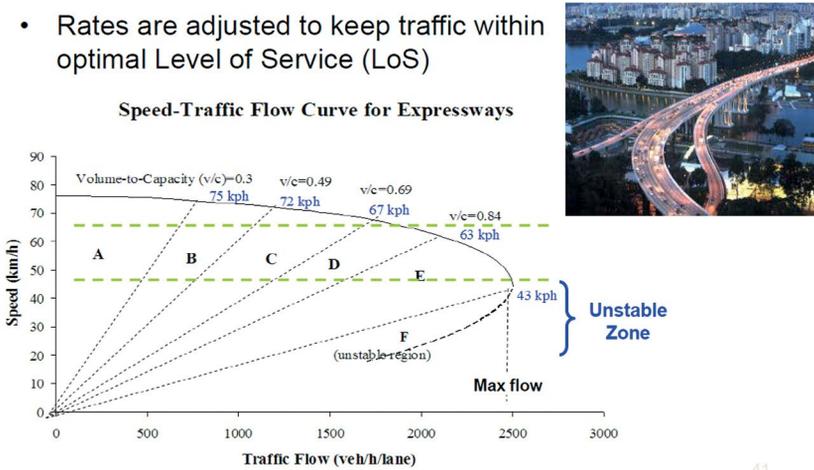

Figure 5.6 Determining speed ranges
Source: Local Transport Authority, Singapore.

In many ways, our ERP is fair, and we can monitor traffic conditions in terms of congestion measured by average speed and adjust our charging regime. During school holidays, for example, we remove the charges because there is no congestion, which people think is fair. So the integrity of the system works when drivers recognise that when and where roads are congested, they pay a charge, but when they are not congested, the charge is reduced or removed. We are considering extending the ERP to include charging by distance travelled, which will be more cost efficient for the city, and increasing charges for parking.

Since 1975, congestion has not increased in Singapore's CBD, despite significant increases in vehicle use. Figure 5.7 shows the effectiveness of congestion charging.
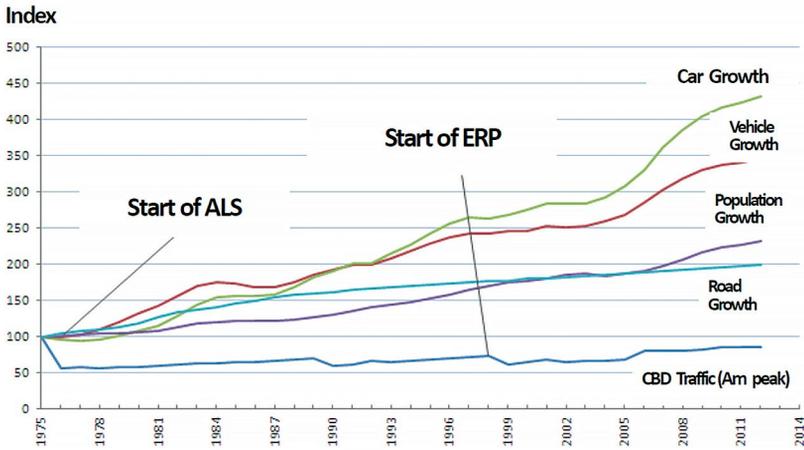
Figure 5.7 Effectiveness of Area Licensing Scheme and Electronic Road Pricing

Source: Local Transport Authority, Singapore.

Future mobility

In terms of future mobility in the city, we are planning for an era of 'smart mobility', including developing 'ERP2' with Global Navigation Satellite System (GNSS) technology to avoid building more gantries. We will introduce advanced big-data analytics, better demand management and an intelligent transport system as set out in our smart mobility vision for 2030.

In terms of autonomous vehicles (AVs), we are looking at four main issues: fixed and scheduled services, point-to-point mobility on demand, freight and utility. We believe that AV—appropriately applied to provide mobility solutions—can help to reduce demand for car ownership, reduce road congestion during peak hours and reduce reliance on human resources. We think we are in a good position to make this happen as we work promptly on the three key enablers: regulation, technology and public acceptance.

We cannot allow our city-state to become dysfunctional because of congestion—as so many global cities already are. Our vision is quite clear. We have four objectives. First, build more connectivity into the system. Second, provide better services that people want and use. Third, open

the system to all, enabling us to enhance our liveability and maintain an inclusive community. And fourth, reduce the level of car ownership to minimise congestion. At the centre of our land transport management is government regulation—regulation that is strategic, has community acceptance and is supported by smart technology to produce better outcomes. Congestion is a cost we all suffer unless it is well managed and alternatives are attractive. We need to be focused on long-term planning, because it clearly sets out our future directions and allows us to manage accordingly. We believe in using economic transaction-based price signals to inform policy and manage the transport system. Our intent is to use market signals and incentives (or disincentives) to change behaviour to enable the optimal operating viability and best cost–benefit ratio for the community. That is how we work.