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# Managing transportation demand in Singapore

*Singapore has long held a well deserved reputation for being at the cutting edge in the field of managing the demand for car use. But in addition to the high profile policies of charging for road use and rationing the number vehicle licences through a vehicle quota system, the South East Asian city state has also been innovative with a number of supporting policies too. In this article **Marcus Enoch** takes a more rounded look at the Singapore experience.*

A detailed report on the operation of the Electronic Road Pricing system was published in **TEC, Volume 45, Issue 2, page 62.**

## CHARGING FOR ROAD USE

Of course there is no escaping from the impact of charging for road use. Area-wide road user charging was first successfully tried in Singapore in 1975 and was introduced because during the 1970s there was very nearly full employment and the city was growing very rapidly as a manufacturing and financial hub. Incomes were rising and people could see that traffic congestion was getting worse. The problem was that there was an absence of measures to restrain car use.

As a result, the Ministry of Communication decided to introduce an Area Licensing Scheme (ALS), which was a

complete cordon around a Restricted Zone (RZ) – effectively the Central Business District area. Initially, motorists entering through one of the 33 entry points had to buy the coupons at booths by the side of the road or at petrol stations. The scheme was manually enforced, motorists had to display a coupon in the windscreen which were checked on entry to the restricted zone (RZ) – which was effectively the CBD area. The scheme operated between 7am and 7pm. Payment was a fixed cost of \$S3 a day.

The ALS worked but there were disadvantages. It was labour intensive and therefore quite expensive to run. It was difficult to alter the charges – as huge print runs were required to print new coupons – and this lack of flexibility meant it was not possible to price according to congestion levels.

In 1998 therefore, the ALS system was automated and in 1999 it was replaced with an electronic road pricing system to reduce labour costs and to allow for pricing to be used to reduce congestion. Drivers must charge up a smart card to insert into a meter on the dashboard. This smart card is then debited every time the vehicle passes under a gantry. If the card does not contain enough credit or is not inserted into the meter, then cameras record the registration plate details and a fine is automatically sent to the motorist's address.

This is based on 28 entry points of the RZ. In addition, more gantries have since been established at certain points on the Outer Ring Road (ORR). This is not a closed cordon and there is some diversion of traffic. About ten gantries are positioned at eight locations – four or five are on the expressway. There are 17 locations altogether on the ORR.

All of these points are being moni-

tored constantly, and new gantries are only to be fitted on an 'as and when' basis. For example, on arterial routes charges will be introduced or raised if traffic speeds consistently fall below 20km/hr (optimal is 20-30km/hr), while on the expressway speeds need to fall below 45km/hr (optimal is 45-65km/hr). Speeds are reviewed every quarter, and if speeds are too high then charges are lowered (too few cars) while if speeds are too low then the charge is introduced or raised. Any changes in the ERP charging levels are announced in the media one week before the changeover period.

Crucially from a public acceptance viewpoint, far more people pay less through the ERP regime than under the ALS. The maximum fee under ERP is \$S3 on the CTE (Central Expressway) which is very congested during the morning peak, and charges are usually a lot less. The system also allows drivers to alter their routes and time of travel. To further enhance acceptability, rebates were granted to certain user groups. For example, taxis were given road tax rebates for the first three years after implementation, while businesses were given four years of rebates.

Overall, Electronic Road Pricing raises \$S80m annually – or about \$S6m a month. The money is paid into general Government revenues, and is not hypothecated to pay for public transport as is sometimes reported.

## RESTRICTING VEHICLE OWNERSHIP

But, despite the success of restricting city centre traffic through the ALS, in 1990 the Singaporean Government still felt that the 6% a year growth of the car



population was far too fast for the road network to accommodate. Accordingly it decided to regulate growth to 3% a year, and introduced a Vehicle Quota System (VQS) to achieve this.

Initially, this system worked by taking into account the de-registered vehicles and then allowing 3% more licences. Certificates of Entitlement (COE) were then offered in eight categories. Categories one to four were based on size of car, then there were motorcycles, goods vehicles, buses and one open category. This was reduced from 1999, and there are now only two car categories, following a review of the system.

Each COE is valid for ten years, and on expiry, the vehicle owner must renew the COE paying the prevailing quota rate. COEs are awarded through a competitive bidding process. This was a closed process until 2001, but is now open. Tenders can now be submitted online.

The current average cost of a COE is about \$30,000, while the highest was around \$100,000, with the rate decided by the number of prospective customers. The number of COEs to be made available is announced at the start of each financial year once the 'number of vehicles on the road' calculation has been made.

As well as paying for a COE, vehicle owners in Singapore also face other vehicle taxes. These include an import fee worth 130% of the open market value of the vehicle, an excise tax of 20% and a registration fee of \$140, although there is no purchase tax. Ongoing costs are that petrol taxes are 35% of the pump price and there is an annual road tax bill of around \$1,200. Overall, for a 1.6L engined car with an open market value of around \$15,000, a prospective car owner could expect to pay around \$80,000, including \$30,000 for the COE and about \$20,000 for the import fee.

## PARKING AND PLANNING POLICY

One key area not often mentioned in the story of the ALS and ERP, is the role of parking policy, and policy relating to private non residential spaces in particular. The Parking Places (Surcharge) Act of October 1975 was designed to complement the ALS (introduced in the same year) in managing traffic levels in the CBD by charging businesses a monthly fee of \$60 a space on each non-residential parking space. Total revenue collected per year was \$540m, and this was paid into the general government revenue account.

In the event, the Act was suspended



in September 1998 to help businesses cut costs in the midst of the Asian Economic recession, although most commercial parking organisations continued to charge similar rates as before. A second reason for dropping the surcharge was due to the adoption of the ERP. This decision was taken because ERP meant that it was possible to charge motorists the full marginal cost of their journeys in a more efficient way, but the policy shift was also designed to help sweeten the pill to businesses that may otherwise have been hostile to the change from ALS to ERP. Currently, businesses still pay a nominal \$1 per space per month licence fee which raises about \$1m a year. The Land Transport Authority (LTA) pays the Urban Redevelopment Authority (URA) around \$30,000 a month to administer it.

A second policy of interest, was developed during the 1970s to address the specific issue of insufficient parking spaces for Heavy Goods Vehicles (HGV). The approach adopted is based on the so called Garage Law (Parking Places Law) which applies in parts of Japan, whereby before one can buy a car, one must have a registered parking space and submit certification of such to the authorities declaring the existence of such a space. In essence, when an HGV licence is renewed, the owner must produce a vehicle parking certificate proving that there is room to park it in Singapore.

Public parking meanwhile, both on and off street, is built and managed by the URA and the Housing Development Board (HDB) – which develops most high density public housing – while the LTA acts as the parking authority. Effectively, a cumbersome administrative process means that all HDB parking lots are charged at the same rate, as are URA spaces (roadside parking and open spaces).

With parking standards for new developments the level of policy innovation is actually fairly low, with the key principle being that every new develop-

ment is required to provide enough parking to service its own needs.

The level of parking required is dependent on the nature of the development (commercial office, commercial retail, residential, industrial) and the gross floor area (gfa) of the development. Minimum parking standards are enforced and developers may provide additional parking if they wish. However, for non residential parking these extra parking spaces must take up space within the gross floor area allowance. Singapore sees itself as being lucky because of the high proportion of new developments, meaning that enough new parking can usually be provided.

But despite this very conservative outlook on parking standards by the URA, the responsible authority regarding land use, parking provision standards have been progressively reduced since the 1970s. This is due to the parking occupancy rates (determined by regular surveys) on which the minimum parking standards are based, falling due to less traffic entering the central business district thanks to the ALS, the ERP and to better public transport (in particular the Singapore Mass Rapid Transit, known as the SMRT).

Interestingly, it is the developers that are seen to be pushing for even lower parking standards rather than the public authority. Indeed, while there is a desire to deregulate parking standards among the transport authorities (whereby developers would develop parking as appropriate), the URA has so far resisted this because it fears that developers would be tempted to use all of its gfa for revenue generating activities, whereas currently land for parking spaces must be supplied in addition to that for the gfa. In short, if parking spaces were part of the gfa, there would be far more of a risk of developers converting under utilised parking spaces into more profitable uses in the future – which would be very difficult to control. In practice though, this already

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happens to a limited extent, ie developers submit an application to cut their minimum parking quotas so as to increase their gfa when the minimum parking levels for the newest developments are reduced.

Meanwhile at the strategic level, the Concept Plan of Singapore sets out the long range development (40-50 year horizon) plan for the country. This projects a population of 4m occupying 70% of the island. It proposes the decentralisation of the present CBD to four new regional centres of Jurong East, Woodlands, Seletar and Tampines, complete with housing, recreational and employment needs. Since the implementation of the 1971 plan, land use zoning controls have been administered by the URA via stipulations in its Master Plans.

This plan is aided by the fact that the Government owns most of the land in Singapore, and whereas previously most landed properties (houses) were freehold, increasingly only 99 year leases are being offered. Such a strong land use planning basis has allowed a number of core corridors to be developed to a density high enough to support the Singapore Mass Rapid Transit network, a high quality public transport system which really does provide a genuine alternative to those who have been 'persuaded' not to drive – and the development of which is still continuing apace. The SMRT now spans the island,

and is supported by light rail lines and bus routes for less heavily trafficked corridors.

## CONCLUSIONS

At this point it should be noted that there are several areas where Singapore is not as progressive as some other cities. For example, where pedestrians must cross the road at traffic signals they invariably must wait for a long time. This is partly because there is a feeling that motorists are not to be inconvenienced – they have paid for the road space after all and deserve a high quality of service as a result. Nevertheless, the objective to reduce road traffic in the city centre has been met and maintained for a quarter of a century. No other traffic management system in the world has achieved anything like this performance over such a period.

Yet despite this success, no other city has attempted to follow the same path. This has often been attributed to several quirky features of the Singaporean situation, that have been seen not only to hinder but to totally prevent any meaningful policy lessons being transferred elsewhere. In many respects such reticence is valid as there have been a number of very specific and even unique circumstances that have played a major part in the success of the Singapore story. For instance, the political and economic situation has meant that citizens of Singapore are largely law-abiding, and very respectful of authority, trusting the Government to make decisions in the national interest. Singapore is also a very densely populated island, and there are no nearby cities to attract businesses to relocate, while internally the national land use plan prevents developers from playing off competing planning authorities against one another. Finally, road pricing is seen to have been implemented as part of an extremely punitive regime of restricting automobile use and ownership, while there has been a very high level of public investment put into its metro system and extensive bus network.

In truth, this is not the whole story. Instead, the reasons that the ERP was implemented with relatively little fuss was most probably due to the fact that many of the prospective losers (taxi drivers, local businesses etc) were effectively 'bribed' with road tax rebates for a certain number of years and with a huge reduction in the parking surcharge. Furthermore, ordinary users were almost guaranteed to pay less money than previously under the ALS – more a case of enlightened self inter-

est than of the usual image of meekly accepting transport users and surely an implementation strategy worth considering elsewhere.

The second point seems to indicate that strong regional land use plans over a very long period (albeit in a rapidly growing economy) can allow public transport rather than the car to shape land use patterns, resulting in economically viable and attractive public transport system and a far more efficient road network. This would seem to strengthen the case for strong long-term regional land use plans where development is focused in a way that favours public transport over the car.

Closely related to this is the fact that significant improvements to the public transport system have been carried out at the same time as the restrictions on road traffic have been introduced. For many people therefore, owning a car is not the necessity it might be elsewhere, ie public transport really is a viable alternative for the majority of journeys.

Lastly, the role of parking policies, particularly the levy on private non residential spaces, has almost certainly led to businesses encouraging their staff not to drive to work wherever possible, with the evidence for this being that developers are far keener to provide more revenue generating gross floor area than car parking spaces.

In summary, the Singaporean parking and development policies have been little known but key elements in the traffic management strategy over a number of years, although with the adoption of the ERP and COE schemes its relative importance as seen by policy makers has diminished somewhat. However, in cities where road pricing and vehicle rationing are less likely to be adopted (ie the vast majority), such innovative policies could well offer a less high profile and thus less more politically acceptable approach towards limiting traffic.

## ABOUT THE AUTHOR

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