

Singapore: A pioneer in taming traffic

Singapore's congestion pricing system dates to 1975, when it introduced an Area Licensing Scheme (ALS) that charged drivers a flat rate for unlimited entries into Singapore's central area. In 1998, Singapore replaced the system with the Electronic Road Pricing (ERP) program which uses modern technology. The ERP is also more expansive than ALS, tolling drivers each time they enter the charging zone. Both systems produced immediate benefits.



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Congestion is under control: The ALS system led to an almost immediate 45% reduction in traffic and a 25% decline in vehicle crashes. Average travel speeds increased from 11 mph to 21 mph. After the institution of the ERP system, traffic levels decreased a further 15%. This has helped Singapore to maintain ideal travel speeds of 30 to 40 mph on expressways and 12 to 19 mph on arterial roads. In addition, 65% of commuters now use public transportation, an increase of nearly 20%.

The air is cleaner: Air quality in Singapore meets health-based standards set by the United States EPA. It also meets the long-term goals of the World Health Organization. According to Singapore's National Environment Agency, this shows that "measures adopted to control vehicular emissions, which include both land transport and environmental policies, have worked well in Singapore." Reduced traffic in the charging zone led to an 176,400 pound reduction in CO₂ emissions and a 22 pound reduction in particulate matter (soot).

The system generates revenue: Implementation of the ERP system, including in-vehicle technology and installation, cost approximately \$125 million in U.S. dollars (\$200 million Singapore dollars (SGD)). Annual revenue from the program is \$50 million (\$80 million SGD), much higher than the program's \$10 million (\$16 million SGD) annual operation costs. With approximately \$40 million (\$64 million SGD) per year in net profits, ERP has already paid for itself.

Officials built public support: Before the ERP started, the Land Transport Authority (LTA) outfitted 98% of vehicles with the necessary electronic transponders free of charge. Officials also launched a public education campaign and held a demonstration period during which motorists were allowed to drive through the gantries to test their devices but were not charged a toll. This helped boost drivers' familiarity with and confidence in the system. The Land Transport Authority also established outlets around Singapore where short-term visitors can purchase transponders.

The system is flexible: Toll rates change throughout the day, with charges ranging from about 30 cents

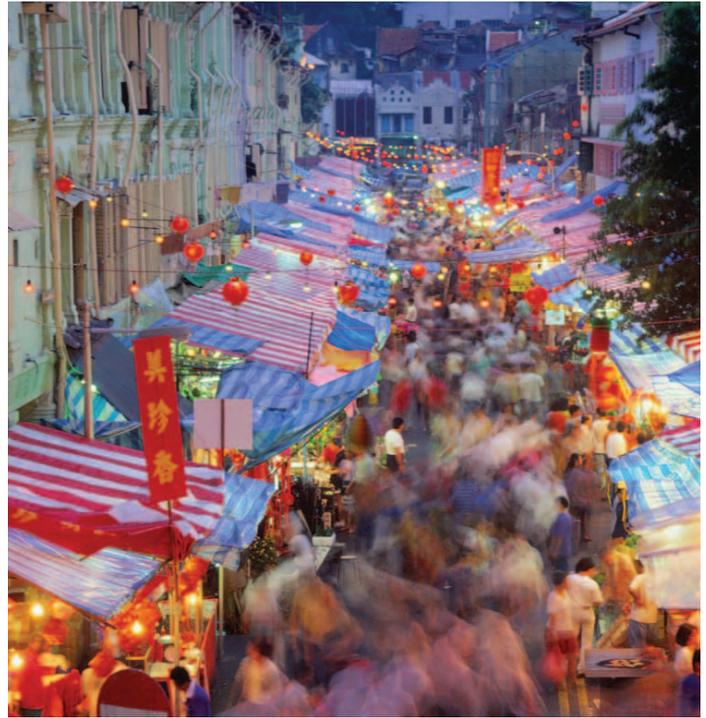
Congestion is under control, with the help of the ERP system.

Singapore Prime Minister and Finance Minister Lee Hsien Loong

(\$0.50 SGD) to \$1.90 (\$3.00 SGD) for passenger vehicles. Tolls for large vehicles like trucks and buses can be as much as \$3.80 (\$6.00 SGD). The prices are raised and lowered gradually to prevent a build-up of traffic trying to get into the RZ before the start or after the end of the most expensive periods. Every three months, LTA officials review toll levels to ensure that traffic keeps flowing smoothly. Seven months after implementation, for example, the LTA did away with all Saturday tolls because it found that roads were not congested on that day.

Singapore's system is flexible in other ways as well. For example, when traffic decreased during tolling hours but increased in the shoulder periods, the cordon tolling hours were extended. The boundary of the cordon in Singapore also expanded as the central business district grew. Changes like these allowed the cordon pricing system to be more effective, so that tolls were subsequently lowered.

The system uses advanced technology: Vehicles enter the charging area, or restricted zone (RZ), by



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passing through one of more than 25 overhead tolling gantries that form the cordon around Singapore's central area. Through electronic communication with these overhead gantries, the price of the toll is deducted from a CashCard inserted into an in-vehicle unit. In-vehicle units with CashCards inserted into them communicate electronically with overhead gantries to deduct the price of the toll. CashCards are essentially refillable debit cards that are transferable between vehicles. The in-vehicle units feature a small liquid crystal screen to display the CashCard balance.

Because tolls vary based on vehicle type (for example, trucks are charged more than cars), the in-vehicle units are color-coded according to vehicle class. This is meant to discourage drivers from illegally using an in-vehicle unit for a vehicle type that would be charged less. Video cameras are used to enforce the ERP program. If drivers pass through the gantries without an in-vehicle unit, a CashCard, or sufficient funds to pay the toll, a photo of the license plate is sent to a control center and the violator is billed an administrative penalty charge plus the cost of the toll.



DANIEL QUITORIANO

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