Kitakyushu Initiative for a Clean Environment: Successful and Transferable Practices

Singapore: Successful experiences in containing environmental problems from transportation sector[1]

Institute for Global Environmental Strategies (IGES)[2]

Target Area: Transportation sector
Time Period:

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[1] Draft report based on secondary information sources; this report will be modified after field visit to Singapore.
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Introduction

Energy use from fossil fuel is the fundamental cause of environmental emissions from urban transportation. Cities around the world have tried several measures that ranges from end-of-pipe interventions to more upstream measures such as containing travel demand in many forms such as command and control to market based approaches. Energy demand itself is a 'derived demand'; the real demand is for the goods and services. In case of urban transportation, it is the demand for travel that fulfills urban dweller's need for mobility. Cities and economies often have limitations to contain growing travel demand for its possible negative effect on economic growth. The thrust is therefore on how to reduce travel demand without hampering economic development and how to organize travel demand into better modal structure, which requires sophisticated manipulation of urban planning and land use policies together with transportation and environmental planning. Many cities and regions in the world suffer from serious vehicle pollution and traffic congestion that manifests into several social, economic and human health costs. In general, modal share of private transportation and their contribution to pollutant concentration are of serious concerns among policy makers. End-of-pipe approaches such as setting emissions standards, fuel quality improvements, vehicle technology interventions and improving traffic management have a limitation over which environment and congestion cannot be improved as number of vehicles and their use increases. Such end-of-pipe measures are *necessary but not sufficient* for a long-term solution to the environmental and congestion problem from urban transportation in dense Asian megapolies. An integrated measure is the most.

Vital statistics

Area:
581.5 km^2 (1967) 647.8 km^2 (1997)
Population:
3.47 million (1995)
City central area population:
241300 (1970), 100000 (1996)
Land use:
Built up area 49.7% (1997)
Per capita GNP in PPP
22,770 US$ (1995)
Car population:
26 per 100 households (1980), 31 per 100 households (1990)
Road length:
(1965) 1761 km (1993) 2989 km, 11% of land use,
(1997) 3101 km 13.1% of land use
Average speed during rush hours:
City roads (20-30 kph), Expressways (45-65 kph)
Modal split of journey to work:
Private 19.1%, Public 56.8%, Other 4.6%, non motorized 19.5% (1980)
Private 25.1%, Public 54.3%, Other 7.8%, non motorized 12.8% (1995)

Since it independence, policy makers in Singapore have been serious about integrated urban, land-use and transportation planning. The fundamental motivation for Singapore was not environment but economic prospects, which envisioned being a prominent commercial and trading center by utilizing its unique geographical location. Singapore has been successful in meeting unprecedented travel demand while controlling congestion and environmental pollution to the acceptable limit while its economy grew from xx in 1965 to to xx in 2001. Singapore employs a mixed approach of command-and-control and market-based-instruments to manage traffic demand and related environmental problems. Our analyses will discuss on several policies and instruments with special attention to three key instruments, congestion pricing, parking regulations, and vehicle ownership restrictions. Theoretically speaking, congestion pricing has potentials to fully internalize the marginal social cost of private motor vehicle travel by including it into the cost of the individual's travel itself. Our focus in on the achievements, i.e. a clear demonstration of the achievement, and instruments that were used to make these achievement. The analyses on underlying condition for these instruments to work in the places other than Singapore are important in order to supplement other cities' quest for congestion-less and pollution-less urban system through these instruments. Therefore, this paper examines success story of Singapore addressing following question.

- How successful was it?
- What was the underlying situation under which the city-state opted for such aggressive policies?
- What kind of policies and policy instruments were implemented? What were the prevailing situations that led to the successful implementation of policy instruments? Why did it worked?

- Are there prospects for replicating one or more aspects of Singapore's experience elsewhere? Under what situation?

Success story of Singapore: Challenges and strategies

Singapore's experience should be viewed in a holistic approach, i.e. from the integrated perspective not only from environment; this encompasses urban planning, land use, transportation planning and environmental planning.

Key dates:

1968: Ministry of Communications established
30% import duty on Cars
1970: Bus service reform begins
1972: Import duty and ARF increases
1973: Singapore bus service unifies
1974: ARF raised to 55%
1975: ALS scheme initiated, ARF raised to 100%, Preferential ARF started
1975: ARF raised to 125%
1980: ARF raised to 150%
1987: MRT begins
1989: ALS extended to other vehicles
1990: Vehicle Quota System begins
1994: ALS implemented whole day
1995: Road Pricing System on expressway
1998: Electronic road pricing begins
1999: ERP extended to highways

Singapore separated from Malaysia and became an independent city-state in 1967; at the time, housing shortage and unemployment was a major problem in the city. Singapore was more sort of densely packed settlement surrounded by shantytowns in the coastal area. Average density of the city's core 400 hectare exceeded 1,200 person per hectare in 1959 (Willoughby, 2000). In 1965, nearly 70% of the Singapore population of 1.8 million was concentrated within 5-km radius from port of Singapore, then city center (Humphery, 1985). Newly elected People's Action Party put all its effort to show its effectiveness by prioritizing housing and employment as a major government focus. The landmark Land Acquisition Act that was passed in 1966 (when it was in Malaysian federation) gave government sweeping hands to acquire any land, which was indeed a land-reform legislation. An aggressive pursuit for urban planning, housing development and industrial estate development went ahead by Housing and Development Board (HDB) under Ministry of National Development. Strategic location and economic liberalization attracted huge manufacturing investment after 1965 and Singapore maintained double digit economic growth till first oil shock in 1973. In late 60s, Singapore also attracted attention from financial and commercial sector investors apart from manufacturing sectors. In the 1960s and 70s, per capita car ownership in Singapore was much higher relative to its per capita income. In 1960s alone, car population doubled and motorcycle tripled, income was constantly rising while public transportation system was slow and unreliable.

Realizing that growing economy needs sound long term city planning in land scarce Singapore, a 4-year State and City Planning (SCP) Project, a concept plan till 20 years for Singapore was commissioned and completed in 1971 with support from UNDP. It emphasized the need for planning the city for 4 million populations rather than 2 million envisaged by earlier plans. For transportation sector, the project made important recommendations that by 1992 it would be environmentally unacceptable and physically impossible to build road infrastructure to meet prevailing private automobile growth. It suggested to ease traffic congestion within the business center, develop rapid transit system in addition to expressways, and that bus alone would not be able to meet public travel demand by 1992 (Fwa, 2002).

Following recommendation from SCP, Singapore government implemented a number of measures within 1972 to 1992. These include private vehicle ownership restriction by high import duty, additional registration fee (ARF) and vehicle quota system, private vehicle use restriction in city centers by Area Licensing System (ALS), expansion of expressway systems and 67 km of rail based MRT.

Public transportation was being provided in Singapore principally by three groups, a large British owned bus company, eleven smaller Chinese owned companies and a herd of unlicensed taxies leading to slow, inadequate and unreliable system. Efforts to organize public transportation were made in 1970 by government forcefully and finally merging all into a single company in 1973 with its share in government hands (floated to Singapore Stocks Exchange in 1978). These measures

improved the quality of public transportation, which provided a choice for private motorists to desert private cars due to its high ownership and running costs imposed by government.

Land use and urbanization pattern influence travel demand through appropriate planning. Government's higher-hand over land rights allowed HDB to construct high rise affordable housing estates in planned zones of the city. The government scheme was successful to move city dwellers to these newly constructed public housings well equipped with supporting commercial and recreational establishments. As a result, 86% of the population today lives in such premises (MIA, 2000). These activities were in consistence with SCP's suggestions to adopt "Ring Concept" where high-density residential areas, industries and urban centers are to be distributed in a ring formation around the central business districts.

As a result, despite strong economic growth and 20 times increase in office space and number of employment, Singapore could maintain its environmental and transportation system under acceptable limits. By 1995, the level of motorization was slightly over 100 cars per 1000 population, which was general trend for cities with one-third-income level of Singapore. The recent data suggests that the average speeds during rush hours are 20-30 kph in city roads and 45-65 kph is expressways.

From environmental viewpoint, the countermeasures of Singapore for air pollution includes cleaner vehicles with controlled emission limits, cleaner fuels and controlling traffic congestion. The first and second ones are being tried with many cases of success in cities around the world while last one remains a biggest problem in which Singapore's experience is a landmark success. Therefore, our attention here is focussed on these efforts of controlling traffic congestion through travel demand management (TDM). This was principally achieved through four major instruments, which limits the number of private cars as well their uses; (1) fiscal measures of car restraining (2) Vehicle Quota System (VQS) (3) Area Licensing System (ALS) which is recently upgraded to Electronic Road Pricing (ERP) system, and (4) efficient and affordable public transportation system.

The Ministry of Communication and its line departments particularly, Land Transport Authority, are directly responsible for car ownership restriction and car use-restraining policies and schemes. It is also responsible for planning, implementation and management of all public and private land transportation infrastructure and policies while supporting economic and environmental goals of the Government (Yuan, 2002 UNCRD report).

Restraining car ownership: Fiscal measures

Fiscal measures for restraining car ownership in Singapore include import duty that is levied through Customs and Excise Department, registration fee and Additional Registration Fee that is imposed by land Transport Authority when imported vehicle is registered, and road/fuel taxes. Singapore has relied upon very high taxes and fees to restrain car ownership initially. These measures were further successful in securing large revenues to invest in land transportation infrastructure. Import duty was 30% of open market value in 1968, which was increased to 45% after 1972. Additional registration fee (ARF) was originally introduced in the late 1950s but revised several times which stands 150% of market value after 1980. A 17.5 times increase in car registration fees (total, including ARF) was made in 1972-83 period; from 10% of car price before October 1972 to 175% of car price after October 1983 (Fwa, 2002). Singapore Government has also imposed 50% of retail fuel price as fuel tax. The annual road tax varies from 60 cents (Singapore) to 150 cents per cubic cc for car with 1000 cubic cc engine to exceeding 3000 cubic cc engine. To lesson the implications of high registration fee on vehicle renewable/modernization rate, Preferential ARF was launched in 1975. In this scheme, government reduced ARF rates for registration of those new vehicles that simultaneously scrap older vehicles of same class and size.

Growing economy and rising living standards surpassed economic disincentives to own a car. Despite such heavy financial burden to own car, Singapore saw 73% rise (average 13,000 car a year)

in car population in 1977-84 followed by brief recession and again steep rise of an average 15,000 car a year in 1987-1990 (Fwa, 2002). Although this increase was much less than other similar nations, it was unacceptable for Singapore Government. Singapore Government imposed a new fiscal measure to control volume of the vehicles directly by Vehicle Quota System to maintain a 3% annual growth rate of vehicle population. In a part, Preferential ARF helped to increase vehicle population due to continued increase in ARF and the appreciation of Japanese yen which car dealers marketed with the argument of increase in "asset" if one buys a car. Indeed, in case of some class of car, older cars increased their value over time.

Vehicle Quota System (VQS)

VQS was announced in February 1990 with the intent to cap number of newly registered vehicles. VQS was easier instrument compared to ARF. ARF was a pricing instrument, and changing level of ARF was politically sensitive. In VQS government just need to fix number of allowable vehicles but not their price. Price is determined by bidding market itself. In this mechanism, prospective vehicle owner should obtain Certificate of Entitlement (COE) to allow owning a vehicle valid for 10 years through open bidding. The bidding is opened each month and a list of bidders in descending order is arrayed. The bid quoted by last bidder of designated quota is called "Quota Premium", and is levied on all successful bidders to own COE. So far, the demand of COE has exceeded designated quota by two times or more and quota premium for passenger car has been in a range of 30-80% of car selling price (Fwa, 2002; Willoughby, 2000). Table below lists the COE price as an illustration.

Table 1: COE bidding for March 2002

Category	Quota premium	Top bid	Number of bids	COE Quota
Cars 1600 cc or below	S$ 31,484	S$ 35,000	4,267	1,491
Card 1600 cc and above	S$ 32,574	S$ 40,796	2,229	649
Goods vehicles and buses	S$ 23,702	S$ 30,000	1,233	399
Motorcycle	S$ 833	S$ 1,406	1,056	611
Open category	S$ 31,438	S$ 36,998	2,255	805

Source: Fwa (2002)

To allow less wealthy consumers to own a car, different sub-categories were established in the beginning. This included weekend cars, small cars, medium cars and taxis, big cars, luxury cars etc. This gave to additional complexities and consequently such sub-categorization is reduced in 1999. For cars, mainly two categories exist; below 1600 cc and equal or above 1600 cc. Public and school buses, diplomatic vehicles, ambulances and emergency vehicles are all excluded from the scheme. Beyond 10 years of COE, one should either de-register or acquire COE at the price of 12-month moving average quota premium of that category. Since then many efforts were made to discourage speculation and other distortions but the basic rule remain same (Phang, Wong and Chia, 1996; Toh and Phang, 1997; Chu and Goh, 1997). For example, at the time of introduction COE was transferable which soon gave rise to speculative market. In the first two months, 20% of COEs changed ownership. Subsequently Government made COEs non-transferable with the exception of open and goods categories in 1991 October (Yuan, 2002). In face of such strict measures that were basically controlling demand rather than need, government implemented other relief measures such as Week-End Car (WEC) Scheme. WEC scheme allowed rebates in ARF, import duty, quota premium and road taxes and allowed WEC-use only during off-peak hours. For urgent uses, five day-use licenses were granted at the time of paying annual road taxes at the cost of S$ 20 a day. In essence, WEC scheme was a manual road pricing, although of a very primitive form.

Area Licensing System (ALS)

ALS is a road pricing mechanism where each car is charged for their contribution to congestion in the central business districts (CBD). This measure reduces the car-uses in CBD when import duty, ARF and other measures such as road or fuel tax cannot influence the car uses once they are on the street. Singapore's ALS Scheme was based on "cordon pricing" system and was introduced in 1975.

The cordoned CBD area of 5.59 Square km (600 hectares?), referred as the "Restricted Zone (RZ)" was isolated from rest of the city by constructing 22 entry point (Toh, 1977). In the scheme, the license to enter into restricted zone during morning peak hours (7.30 to 9.30) was required to be taken at the cost of S$3 (later changed to S$4) a day (S$ 60 per month, later changed to S$80) in advance. The system was paper based that verified by the observers at the entry posts. Non complying vehicles needed to pay a fine posted to their homes through letters. The restricted zone, time and the price of ALS license were changed several times later to accommodate CBD expansion, traffic and economic condition. Initially taxies and cars with more than 3 passengers excluding the driver and buses were exempted from buying entry licenses, later (since 1989) they were not exempted. At the same time, public parking charge in the restricted zone was raised and additional surcharge was levied on private parking operators to discourage car use.

ALS was highly successful in curbing traffic congestion in morning peak hours. By the fourth week of ALS, traffic flow during peak hours had fallen by 45.3%, number of cars in dropped by 76.2%, and percentage of commuters travelling by public transportation rose from 35.9% to 43.9% (Toh, 1977, Yap 1981). The average speed increased from 18 to 35 kph (Willioughby, 2000). The traffic reduction by 45.3% was higher than aimed 25-30%. However, this also increased traffic pressures just before or after restricted hours and to immediate-outside of restricted zone that served as an "escape corridor". Traffic management measures were implemented in those escape corridors to relieve pressures. The anticipated "mirror effect" of less traffic during evening peak hour did not happen. In order make optimal use of road space and smooth operation, several adjustments in restricted time and uses were made in later years through careful monitoring. After 27 years of ALS implementation, the inbound traffic volume in CBD in morning peak hours was still less than it used to be before ALS implementation (Fwa, 2002). Apart from congestion, the major advantage of ALS was on energy saving and air pollution reduction. Fwa and Ang (1996)'s conservative estimate of energy savings with and without ALS, based on 1990 flow and traffic speed data, suggested 1.043 GJ per day. The shift from clean vehicle to clean transportation system relieved over dependence on end-of-pipe measures for air pollution in CBD.

One of the major questions in ALS is whether pricing was correct given externalities to society due to congestion and environment. In 1990, a study by Public Works Department in Singapore revealed that the average speed during morning peak hours in restricted zone was higher than during non-peak periods (McCarthy and Tay, 1993). The existing price of the access license was calculated about 50% more than the optimal price. However, in the absence of time and spatially varying pricing mechanisms any such price would not be optimal. The new measures that replaced manual ALS, Electronic Road Pricing (ERP) with improved technology many pave such way for such pricing mechanism.

Electronic Road Pricing (ERP)

ERP was implemented in 1998 replacing Area Licensing System (ALS). The basic idea of ERP is similar to ALS, but ERP is technologically sound so that time and spatially varying charges is possible reflecting the true cost of vehicle uses in CBD. In this system, all ALS gantry are replaced with ERP gantry and each vehicle to enter into restricted zone are fitted with In-vehicle Unit (IU). IU is fitted in the lower right hand corner of windscreen in the four-wheeled vehicle and in the handle bar of motorcycle. IU unit reads stored-value cash card from which charges are deducted automatically as soon as vehicle enters into restricted zone through ERP gantry. This is done by short wave radio frequency link between ERP gantry and In-vehicle Unit. For violators, photographs of non-complying vehicle's license plates are taken automatically for further action.

At the moment pre-determined ERP charges varies each half-hour of a day, from S$2.50 during peak hours to 50 cents during off-peak hours depending on road sections. Charges are different for motorcycles, cars, good vehicles, taxies and buses etc; different IU units are installed in each category of vehicles. The fundamental question is what amount of charge is appropriate. Theoretically speaking, a real time pricing reflecting the cost of congestion, level of congestion and

relative contribution of each vehicle category to congestion is an ideal mechanism that can internalize the externality of congestion. In reality, it's not easy to enforce such pricing although not impossible through ERP. At the moment, charges do not fluctuate depending on the traffic conditions in Singapore. ERP charges are subject to review every 3 months to suit changing traffic conditions, these charges are basically tied to prevailing speeds with the aim of maintaining traffic speeds of 45-65 kph in expressways and 20-30 kph is arterial roads (Willoughby, 2000). The successful implementation of ERP has facilitated to reduce taxes and other charges and increasing the allowable vehicle quota. The cost of IU units was less than S$300 and for new vehicles with IU units rebates are offered in road taxes as much as S$ 200.

Why did it work in Singapore?

Travel Demand Measures (TDM) have seen only a limited success in many parts of the world while supply side measures (such as building road infrastructure etc) are being actively pursued in those countries. Supply side measures are "never enough" and put greater burden environment because usually more infrastructure means more vehicles on the street. From global sustainability consideration, TDM measures facilitates energy and resources conservation at "downstream" as well as at the "upstream". The fundamental question therefore remains, why such measures worked in Singapore.

Integrated planning of a city is the keyword in Singapore's success. All the measures are apart of a comprehensive strategy and are coordinated very closely to provide a comprehensive solution; without such strategies a single measure alone wouldn't have worked. Right to travel is basic human right, however government policies can provide various options to travelers to choose the reasonable mode of travel. Such perspectives in policies are essential and will be acceptable to citizens. When Electronic Road Pricing Mechanism was implemented in Singapore, commuters have choices to (1) pay charges and drive smoothly (2) change the time of travel to pay less charge (3) use an alternative road, (4) use public transport, and (5) use other schemes such as park-and-ride (Menon, ADB report). The success of Singapore is coupled with favorable economic, social and urban conditions too. Small land and population size allowed flexibility of planning too. Being a city-state, a single tier government exists in Singapore, which eliminates all the complexities arising from layers of authorities (so easy and quick decisions) and a mismatch between local and national priorities. The economy of Singapore heavily relies on foreign investments and on transaction related to international trade, commerce and finance for which efficient transport and communication is essential. The need to fulfill this condition for economic reason has contributed to transport and environment. Unlike other countries, improvements in environment and transport complimented economic growth in Singapore. Strong Government, stable and strong regulation and institutional frameworks for enforcement are the other reasons why it worked in Singapore. The land reform initiated in 1967 allowed government to acquire majority of land and subsequent development of housing estates in the city periphery and facilitated infrastructures for sound land use planning. Another reasons for success of Singapore is the periodic adjustment of policies through feedback from public and other stakeholder and learning by doing including transparency in policy formulation; policies are never perfect. For example, charges are ERP are subject to review every 3 months, charge structure and time of ALS changes several times depending on traffic and economic conditions.

One of the keys to these successes is infrastructure investment. Demand side management was supplemented by constructing additional road infrastructure, good maintenance of roads, improving coordinated traffic lighting systems, expressways and rail based MRT. The taxes and fees imposed on vehicles generated huge financial resources not only to invest on demand and supply side management but also to lessen less desirable taxes. Willoughby (2000) estimated that the annual revenue from road transportation were at least 3-4 times road expenditure.

There are some technology-factors that also played important role in Singapore. ERP for example, depends on sophisticated technology that allows time of day pricing reflecting traffic conditions. Its

primitive version, ALS however was non-technology measure. Computerized traffic controlling system was already in place by 1986 in central business districts (Lee, 1986) which was replaced with a more advanced automated traffic signaling system called GLIDE (Green Link Determining System). GLIDE was traffic adaptive signal control monitored centrally to adjust changing traffic conditions (Lee, 1990). Efforts are being made to create Global Positioning System based coordinated public taxi calling system which dispatch taxies automatically from most nearest location although individual taxi operators are using such system. These high-technology measures provided support to non-technology measures of car ownership and use restrictions. However, high-technology measure's overall effectiveness can be questionable (Fwa, 2002).

Singapore is migrant's society where people moved to Singapore from many countries in and out of the region. From societal point of view, probably this facilitated Singapore in implementing policies because these migrant were economic migrants in most cases and their opposition and barriers in the form of organized resisting force to government policies was minimal.

Significance of Singapore's experience to other cities

The big question is therefore what are the lessons of Singapore's experience to other cities discounting the localized favorable conditions of Singapore? Being a city as well as whole nations, ease of policy implementation exists in Singapore. It is possible to control flow of goods and services in and out of the city being an "island city". In most of other cities in Asia, cities do not have clear function boundaries and have too many interactions with outside of the cities thus pose difficulties in making effective policies. In many cities, transportation sector provides employment to low-income groups through cheap travel mode such as manual tricycles (Bangladesh, India), three wheelers (many cities in South and Southeast Asia and China), Jeepney (Philippines) and others. Policies need to provide viable alternatives. The root causes of policy failures in cities of developing countries are the wrong and inadequate policies, lack of integrated policies, lack of institutional capacity to enforce existing policies, problems of jurisdiction of authorities (institutional arrangement) and lack of coordination, and political interests of governing parties. These are all examples of poor governance, which are often associated with lack of financial resources. Selling travel demand measures to public is not easy because it directly affects each City dweller's travel. Such measures cannot be acceptable or popular unless it is a part of overall strategies and a good public campaign regardless of economic and social conditions of a city. At the same time acceptable alternatives need to be provided. Development of sound public transportation system is key to replicate Singapore's other successful measures.

Vehicle quota system in other countries needs a serious planning and would not be as simple as in Singapore. Collaboration of national government and local authorities is greatly needed. Controlling quota only at national level might produce "hot spots" due to over concentration of vehicles in few cities. National government can exercise control over total vehicle import quota and allocate registration quota to local governments based on their traffic conditions. Some form of restrictions over transit vehicles in the form of local road use charging system would compliment such policy. Hong Kong, in particular has long adopted strong vehicle ownership control measures through fiscal measures.

In general, strong legislative and institutional framework is prerequisite. Electronic Road Pricing may seem a little bit too far at the moment in cities of developing countries but other measures such as ALS and VQS neither need any high technology not operationally complicated. ALS, for example is a simple measure that is easy to enforce and most suitable for dense city core areas in mega-cities and medium scale cities to curtail emissions and congestion during peak hours. Local governments under Self-Governance Act, which are in force in many cities, can carry out such provision. Together with parking regulation such charging system doesn't interfere with national government and revenue generated from ALS can be used to improve roads, signal systems and to relieve pressure on escape routes around the cordoned area by the city authority. This can further relieve financial burden for maintaining road infrastructure. ALS in particular has generated lots of interest

around the world. Many cities have prepared schemes to implement such cordon pricing in central city areas. Three Norwegian cities, Bergen, Trondheim and Oslo initiated such scheme in 1980 covering wider areas than Singapore. High technology options, especially ERP and Intelligent Transport System (ITS) have attracted attentions developed countries, Canada, Norway, and USA are already carrying out initial applications while Chile, Netherlands and UK are expected to do so (Willoughby, 2000). In nearby cities, especially Bangkok, Kuala Lumpur and Manila, vehicle ownership and uses restrains were proposed several times. In Manila such restrain was proposed in 1977 (Freeman and Fox, 1977 see paul's reference) however citing insufficiency in enforcement mechanism such idea was later dropped (Kirby et al., 1986 see paul's reference). Similarly, proposal was made several times in Kuala Lumpur and Bangkok for car restraining in central areas since late 70's but without any success.

As mentioned earlier, the root of the integrated land use and transportation planing goes back to Land Acquisition Act of 60s allowing Government to acuire land and made land reservations for city planning. Clearly, in dense cities in Asia Government control over land does not exist with exception of few centrally administered countries. Land reform calls for setting many limits and constraints to public, and it has remained not intervened by policy makers in many countries due to their political sensitiveness. In densely built cities, some changes in land-use may be possible by providing incentives to de-populate central area, however their effectiveness could be nominal.

References: