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Transport: Overcoming Constraints, Sustaining Mobility - Singapore’s transport policies have moved in tandem with the city’s development. At one level, this can be seen as a linear progression in transport infrastructure – from ‘mosquito’ buses and ‘pirate’ taxis, to a modern bus and train system. Seen in this light, the main policy challenge is the integrated planning and development of effective transport hardware and systems. At another level, transport is about meeting the mobility needs and social aspiration of individuals, as well as addressing negative externalities such as congestion and pollution. These needs are often at odds, and integration on this level means meeting competing needs for land – roads in Singapore have to compete with housing, industry and living spaces for Singapore. This study presents the dynamics, processes and institutional framework involved in resolving these issues. It presents a historical account of transport policy changes in Singapore, while highlighting how the twin policy dilemmas - between public and private transport, as well as between roads and other uses of land - have resulted in policy challenges and innovations over the years.

The Singapore Urban Systems Studies Booklet Series draws on original Urban Systems Studies research by the Centre for Liveable Cities, Singapore (CLC) into Singapore’s development over the last half-century. The series is organised around domains such as water, transport, housing, planning, industry and the environment. Developed in close collaboration with relevant government agencies and drawing on exclusive interviews with pioneer leaders, these practitioner-centric booklets present a succinct overview and key principles of Singapore’s development model. Important events, policies, institutions, and laws are also summarised in concise annexes. The booklets are used as course material in CLC’s Leaders in Urban Governance Programme.

The Centre for Liveable Cities, Singapore (CLC) was set up in 2008 based on a strategic blueprint developed by Singapore’s Inter-Ministerial Committee on Sustainable Development. The Centre’s mission is to distil, create and share knowledge on liveable and sustainable cities. CLC distils key learning points from Singapore’s experiences over the last half-century, while creating knowledge to address emerging challenges. It also shares knowledge with, and learns from, other cities and experts. The Centre works across three main areas - Research, Training, and Promotions. CLC’s research activities include its Integrated Urban Solutions Research, and Research Workshops, as well as Urban Systems Studies.
TRANSPORT

OVERCOMING CONSTRAINTS, SUSTAINING MOBILITY

Centre for Liveable Cities
Ministry of National Development, Singapore

Land Transport Authority
Ministry of Transport, Singapore
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Land Transport Authority

The Land Transport Authority (LTA) is a statutory board under the Ministry of Transport, that spearheads land transport developments in Singapore. LTA plans the long-term transport needs of Singapore, taking care of those who drive as well as those who take public transport. LTA's vision is to work towards a more people-centred land transport system that will meet the diverse needs of an inclusive, liveable and vibrant global city through its three key strategic thrusts — Making public transport a choice mode, Managing road use, and Meeting the diverse needs of the people.

LTA Academy

The LTA Academy is a division of the Land Transport Authority (LTA), Singapore. It serves as a one-stop focal point for governments, organisations and professionals around the world to tap Singapore's know-how and exchange best practices in land transport management and development.
Foreword

Over the past few decades, Singapore's land transport has evolved from traffic-clogged roads and unreliable bus services to one which has a world-wide reputation for mobility and efficiency. This transformation was not achieved by chance, but through foresight, judicious planning, infrastructure developments and the sustained implementation of policies, some of them requiring difficult and unpopular decisions, to ensure sustainable mobility in Singapore.

The land transport journey, however, is a never-ending one. Singapore, like many major cities with a growing population and expanding economy, will continue to face the challenge of balancing the increasing mobility needs of the public while enhancing the liveability of the urban environment. With a more affluent society comes the need to meet rising public expectations and to keep improving the mobility options for the populace. Thus, the social role of transport in providing access to amenities and opportunities for the people, while taking care of the environment, will become even more important.

*Transport: Overcoming Constraints, Sustaining Mobility*, a joint effort of the Centre for Liveable Cities and the LTA Academy, traces Singapore's land transport journey, from its nascent stages to an efficient and cost-effective urban transport system. It provides an in-depth review of the challenges faced in each phase of land transport development, and the underlying principles which guided key policies and decisions implemented. These principles are based on planning strategically with a long-term view, being adaptive and responsive in implementation, and catering to key social goals such as affordable public transport and balancing the social aspirations of car ownership.

Last but not least, the Transport Urban Systems Study captures valuable lessons and profound anecdotes of how Singapore managed to overcome the transport challenges with the tenacity, dedication and perseverance of our former key policy makers.

I hope you will find *Transport: Overcoming Constraints, Sustaining Mobility* as inspiring and insightful as it was for me.

Happy reading!

Professor Cham Tao Soon  
Chancellor and Chairman, SIM University  
Chairman, LTA Academy Advisory Board
Preface

The Centre for Liveable Cities (CLC) research in urban systems tries to unpack the systemic components that make up the city of Singapore, capturing knowledge not only within each of these systems, but also the threads that link these systems and how they make sense as a whole. The studies are scoped to venture deep into the key domain areas the CLC has identified under its Liveability and Sustainability Framework, attempting to answer two key questions: how has Singapore transformed itself to a highly liveable city within the last four to five decades; and how Singapore can be resilient to new and more complex forms of urban challenges and remain at the forefront of urban development and management. *Transport: Overcoming Constraints, Sustaining Mobility* is the second in the Singapore Urban Systems Studies Booklet Series.

The research process involves close and rigorous engagement of the CLC with our stakeholder agencies, and interviews with Singapore’s urban pioneers and leaders to gain insights into development processes and distil tacit knowledge that have been gleaned from planning and implementation, as well as governance of Singapore. As a body of knowledge, the urban systems studies, which cover aspects such as Water, Transport, Housing, Planning, Industry and Environment, expound not only the visible outcomes of Singapore’s development, but reveal the complex support structures of our urban achievements.

The CLC would like to thank the Land Transport Authority, LTA Academy and all those who have contributed their knowledge, expertise and time to make this publication possible. I wish you an enjoyable read.

Khoo Teng Chye
Executive Director
Centre for Liveable Cities
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INTRODUCTION

Land Transport Planning and Development

The development of Singapore's transport policies has been a corollary to the economic development of the country as a whole. On the one level, its progress can be seen as a simple, linear development of transport infrastructure — from trams, to buses, to rail and trains. On this view, the main policy challenge is that of planning and integration.

On another level, transport is about meeting the needs of individuals, mobility and social aspiration, as well as the public needs for mass transport coupled with negative externalities such as congestion and pollution. These needs are often at odds, and integration on this level means meeting competing needs for land — roads in Singapore have to compete with housing, industry and living spaces for Singaporeans. This case presents the dynamics, processes and institutional framework involved in resolving these demands.

The linear development presents a historical and chronological map of transport policy changes in Singapore. This case traces this development while highlighting how the twin policy dilemmas between public and private transport, as well as between roads and other uses of land have resulted in policy challenges and innovations over the years.

There are three main elements to Singapore's transport policies. First, they provide a world class public transport system to cater for mass movement. Singapore's first challenge was in terms of land and funding constraints for increasing capacities to meet a growing economy and population. Transportation policy and infrastructure also impacted economic and social development. As such, the Government restructured the industry to ensure adequate service provision at affordable prices, and a commercially viable industry.
Second, there is also the policy challenge of managing demands for cars, including the choice and structure of public and private transport. As such, regulatory and economic institutions were put in place to achieve public goals of mobility, equity and development.

Third, there were crucial market-building efforts with different experiments in institutional forms, including the move from free markets to central planning to monopolies, to regulate prices and services in a public transport industry operated as a monopoly.

Transport policies have moved through these three broad phases, driven by changing needs, as well as interests and principles. While the changes in the early years were seen to be responding to market demand, the later years were more complex, and the change from one phase to another appeared to be driven both by institutional structures and changing political demands.

Public transport, by its nature, is a large-scale network industry, one that is most efficiently run as a natural monopoly. Singapore's transport system, however, did not start out from this basis, but evolved towards it in a series of experiments, adaptations and sometimes, missteps. What appeared obvious on hindsight was relatively murky to the transport players at that time.

So the transformation of the transport system was a series of incremental changes, not always and altogether in the same direction, with two or three crisis points which led to relatively much larger changes. At the same time, there were a few key constants in the form of underlying principles, which informed the transformation of transport from the 1950s to today. These key ideas are to be strategic in planning (a strategic long-term view, with prudent large investments), pragmatic in implementation (iterative process, and to experiment with regulating industry), strongly governed and institutionalised, and to work towards key social goals (affordable public transport, and balancing aspirations with social costs of cars).
In the mid-1950s, about 90% of people living in Singapore depended on public transport, which was unfortunately distinguished both by poor service and high labour unrest. Complaints over buses were commonplace in *The Straits Times*, the national broadsheet.

Schedules were erratic due in part to drivers who often went on strike to demand for higher pay and better working conditions. On 23 April 1955, things came to a boil when the workers of the Hock Lee Amalgamated Bus Company went on strike, supported by Chinese school students. The next month, on 12 May 1955, later known as “Black Thursday”, a major riot of more than 2,000 people broke out. Four people — two police officers, a student and an American press correspondent died and more than 30 were seriously injured. 5

The next year, in January 1956, the “Great STC (Singapore Traction Company) Strike” took place which lasted for 146 days, seriously crippling Singapore’s public transportation system.

In response to these crises, the Government set up a Commission of Inquiry, which resulted in the 1956 Hawkins report, and recommended the merger of all 11 transport companies into a single

---

“Public transportation is in a chaotic condition and something needs to be done.”  

“The Toa Payoh Housing Estate has a full quota of residents but no bus services. The only ‘public’ transport vehicles are the pirate taxis which poor people cannot afford.”  

“Adding the number of vehicles will not solve the transport problem because the grousers of the workers and passengers must be attended to.”  

“Transport improvements over the past years did not correspond with national development.”
nationalised corporation. But, as pointed out by Associate Professor Gopinath Menon, former Chief Transportation Engineer of the Land Transport Authority (LTA), “As the late 50s were turbulent times with communist agitation in the trade unions (including bus unions) and strong anti-colonial feelings, the Colonial Government may have hesitated on implementing the recommendations put forth as it could have caused stronger disturbances.”

STC continued to run its services after the strike, but it was clearly an extremely unstable equilibrium.

**UNFETTERED MARKET FORCES**

This quagmire of the 1950s was the result of neglect in transportation planning, since it was something that was of low priority in the early days. There was no formal transport study reported until the Traffic Conditions Committee was formed in 1938. Even then, the committee's main consideration was focused on facilitating motor car movements, including improving parking and reducing traffic offences, than meeting transport needs of the populace.

It was only in 1958 that Singapore had its first statutory Master Plan, which regulated land use through zoning, density and plot ratio controls. However, planning focus at that time was placed on public housing and industrial development as Singapore was faced with massive housing shortages and unemployment. No concrete transportation plans were laid out then.

In managing transport demands, the Colonial Government's primary role was in vehicle licensing and carrying out road infrastructure widening and construction. Public transport operations and planning were left to private bus operators.

Hence, from the 1950s to mid-1970s, the problems that Singapore's transportation faced were typically those experienced in many developing cities such as poor traffic management and serious congestion in the city centre, inadequate and inefficient public transport services, poor infrastructure maintenance and lack of governmental plans and enforcements. These were perpetuated with the uncoordinated land transport policies implemented by different agencies due to the absence of an authority to oversee holistically Singapore's transportation development.

The year 1963 marked the end of a 144-year period of British rule in Singapore. The city-state, alongside Sabah and Sarawak, merged with the Federation of Malaya to form Malaysia. This new vision of independence gave the Singaporean Government the impetus for a massive urban renewal programme. Public housing was built to get rid of slums and road developments were implemented to improve accessibility.

However, public transport services continued to be undertaken by private operators with the Government concentrating only on controlling private vehicles. Consequently, “the public transport situation was acute with services with no proper schedules, no coordination and no common fare structure. Some of the fleets broke down frequently and there was internal sabotage — gangster elements were probably involved.”
FROM CHAOS TO ORDER: TRANSPORT PLANNING BEGINS

The limitations of the 1958 Master Plan and the rapid developments in the 1960s prompted the call to work out a more concrete and comprehensive land use and transportation plan. The Government hence commissioned a State and City Planning (SCP) project in 1967 to examine urban planning in general and transport in particular.

Work began on the SCP Project with the help of the United Nations Development Programme (UNDP) to address the inadequacy of the 1958 Master Plan, which was ineffective in addressing the economic and housing expansion of the 1960s. The task force of the State and City Planning was formed by members of the Planning Department in the Prime Minister’s Office, Housing and Development Board (which then included the Urban Renewal Department) and the Roads and Transportation Division of the Public Works Department (PWD).

The SCP project marked an important chapter in transport planning in Singapore. It started in the early 1960s, and enabled planners to integrate transport and land use planning in the early years before Singapore became more urbanised. Hence, basic infrastructure could be laid down and long-term policies could be implemented, in recognising the need for future growth.

This four-year study eventually led to the birth of the Concept Plan of 1971 — Singapore’s first integrated land use and transport-development plan. The Concept Plan of 1971 mapped out the basic framework for physical planning in Singapore along designated corridors projected to the year 1992 for a population of 3.4 million.9

The SCP project, which cost approximately US$5 million, also laid out the future road and rail networks to facilitate transportation between zones of high traffic generation. This marked an attempt to integrate transportation policy and infrastructure planning with economic and social development. It set the path towards thinking of transport as linking people to employment, services, recreation, and community development.

Extensive road-infrastructure development to meet the rapidly increasing road usage demand in the 1980s was made possible with a key piece of legislation — the Land Acquisition Act.

The Concept Plan of 1971 adopted the idea of a “Ring Concept Plan”, which, in turn, was based on the Koenigsberger Plan laid out in 1963. The proposal was to organise land use into high-density satellite towns surrounding the central catchment area, with a planned transportation network connected through their centres. Lower density housing areas were planned to intersperse amongst green spaces. The MRT network ring along the development corridor, together with the proposed east-west MRT lines, was envisaged to link land use for industrial developments and new residential towns. Arising from the Concept Plan, there were extensive developments of road infrastructure from about 800 km of roads at the end of the 1960s, to nearly 3,000 km by 1990.10

Taking a strategic long-term view led to the rest of the other principles of transport. For example, it was clear that Singapore’s long-term population and economic activity would require efficient travel, with two key elements of clear roads and a mass people-mover system.
On the one hand, this meant that we understood the cost of congestion, even before the roads become clogged up. Even when Singapore was a fledgling economy in the 1970s, it had some rudimentary control mechanisms in place.

It also meant that, even while policy goals cannot be obtained immediately, the long-term view kept the policy option alive. Having a long-term view meant that the strategic direction was clear, but things did not always go according to a long-term plan. Incremental change, historical planning and building legacies, a lack of perfect foresight plus certain peculiarities of public transport, meant that transport planners could never get things exactly right, but were pragmatic in learning and changing as they went along. (See Appendix A for key policy timelines)

The focus on long-term planning meant that the Government had identified broad strokes of transport development in 1971, with main priorities of 1) reducing and managing road congestion and 2) increasing road infrastructure to facilitate movement. More detailed land use and transport plans came about in the 1990s with the birth of the MRT and the 1991 Concept Plan. This moved Singapore’s transportation management from an era of “problem-solving” to one of “forward-planning”. This included the participation of the private sector.

Endnotes

4. Ibid.
6. Extracted from National Archive’s Oral History interview with A/P Gopinath Menon. He was the Chief Transportation Engineer from 1991 to 2001 and presently the Principal Consultant with CPG Consultants.
8. Extracted from National Archive’s Oral History interview with A/P Gopinath Menon.
3

Private and Public Partnerships

3.1 REGULATING BUSES

The Government then saw the need to improve the conditions of the early days' laissez-faire. To address bus drivers' dissatisfaction with their working conditions, it set up the Bus Service Reorganisation Committee (BSRC) in 1973 to resolve problems associated with the dissatisfaction of workers. The committee consisted of representatives from the workers, owner operators and government authorities. This was a move towards the new “tripartite” spirit for Singapore that was to involve union in negotiations in the years to come.

More fundamentally, the approach towards buses as a form of public transport changed — from a free market of many players into a centrally planned approach with a restricted number of operators. This came after a 15-member Transport Advisory Board was set up in 1968 whose reports were used to draft the 1970 Government White Paper. Various problems of the bus operations associated with poor quality of service, inefficient management and lack of coordination were highlighted in the Paper.

The White Paper recommended a merger of the different companies (See Box Story 1) to bring about new efficiencies and economies. However, these did not come about since the new management of the SBS was still using management methods previously adopted for small bus companies. The problems persisted and led the Government to appoint a team of government officials to study its operations. Eventually some 100 civil servants, police officers and military personnel were seconded to the SBS to revamp its operations, which resulted in improvements in productivity and profitability.

In 1978, the SBS was listed on the stock exchange, demonstrating that public service and profitability were not at odds. The SBS continued to improve its operations in reducing costs, as well as raising the quality of service. These included the introduction of air-conditioned coaches...
THE MOSQUITO AND THE PUBLIC SERVANT —
Curbing the Bus-Free Market

In Singapore of the 1950s, buses were “mosquitoes” that wove in and out of traffic, routes were haphazard, service poor and workers poorly paid. These were halcyon days when the tiny colony was agitating for self-rule from Britain, and Communist-inspired unions were leading the charge towards change and working conditions.

At that time, the Shanghai Electric Construction Company Limited had already established the Singapore Traction Company (STC). Set up in 1925, it was given a 30-year monopoly to operate trolley and motor buses within the city. But enforcement was weak — and many privately-owned Chinese bus companies started providing bus services outside the STC routes. Among them were the Changi Bus, Easy, Paya Lebar, Keppel and Hock Lee Amalgamated bus companies. These bus companies vied for business and took only popular and profitable routes, hence leaving many streets uncovered, affecting the population living at secluded places.

By the 1940s, the STC was already facing serious labour and bus supply problems and was making a loss because of intense competition from the Chinese bus companies. By the mid-1950s, the situation had deteriorated further. A combination of poor pay, high union agitation and lack of planning in transport issues soon culminated in tragedy. Militant bus workers, manipulated by communist-controlled unions, frequently resorted to work stoppages, paralysing the whole bus system. In the year 1955 alone, there were 57 strikes in the Chinese bus companies.

The 1970 White Paper titled The Reorganisation of the Motor Transport Service of Singapore marked the overhaul in the overall public transport service, where the 10 Chinese companies were merged into three major bus companies with clear territorial demarcations — (1) Associated Bus Services Pte Ltd served the western sector of Singapore, (2) United Bus Company served the northern sector of Singapore and (3) Amalgamated Bus Co Ltd which served the eastern sector of Singapore. Lastly, the southern sector fell under the STC’s area of operation.

At the same time, the bus network was revised along with a newly-designed uniform fare structure for all three merged companies and the STC. The latter, which was not affected by the physical reorganisation, went into financial difficulties and eventually ceased operations. This was largely due to the fact that much of the concessions they previously enjoyed were removed when fares were standardised.

The failure of the STC prompted the Government to give more thought to the future of bus transport, and the three remaining bus companies merged to form the Singapore Bus Service (SBS) in 1973.
in 1984, semi-express services and one-man operated services in 1985. However, insufficient peak-hour capacity remained as a major public transport problem in the 1970s.

Although licensed private transport such as private hire buses acted as some form of competition and service benchmarking for the SBS, it was clear that the public transport structure was a monopoly. In 1982, Mr Ong Teng Cheong, then Minister for Communications, announced the need for competition within the public bus sector of Singapore to raise service standards. In May 1982, the second bus company — Trans-Island Bus Services Pte Ltd (TIBS) was established for that purpose.6

**Market Building Efforts**

Competition also led SBS and TIBS to consider many cost-cutting measures such as the use of higher capacity double-decker buses, the introduction of feeder services in new towns, and the conversion of many of their services to one-man operations.

From a free-wheeling unfettered market to a centrally planned company, and at present some regulated competition, public transport was slowly finding its way towards a hybrid structure that suited the peculiarities of a small and ever-changing market. This change in structure was also to be reflected in the regulation of the taxi industry.

### 3.2 REGULATING TAXIS

The 1970 Government White Paper also impacted taxis. The taxi industry in the 1950s and 1960s was a free-wheeling one, lightly regulated. Because of high unemployment, many wanted to be taxi drivers, and private cars also ferried passengers.

The main issue was the rapid rise of 'pirate taxis'. These were private cars operating as taxis without licences and many pirate taxi drivers were employed by gangster-like owners who controlled fleets of up to 100 vehicles. While these pirate taxis had poor service standards, posed road safety problems and irregular fare structures, they served a public need as the public bus transport services were then inadequate.

Although only 3,800 taxi licences were issued by 1970, pirate taxis already numbered some 6,000. It was estimated that the legal taxi industry earned $50 million in fares in 1970, while another $20 million went to pirate taxis.
The 1970 White Paper made the following changes: (i) raising diesel taxes on private diesel vehicles (majority of which operated as pirate taxis) by 100%, (ii) suspension of pirate taxi drivers’ driving licences for one year if caught; and (iii) making pirate taxi operations a seizurable offence where offenders could be arrested on the spot and charged the following day. Other new regulations included establishing an age limit of seven years for taxis and a maximum age of 63 for taxi drivers.7

Providing further incentives to play by these new rules was a new spirit in labour relations. To provide employment opportunities for the former pirate taxi drivers, the Ministry of Communications provided a loan of $13.5 million to the National Trades Union Congress (NTUC) Workers Co-operative Commonwealth For Transport Limited (NTUC Comfort) to be established in 1970. Members of the cooperative could then take up vehicle loans allowing them a four-year period to repay. With this, taxi operations improved as drivers took personal interest in maintaining their own vehicles.8

New taxi licences were also no longer transferable and were issued only to NTUC Comfort. Pirate taxis died a quick death and in their place were several new licensed companies namely, Singapore Airport Bus Services (SABS), Singapore Bus Service Taxi (SBS Taxi), Singapore Commuter (SC) and TIBS taxis. The emergence of new technology such as radiophone call booking in 1978 and Global Positioning System (GPS) in the 1990s led to the consolidation of SABS, SBS Taxi and SC to form CityCab in 1995.9 Three major operators — NTUC Comfort, CityCab and TIBS Taxis remained in the taxi market.

The 1970s thus can be seen as a decade-long experiment in transport planning and restructuring. The excess of the free market was at first controlled by central planning, and then by the regulated “free market” model for buses and taxis. One important but often overlooked lesson is the roles of both bus and taxi reorganisation unions, who were instrumental in the political process of communicating and pushing through difficult changes. Given the high unemployment and the power of the unions then, the cooperation of both bus and taxi unions, as well as the umbrella NTUC, were important ingredients for success.

In the last few sections, we have seen how a key idea in transport was played out — pragmatism in implementation was demonstrated in the iterative process, and the continued experimentation with different regulatory forms for the transport industry. This is captured in Figure 1.

By the start of the 1980s, there was a fairly stable set of practices and expectations for businesses and commuters alike. By that time, the public transport industry had been restructured with the aim of adequate service provision at affordable prices, (See Appendix C for how Singapore ranks in terms of affordable transport) and a commercially viable industry, with rules covering industry structure, model of competition, regulation, pricing and service standards for buses and taxis.

This process is best illustrated in examining the development of the main transport modes. There is no standard recipe for the development of all transport modes. The issues were dealt with in specific industry contexts. Even though the policy outcomes were clear, there were no predetermined paths.
As Singapore grew quickly in the 1980s, however, the need for a “mass mover” transport system came into being, which was to herald a new age of travel for Singaporeans. In the MRT development, the disagreements about whether to proceed were played out openly.

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**FIGURE 1** The Iterative Process

<table>
<thead>
<tr>
<th>Transport Mode</th>
<th>Development</th>
<th>Lessons</th>
</tr>
</thead>
</table>
| **Bus**       | • 1968: Transport Advisory Board  
• 1970: Government White Paper released  
  − Merged 10 privately-owned bus companies into 3  
• 1973: 3 bus companies merged to form SBS  
• 1974: Supplementary transport schemes (peak hours)  
  − Scheme A: direct service to city  
  − Scheme B: private bus operators run parallel service for some routes to city  
• 1978: SBS listed on Singapore Stock Exchange  
• 1982: TIBS established to compete against SBS | • Clear strategic intent and policy  
• Implementation process: learning by doing, iterative  
  − Restructuring → More restructuring →  
  Government intervened directly by sending experts → Provided short-term solutions →  
  Improved operations and results → Introduced competition → Regulated fares and maintained standards |
| **Taxi**      | • 1970: Regulating pirate taxis  
• Change in regulations  
• Establish NTUC Comfort Cooperative  
• New taxi companies set up  
• Use of technology to improve service  
  − Radio call booking (1978)  
  − GPS (1995)  
• 1998: Deregulate taxi fares  
• 2003: Liberalisation of taxi companies and licenses | • Rational pattern of development possible here because of lower risk of market failure  
• Process:  
  − Regulation  
  − Restructuring  
  − Competition  
  − Deregulation  
  − Liberalisation |
| **Rail**      | • Objective: Build MRT to support Singapore’s economic and social developments  
• Feasibility studies: 1972–81  
  − 10 different studies  
  − Main issues: High cost of construction ($5 billion) and need for operational subsidies  
• Construction of MRT commenced in 1983  
• MOF criteria depends on viability of each line =>  
  − New Financing Framework: LTA looks at viability of the entire network and uses the network to encourage residential and economic developments  
• Financing  
  − Public investment in infrastructure  
  − Operators bid to operate and maintain line, and replace trains (changed in 2011) | • Financial prudence even when policy intent and direction clear  
• Resolving disagreements among ministers  
  − Both sides committed to Singapore’s future, held strong views and did not compromise  
  − Resolved through reframing: a series of feasibility studies and the new plans for Marina South developments  
• Tension between agencies led to pragmatic solutions |

*Source: CLC*
3.3 THE BIG LEAP TOWARDS TRAINS

Financing Transport Infrastructure

The 1971 Concept Plan pushed planners to consider the best approach for the backbone of Singapore’s public transport system to cater for future demand. This led to an initiation of feasibility studies, carried out between 1972 and 1981, to study the necessity of building a Mass Rapid Transit (MRT) system supported by a network of buses, and the routes that the MRT system should take. Major consideration factors relating to cost and project viability were also studied.

The great debate on the development of the MRT started as former Prime Minister (PM), Mr Lee Kuan Yew and then Minister for Communications, Mr Ong Teng Cheong had faced formidable opposition in the Cabinet — led by then Minister for Finance, Dr Goh Keng Swee.10

PM Lee was a strong advocate for the development of the MRT as he saw how it could support future economic and social growth in the city.11 However, Dr Goh Keng Swee, the then Minister for Finance was strongly against the development of the MRT, because the sum of S$5 billion involved was a large amount at that time. Dr Goh did a cost-benefit analysis on the development of a MRT and nearly overturned it as he was not convinced of such a lumpy investment.12 He said, “If you got to spend all this money and subsidise the system, why not spend the money and have an equally effective all-bus system? If an all-bus system is just as good as MRT, why have a MRT if you have got to subsidise it?”

Professor Kenneth Hansen and his Harvard University team were also brought into the debate by Dr Goh, which at the end of the 1970s had proposed that an all-bus system would be sufficient and would cost some 50 per cent less than the MRT.13 The Government appointed two teams of American transport and urban planning experts to conduct independent reviews on the system proposed. They completed the Comprehensive Traffic Study in 1982 which reported that an all-bus system was not practicable since it would have to compete for road space in a land-scarce country. Lively debate ensued, even on television.

All in all, it took 9 studies over 10 years before deciding to build a rapid transit system.

The breakthrough came with the reclamation of Marina South which helped tilt the debate in favour of building the MRT. As Marina South adjoins the city centre, Telok Ayer Basin and south of Shenton Way, the capacity of the road network to Marina South could not cater for a large crowd, thus the need for the MRT.

In addition, the construction of the MRT at Marina South was expected to pull more developments along the seafront spaces, which could help defray the infrastructure cost needed.

These sweeteners meant that the green light was finally given to build the MRT system, after almost three years of debate, at an estimated S$5 billion in 1982.15 Construction was swiftly carried out in 1983. This came under the newly formed Mass Rapid Transit Corporation (MRTC), which took over the roles and responsibilities of the former Provisional Mass Rapid Transit Authority (PMRTA).
The North-South Line was given priority as it passed through the central area with high demand for public transport. This was soon followed by the East-West Line in 1989, which together completed the basic system, also known as the Compass Line. It consisted of interchange facilities between the two lines at two stations in the central area. With an initial rail network of 67 km and 42 stations (of which 15 were underground), the system was designed to have 40% of business and industrial areas as well as 30% of residential areas within the catchment of the MRT.\(^\text{16}\)

Singapore's MRT financing framework is quite different from those of buses. Trains tend to exhibit characteristics of a natural monopoly\(^\text{17}\) because of the high cost of building and maintaining the necessary infrastructure. The Government funds the capital cost of rail infrastructure while the operators bear the operating and maintenance costs of running the system.

While the operators get an initial leg up through the subsidised infrastructure, they need to ensure recurring efficient operations because there are no direct operating subsidies from public funds.

This Public-Private Partnership (PPP)\(^\text{18}\) based on an Operations and Maintenance model has worked well in Singapore's rail industry over the years.

**Financial Evaluation**

Before a rail line is tendered out, a financial evaluation is undertaken by the LTA to ensure that each line is financially sustainable for both operator and Government. This is done through a comparison of operator revenue against the required operating cost over the appraisal time period.

Operating costs, such as manpower and maintenance costs would have to be covered by revenue generated from fare-box revenue, and revenue collected from commercial facilities in the Rapid Transit System (RTS) stations, such as shop spaces and advertising panels. The operators pay nominal fees\(^\text{19}\) to rent transport infrastructure such as bus interchanges, bus terminals and RTS stations from the LTA.

In other words, the total revenue of operators would have to exceed that of total operating costs plus asset replacement reserve.\(^\text{20}\)

**Economic Evaluation**

Besides financial evaluation, the LTA does an economic evaluation to ensure that each rail investment justifies the resources and monies used from government coffers. A Cost-Benefit Analysis (CBA) Framework has been adopted by the LTA for this evaluation. With the formula: \( \text{Total Benefits} > \text{Total Costs or Benefit-Cost Ratio} > 1 \), CBA compares a stream of transport benefits against the required costs over the appraisal period.

Having a benefit-cost ratio of more than 1 indicates a project's practicability and feasibility over the opportunity cost of funding the investment. (Appendix D).
Changes to Financing Framework

With the LTA’s vision to expand the rail network to 278 km by 2020, a new financing framework was mooted in the Rapid Transit Systems (Amendment) Act, which was amended in 2010. Starting with the Downtown Line, the new financing framework acts to facilitate the future expansion of the RTS network in a financially sustainable manner, especially since new lines would be more costly to operate and maintain as they will be built underground. Furthermore, as new rail lines are expected to serve the less mature corridors with lower ridership, they would be less profitable initially as compared to existing lines.

Therefore, in order to recognise the benefits of new rail lines, a network approach (instead of the previous line-by-line approach) would be used to conduct the financial viability of a new line. This would help speed the process of implementation of new rail lines that may otherwise fall short of being financially viable on their own.

In addition to recognising network benefits, operating licences in the rail industry would be reduced from the current 30 to 40 years to 15 to 19 years. This change endeavours to introduce greater contestability to the rail industry.

A shorter operating licence would also mean that operators have less time to recover the full cost of operating assets. Consequently, the LTA has taken over ownership of these assets while leasing them to operators.

“Hub and Spoke” Model: Buses and Light Rapid Transit

With the MRT system in place, Singapore needed a strategic place for buses and other forms of transport. The LTA planned for a system with defined roles for each mode of transport. The MRT network would form the backbone of Singapore’s public transport system, serving the heavy transit corridors primarily for long-haul travel. This would be supported by the buses and the Light Rapid Transit (LRT) which serve lighter corridors and provide intra-town feeder services to connect residential towns to MRT stations and bus interchanges. This concept is known as the “Hub-and-Spoke” model.

It was a simple and effective design but implementation required careful calibration.

First, the Government needed to move people from buses, which were familiar and cheap, to a new and more expensive form of transport. To do so, the bus routes were “rationalised”, which meant they were either stopped or rerouted so that they would not duplicate train routes. Not surprisingly, some commuters were unhappy as these meant longer or more expensive journeys. In the end, this unhappiness led to some bus routes being reinstated.

Nevertheless, over the years, rising population led to an increase in demand for public transport. With rising population numbers and a significant increase in annual MRT ridership from 396,390,000 in 2000 to 791,409,000 in 2010, buses running the same route as the MRT are now
seen as providing additional capacity to trains. This made buses a complementary service rather than a competitive one.

**Towards a New Transport Model**

With the entry of the MRT, the market structure of public transport changed. The regulated market of the 1980s was joined by a new and dominant player. Today bus and rail services in Singapore are provided by two publicly listed, multi-modal Public Transport Operators (PTOs) — SBS Transit and SMRT Corporation — which are regulated by the Government. Government tenders out rights to operate new RTS lines to the PTOs. SBS Transit operates the North-East Line, SengKang LRT and Punggol LRT while SMRT operates the North-South Line, East-West Line and Circle Line, and the Bukit Panjang LRT.

The two operators also operate basic bus services in their respective Areas of Responsibilities (AoRs) designated by the Public Transport Council (PTC), and are allowed to run bus services from their AoRs to the central area.

As illustrated in the Land Transport MasterPlan, a new concept was introduced by the LTA — ‘Competition for the Market’ for railway operations. This is one of the many ways in which the Government regulates the market in Singapore. ([Appendix E](#))

At first glance, it would appear that the market is a duopoly, allowing the operators to reap economies of scale in bus operations such as bulk buying of diesel and maintenance costs for their fleets.

However, the existence of separate AoRs is in effect a virtual wall — marking the boundaries of two separate monopolies. This presents market incentives for the operators to keep up to standards — since commuters only have to hop onto the next train in a different area to compare service — but also allows the operators some long-term predictability since their service areas are protected. This offers the benefits of peer benchmarking in terms of service standards and cost efficiency, in lieu of free market competition, to ensure optimum standards provision.

An independent body established in 1987 — the Public Transport Council (PTC) — regulates transport fares for both buses and trains, keeping prices and standards from monopolistic manipulation.

Regulating public transport fares is a crucial and politically salient function, since public transport ridership accounted for 59% of all daily transport trips during the morning peak period. At the same time, the operators, both of which are listed companies, have to keep their profits healthy.

> “This can be challenging for the public transport regulator. They have to ensure fares remain affordable for the public and operators’ service provision meets quality service standards, while at the same time balancing the need for operators to remain viable.”

 Mrs Maria Choy, a veteran in the LTA, 2011
In 1996, the White Paper on a World Class Land Transport System established three principles for the financing of public transport. These were: (a) Fares have to be realistic and revised periodically to adjust for justifiable cost increases; (b) Operating revenue must be able to cover operating costs; and (c) There must be a sustainable policy on asset development. In addition, the 1996 Cost Review Committee recommended that public transport fare increments should be small and regular.

As a result, in 1997, the PTC announced that it would implement a “CPI + X” formula to cap annual fare adjustments by the PTOs beginning from 1998. In March 2004, then Minister for Transport, Mr Yeo Cheow Tong, requested the Chairman of the Government Parliamentary Committee for Transport, Mr Chay Wai Chuen, to form a committee to review the public transport fare adjustment mechanism.

This committee chaired by Mr Chay consisted of MPs, PTC members, a union representative and an academic. After much discussion, the formula for fare-cap was refined in 2005 to be “Maximum Fare Adjustment = Price Index – X”, where Price Index = 0.5CPI + 0.5WI²⁴ and X, the productivity component was set at 0.3% from 2005 to 2007, and later revised to 1.5% from 2008 to 2012. This refined fare structure is still being used today.

Although the structure of separated monopolies appears to be simple, the regulatory details are complex. The current structure is the result of continuous adaptation, starting first from lessons of the bus industry, where 11 private bus companies had competed freely resulting in poor public transport. Today, with the element of contestability introduced, the threat of competition becomes real to Singapore’s multi-modal public transport operators. This leads to efficiency, resulting in better services and affordable fares.

**Endnotes**

7. The current age limit for taxi drivers is 73.
10. Extracted from Oral History Centre’s interview with Ong Teng Cheong, Accession number 00794, reel 3
12. Extracted from Oral History Centre’s interview with Ngiam Tong Dow, Accession number 001658, reel 5
15. Extracted from Oral History Centre’s interview with Ong Teng Cheong, Accession number 00794, reel 3
17. Natural monopolies occur in industries where there are enormous economies of scale present, such that a single firm can effectively and efficiently supply the market at lower cost than two or more firms.
18. Public-Private Partnerships (PPPs) are joint ventures between the Government and one or more private firms to deliver and/or provide public infrastructure and services.
20. The Asset Replacement Reserve (ARR), based on a sustainable operating asset replacement policy, is incorporated as part of an operator’s overall costs and allows for the financing and replacement of depreciated operating assets during the concession period.
22. Source: Research & Publications Division, Land Transport Authority, Singapore.
24. CPI refers to the change in consumer price index over the preceding year and WI refers to the change in wage index (measured by national average monthly earnings) over the preceding year. The productivity component is an extraction factor through which the operators share with the commuters their savings from productivity improvements.
4

Private Transport

4.1 LAND USE PLANNING

Rapid economic growth, a growing population and the rising affluence of Singaporeans have caused the demand for travel to burgeon over the years. To address the increase in travel demand, the Government identified four key strategic thrusts to develop an efficient land-transport system.

The four strategic thrusts work in tandem to meet the Government’s vision of making Singapore a thriving, modern city which is people-centric, sustainable, and promotes economic growth. A World Class public transport network is paramount for the LTA to achieve its vision especially with a growing population that expects high standards in services and infrastructure.

Nevertheless, given the convenience and comfort private transport offers, a high-quality public transport may be insufficient to shrink the private-transport modal share. Furthermore, the rising affluence among Singaporeans has resulted in higher aspirations of owning cars. This presents the Government with a familiar big city conundrum: meeting the aspirations of motorists while having less scope to increase the road network in years to come.

Given its high carrying capacity, speed and reliability, the MRT is a crucial player in reducing congestion and enhancing mobility in Singapore. However, rail lines are expensive infrastructural investments, and are definitely not quick to construct. Other alternative measures are therefore necessary to ameliorate congestion while the Government is in the midst of expanding the rail network.

With this in mind, the Government has put in place a combination of ownership and usage measures to manage road use. Although ownership measures are effective in controlling vehicle population growth, usage measures such as the Electronic Road Pricing (ERP) system are needed
to counter what behavioural economists term “the sunk-cost effect”. With high-ownership costs, car owners tend to maximise the value of their cars by driving whenever possible. Thus, relying on high-ownership costs is not enough. Usage charges are equally important to manage the demand for road space.

4.2 MANAGING DEMAND

Restraints on Car Ownership
Since the late 1950s, Singapore already has in place fiscal measures to control vehicle population. Originally intended as a revenue-raising measure, the Additional Registration Fee (ARF) acted as a vehicle ownership tax. The ARF is an *ad valorem* duty on a vehicle’s open market value (OMV) and is payable by buyers of new motor vehicles. The ARF rates increased through the 1970s, from 25% in 1972 to 150% in 1980. This discouraged vehicle owners from replacing their cars and encouraged new car buyers to buy used cars. In addition to the ARF were import duties, registration fee and road tax on private vehicles.

To address the problem, the Government introduced a Preferential Additional Registration Fee (PARF). The PARF incentivised car buyers to purchase a new vehicle by having them pay a much lower PARF rate if they de-registered an old vehicle of the same engine-size category that is less than 10 years old at the time of the purchase.3

Car population continued to rise despite the existing fiscal measures. From 1962 to 1973, the average annual growth rate of motor vehicles was 8.8%.4 Traffic congestion worsened especially within the central business district and little expansion could be done to the road network due to the old city layout. It was also environmentally unacceptable and physically impossible to continue building road infrastructure to accommodate the increasing private vehicle growth. The State and City Planning (SCP) project in 1971 then recommended that restraints on car ownership and usage in the city area were clearly necessary.

Furthermore, the SCP noted that congestion around the central area was reaching unacceptable levels. Traffic flow along major arterials such as Kallang Road was at 85,000 vehicles per day. New Bridge Road had 60,000 vehicles per day, and Orchard Road had over 70,000 vehicles per day. Anderson Bridge, which links Collyer Quay to Nicoll Highway, carried an astonishing figure of 93,000 vehicles per day.5

According to Mr Joseph Yee, former Director of Planning and Transportation at the LTA from 1999 to 2003, “The Government took the SCP’s recommendations very seriously, and since October 1972, the Government started off introducing a series of tax measures on car ownership growth in the form of very steep import duties on cars and stiff road taxes.”6
**Pay for Use Schemes**

In order to improve accessibility and ameliorate the severe congestion problem in the central area, an inter-ministerial Road Transport Action Committee (RTAC) was formed in 1973 to coordinate transport planning measures and formulate transport policies. Comprising technical staff from the Public Works Department (PWD) of the Ministry of National Development and helmed by permanent secretaries of several ministries, the committee highlighted the pressing need for restraints on car use in the central area.\(^7\)

The RTAC examined and experimented with a series of measures which included the staggered work hours scheme, car pooling, toll roads and parking fees. Some of these measures, however, had inherent problems which resulted in their limited success. For example, the car-pooling measure contradicted the staggered work hours scheme as it was difficult to gather a suitable pool of commuters with different reporting times. Finding car poolers with reasonably nearby origins and destinations was also rather challenging. In January 1975, the Ministry of Communications set up a Car Pooling Management Unit (CPMU) to alleviate the problems faced with car pooling. It also recommended rates of financial compensation for drivers and assisted with the formation of car pools.\(^8\)

**Area Licensing Scheme**

The RTAC concluded that more had to be done to mitigate the rapid rise in traffic flow in the central area. The committee adopted several guiding principles when considering the various measures of limiting traffic. First, the scheme should be easily understood by motorists. Second, enforcement of the scheme should not require a burdensome administrative structure. Third and foremost, the scheme had to be effective in decreasing peak-hour traffic while being equitable to all users.\(^9\)

The ALS was implemented in June 1975 — it was a moment that launched Singapore into the transport world, as the first country to use a price stick to discourage car usage.

Over the years, inflation and increase in income resulted in the rise of licence fees charged. In addition, boundaries of the ALS were extended further as the Restricted Zone (RZ) became more developed and congestion-prone. In June 1989, the increasingly heavy traffic flow during the evening peak-hour period made it necessary for the authorities to impose the ALS from 4.30 pm to 7.00 pm (see Figure 2 for change in total volume of evening peak traffic after implementation of evening ALS). In addition, to ameliorate the heavy traffic flow into the RZ, car pools, motorcycles and company cars were no longer exempted from the ALS.

Congestion in the CBD continued to worsen in tandem with Singapore’s economic growth during the early 1990s. The Government therefore fine-tuned the ALS in 1994 by imposing a whole-day restriction period between 7.30 am and 6.30 pm and implementing two sets of rates for the period in-between the morning and evening restricted hours.
The implementation of the ALS saw an immediate 44% decrease in the number of motor vehicles entering the RZ during restricted hours, from about 74,000 to 41,500. In addition, the ALS led to the increase in travel speed in the RZ during restricted hours.

**FIGURE 2**  Effect of the evening ALS on volume of traffic

<table>
<thead>
<tr>
<th>Time (h)</th>
<th>All vehicles:</th>
<th>Volume of traffic (inbound)</th>
<th>Percentage change</th>
<th>Volume of traffic (outbound)</th>
<th>Percentage change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1530–1600</td>
<td></td>
<td>12,193</td>
<td>12,537</td>
<td>2.8%</td>
<td>11,775</td>
</tr>
<tr>
<td>1600–1630</td>
<td></td>
<td>12,859</td>
<td>12,280</td>
<td>–4.5%</td>
<td>11,937</td>
</tr>
<tr>
<td>1630–1700</td>
<td></td>
<td>12,471</td>
<td>6,917</td>
<td>–44.5%</td>
<td>12,364</td>
</tr>
<tr>
<td>1700–1730</td>
<td></td>
<td>12,744</td>
<td>6,845</td>
<td>–46.3%</td>
<td>14,281</td>
</tr>
<tr>
<td>1730–1800</td>
<td></td>
<td>13,266</td>
<td>7,122</td>
<td>–46.3%</td>
<td>15,513</td>
</tr>
<tr>
<td>1800–1830</td>
<td></td>
<td>13,019</td>
<td>6,811</td>
<td>–47.7%</td>
<td>15,382</td>
</tr>
<tr>
<td>1830–1900</td>
<td></td>
<td>11,694</td>
<td>6,168</td>
<td>–47.3%</td>
<td>13,809</td>
</tr>
<tr>
<td>1900–1930</td>
<td></td>
<td>10,614</td>
<td>11,368</td>
<td>–7.1%</td>
<td>12,387</td>
</tr>
<tr>
<td>1930–2000</td>
<td></td>
<td>10,264</td>
<td>10,060</td>
<td>–2.0%</td>
<td>10,214</td>
</tr>
</tbody>
</table>


### Implementing Electronic Road Pricing (ERP)

The experience of the ALS led to the implementation of the Road Pricing Scheme (RPS) in June 1995. This passage pricing system was progressively introduced and started with a section along the East Coast Park Expressway before extending to other expressways such as the Central Expressway and the Pan Island Expressway in 1997. The RPS charged motorists for passing through a certain route, thus encouraging those who did not want to pay the extra charges to look for alternative routes or times. This resulted in better traffic distribution between the expressways that lead into the central business district during the morning peak hours. It was also a pilot of road pricing before the implementation of the ERP system in 1998.

Despite its success and practical low-cost means of managing road usage, the ALS had its limitations. Being a manual system, ALS charges were fixed regardless of changes in travel speed during the year. Although traffic conditions fluctuated depending on the hour, day and location, it was technically and administratively impossible then to provide a flexible system with shoulder-peak charges in accordance with traffic volume for each road in the RZ.
In 1989, the Government noted the technical limitations of manual pricing schemes and approved the implementation of a technologically-advanced road pricing system. The contract for supplying the system was awarded to the Philips/Miyoshi consortium in October 1995.  

In 1998, the ALS evolved into the automated ERP.  

A year after its implementation, traffic volumes in the RZ fell by 15% for the whole day and 16% during the morning peak hours. Figure 3 shows how the ALS and ERP have effectively managed traffic volume into the CBD over the years.

FIGURE 3 Traffic Volume into the City (AM Peak) with ALS and ERP Implementation (1975–2011)  

![Traffic Volume into the City (AM Peak) with ALS and ERP Implementation (1975–2011)](image)

Source: Land Transport Authority.

Albeit the lower charges of the ERP as compared to the ALS, the sharp fall in traffic volume was likely associated to the per-entry charging which led to the reduction of multiple trips in the RZ. This suggested that ERP made motorists more aware of the true cost of their journey, thus encouraging them to make travel-related decisions based on cost, necessity of the trip, alternative routes and alternative transport modes available. (See Box Story 2 for implementation of the Electronic Road Pricing or ERP scheme)
FLYING PROJECTILES AND CAREFUL PLANNING —
Regulating Cars

It is hard to imagine an instrument of public policy turning into a lethal flying weapon but for LTA’s first CEO Mr Liew Heng San, this was a serious question to tackle.

The year was 1997, and he was implementing the Electronic Road Pricing (ERP) system which needed a small electronic device — In-vehicle Unit (IU) — to be fitted into each car. The system worked by deducting a small fee each time the car passes through special zones, which are high-congestion areas. In effect, it was an additional tax on road usage, with the premium meant to discourage use of the car in certain areas during peak hours, using prices to regulate congestion.

The idea was simple and effective. The implementation however, required months of planning and public engagement.

Recalling the difficulties, Mr Liew said, “There was a debate — ‘What would happen in a car accident, when the IU gets dislodged and turns into a flying projectile, knocking off the braces and the jaws of the driver?’ This is really melodramatic! I thought to myself, ‘How am I going to argue against that?’”

This challenge came on top of many others. Being electronic, the public had many fears and issues with the system. Firstly there was the issue of privacy. Many motorists feared that their vehicle movements were being tracked by the ERP’s central computer system. The Government assured the public that records of all ERP transactions were kept in the memory chip of the smart-card of the drivers. Furthermore, all records required to secure payments from the banks were deleted from the central computer system within 24 hours.

Motorists were also concerned about radiation coming from the antenna controller installed in the ERP gantries and the IUs in the vehicles. The LTA explained that the IUs are non-radiating and only reflect what it receives from the antenna controller of the ERP gantries. Similarly, the antenna controllers do not pose a threat to motorists. Positioned six metres above the road surface, the radiation power of the antenna controllers are a thousand times less than the acceptable radiation power allowed by the International Agencies on Radiation Protection.

Then came the “flying projectile” fear — motorists argued that the IUs may pose a threat to motorists during an accident. Motorists were afraid that the IUs would dislodge and injure the driver during impact. In order to prove this untrue, the LTA simulated a crash. However, three days before the simulation, a newspaper article on an accident displayed a photograph of a smashed car with only the IU intact.

Prof Menon recalled, “There was a photograph of a car in an accident in the newspapers, and the IU was the only one standing. So we spent a lot of money for nothing. But what I’m saying is, the whole idea was people were not happy with the system and anything was
chosen to part ... but I think we did a lot of experiments to make sure that it's reliable because we wanted to make sure that people will not complain." The ERP was finally implemented later that same year.

It was, and remains, a very tough measure but the policy trade-off for roads is felt more keenly here than for many other countries. Today, road infrastructure already takes up 12% of total land use on an island of about 710 sq. km. This is a considerable figure when compared to the 15% used for housing.
Endnotes

1. The four key strategic thrusts identified by the Government are: integrated land-use and transport planning, providing quality public-transport system, developing a comprehensive road network and maximising its capacity, and managing demand of road usage through ownership and usage measures.
8. Ibid.
9. Ibid.
10. Ibid.
13. Oral History Interview with Liew Heng San by Centre for Liveable Cities and LTA Academy, March 2011.
Even as Singapore's land transport system grew more complex, efforts were made to simplify the regulatory framework. This began in the late 1980s with institutional integration. (See Appendix B for the Governance Tools of Singapore Transport)

Mr Low Tien Sio, former Executive Director of the MRTC, said, “Institutional integration is what differentiates us from the rest of the world. It provides a drive, it provides the initiative, and it influences perspective and eventually the end delivery.”

As a result of this, multi-modal public transport operators were set up in 1987, while TransitLink, an integrated fare collection system was set up in 1989 and most importantly, the Land Transport Authority (LTA) in 1995.

The LTA was established in 1995 to integrate different areas of land transportation, including planning and regulatory functions for both public and private transport (See Figure 4). It was formed through the merger of (i) the Roads and Transportation Division of Public Works Department (PWD), (ii) Registry of Vehicles (ROV), (iii) MRTC and (iv) the Land Transport Division of the then Ministry of Communications.

This merger formed a single agency, focused on land transportation to coordinate planning for private and public transport infrastructures, formulate vehicle-restraint policies, as well as evaluate trade-offs between alternative infrastructure and policy options.

Although it appeared to be a sensible idea, the formation of the LTA was not easy. It took six months for this new authority to be launched. Mr Liew said that being a politically salient issue, politicians also weighed in in the development of the LTA. “They sent all the right messages to the public and were very supportive of the policies implemented,” he said.
He added: “[the Government] put together land policy, vehicle registration, road transport and rail transport all into one organisation. That is a significant move because it means that they have brought together many diverse ideas into a central body that is tasked to envision Singapore’s land transportation in the next decade.”

For Mr Low, this institutional integration was more than mere organisational change. “Integration must come from all levels — between the guy who plans, the guy who builds and the guy who uses,” he said.

The integration of the customer experience that led to the creation of TransitLink, an integrated fare collection system, was a natural one. The three public transport operators — SBS Ltd, TIBS Ltd and SMRT Corporation Ltd — jointly established this common ticketing system for buses, the MRT and the LRT.

As Mr Low noted, “You need to ensure that the commuter gets to travel on bus, on rail and on all the different modes without the fuss of changing payment methods. And that all the discounts or rebates are captured in one database.”

In addition to fare integration, TransitLink also helped to ensure network and information integration. It took on the role of central planning and coordination of the bus network, MRT and LRT systems, before the LTA took over as the central bus planner in 2009.

This is an important lesson, but one that is difficult to realise in practice, even in a small city-state with a cooperative civil service. The complexities were soon manifested in what became known as the “Buangkok White Elephants”. (See Box Story 3)
MINISTER FOR COMMUNITY DEVELOPMENT, YOUTH AND SPORTS, MR VIVIAN BALAKRISHNAN WAS DRIVING HIS CAR INTO PUNGGOL SOUTH FOR A VISIT IN 2005 WHEN HE STOPPED HIS CAR BESIDE THE YET UNOPENED MRT STATION.

Instead of the usual welcome committee of lion dances and student songs, he was greeted with silence and a peaceful scene of eight large paper elephants, grazing on grass.

It was a protest by the residents — who did not see why Buangkok MRT station should remain closed. This station was one of the stations, besides Woodleigh, that remained non-operational when the North-East Line first started running in 2003.

It was a dramatic moment when economics and public demands came to a head. Talking to residents later, the minister said, “It’s just a matter of time before you reach that critical mass when the Ministry of Transport and the LTA and SBS Transit will have no choice but to declare it open.”

He later told reporters, “I think we are rapidly reaching the point at which the case is so compelling that it must open. The LTA said in 2003 that there would need to be some 2,000 housing units within a 400 m radius of the station to generate enough traffic to justify its opening. The station is part of the North-East Line that was completed in June that year.”

The white elephants were certainly not part of the plan, and neither was an empty station.

“Planners certainly do not plan to shut down a station,” Mr Low said when asked about Buangkok.

In the past, the work of transport planning, building infrastructure and overall master planning used to be under the PWD’s purview until it all split into the various present agencies. Although this demarcation of work has allowed individual agencies to be more focused in their specific areas of concern, teamwork amongst various agencies were not tightly strung in achieving the common goal.

With plans laid out for the construction of a certain MRT line, it is very clear that the network is ready to operate to serve the public. However, overall planning that incorporates residential usage, commercial and industrial facilities were not perfectly integrated with transport planning, rendering certain stations non-operational in the consideration of low ridership and low cost recovery. The Buangkok MRT, one of the stations on the North-East Line, was one such case.

A dilemma was apparent for the authorities in weighing the economic interests of the private operators, and the need for transport among the residents there. Should the decision to open stations be dependent on the operators (economic interests) or the Government (public interest)?
Holding back the full operation of a constructed line would mean depriving the residents of the use of one station. On the other hand, the full operation of a constructed line could mean that the operators’ fare revenue would not be able to cover the operating costs. At the time, the decision was to delay the opening of those stations with low ridership.\textsuperscript{11}

Today however, such decisions are usually made following the principle of supply creating demand, an approach preferred by the authorities. Mr Low said: “Initially the take-up rate is low, but as more people use it, it gets more attractive and then the line itself will encourage the commuters to go to that station. It takes time for the public to accept the line and start using it.”\textsuperscript{12}

5.2 PRIVATE ASPIRATIONS, PUBLIC COSTS

The increasing complexity of transport issues in Singapore points to three factors which stand in tension to one another — affordable personal mobility; the needs of industry; and the use of public transport.

To keep public transport affordable, Singapore has the unique mechanism of a government-linked council, the Public Transport Council, which approves the operator’s proposal to increase fare charges. In this way, the open processes garner some legitimacy, while distancing the Government from the political fallout.

But the extent of usage for public transport is not just a function of affordability; it is also a matter of service and preferences. Whether people choose to be drivers or commuters is a decision that is largely (although not wholly) economic, since as a matter of policy, Singapore has presented clear economic proxies for the cost of congestion and other costs, such as pollution from car ownership.

Still, it is evident that the aspirations of car ownership as Singapore moves towards an increasingly developed economy, are difficult to deny. In the 1970s–1990s, the price mechanism, although blunt, was sufficient to deter. As the country’s income level moved up, and questions of equity and access to private transport become more salient, it has become more complex to balance the two.

Consequently, the policies have made fine-tuning incremental, with constant changes to the car tax structure, quota and charges on use, as seen in the Vehicle Quota System, ERP and ALS. Government intervention too has been high, and the advocating of public transport over private car ownership looks set to endure.

In conclusion, in an increasingly mature market, with major pieces of infrastructure already in place, the driving forces for transport in Singapore are changing.

In the early days of the 1950s to the 1970s, changes in the transport system tended to be large-scale and high-speed, since motivations behind these changes were urgent problems faced both by the providers and the users — the public transport operators were competing in a messy, cut-throat market place, with rules that were either nascent or not properly enforced. As a result,
they paid workers badly, leading to strikes and poor service. Commuters, meanwhile, were stranded without recourse since cars were too expensive, but public transport was both unreliable and uncomfortable.

The Government’s solution to the crisis was to change to a controlled market with fewer players. It worked, but only for a period of time, and the structure continued to evolve in the 1980s, as the market matured and regulations became both more sophisticated and more strictly enforced.

In later years, the changes in transportation were driven by the city’s economic development strategy for 1990s — to become a global city with economic dynamism and a high quality of life and liveability.

This was reflected in the Concept Plan 1991 for a projected population of four million, which outlined a broad view of Singapore within the next 30 to 40 years. This concept plan marks the paradigm shift in transportation planning from problem-driven planning to vision-driven planning. The revised Concept Plan adopted a “constellation concept” strategy of setting up regional centres, aimed at decentralising commercial activities and hence reducing congestion in the city. The four regional centres planned were Tampines in the East, Seletar in the North East, Jurong East in the West and Woodlands in the North. (Appendix F)

So as Singapore moved into a more developed economy, transport changes moved on three key fronts: (1) the move to develop an extensive rail network picked up in the late 1990s; (2) more measures to curb both ownership and usage of cars; and (3) institutional integration linked up the different pieces of the transport planning and execution processes at the policy ends.

Therefore, at each stage of Singapore’s development, the driving forces are different; but the cumulative effect can be seen today in a networked system that is increasingly embedded into the lives of Singaporeans. This is an advantage gained at some cost. While a mature transport system makes for easier travel between key points and nodes, as well as provide some solutions to policy dilemmas, it also means that the sunk costs are greater, and any large-scale change will be increasingly difficult. Going forward, however, with a more vociferous commuting public, the need for speedy responses will become even more urgent.

Endnotes

1. Oral History Interview with Low Tien Sio by Centre for Liveable Cities and LTA Academy, April 2011.
2. In 1987, a newly formed Singapore Mass Rapid Transit (SMRT) Corporation was established to operate the first urban trains. In 2001, when the concept of multi-modal operation of bus and train services was being promoted, SMRT Corporation became the first multi-modal operator when it acquired TIBS to form SMRT Buses Ltd, which became a sister company of SMRT Trains Ltd. SBS then followed suit and also renamed itself as SBS Transit Ltd and started running train services in 2003.
3. In the 1800s, the British established the Straits Settlement’s Public Works Department (PWD) which was headquartered in Singapore. It was also known as the ‘grandfather’ of all transport planning units and the primary builder of transport infrastructure in Singapore. The PWD was formally launched in 1946 and
took charge of most public works in Singapore including the construction of government buildings and supervision of the sewerage and drainage system. Its Roads and Transportation Division was in charge of building transport infrastructure, which included roads, bridges, bus interchanges and shelters.

4. The Registry of Vehicles (ROV) was established in 1945. It implemented policies relating to vehicle ownership and usage control, enforcement of vehicle safety and the regulation of public transport services. The ROV was also the licensing authority and regulator of the taxi industry until it was subsumed into the LTA in 1995.

5. Oral History Interview with Liew Heng San by Centre for Liveable Cities and LTA Academy, March 2011.

6. Oral History Interview with Low Tien Sio by Centre for Liveable Cities and LTA Academy, April 2011.

7. Low Tien Sio was also the Deputy Chief Executive of the LTA in 1998.

8. When distance-based fares were introduced in 2010, TransitLink became a subsidiary of the LTA.


10. Oral History Interview with Low Tien Sio by Centre for Liveable Cities and LTA Academy, April 2011.


References


Low Aaron, “Residents cheered by the minister’s comments, but still want a firm date” Singapore: Lianhe Zaobao, August 29, 2005.


Low Tien Sio, interview by Centre For Liveable Cities and LTA Academy. Oral History Interview, Singapore, April 2011.


“‘The buses that are too few, too full, and late.” The Straits Times, October 15, 1968, p. 12.

## APPENDIX A
### — KEY POLICY TIMELINES OF TRANSPORT SYSTEM

### (I) Road Pricing Timeline

<table>
<thead>
<tr>
<th>Timeframe</th>
<th>Historical development/milestone</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>Severe congestion noticed in Central Business District (CBD) areas. Road Transport Action Committee introduced staggered work hours scheme and car pooling scheme. Both did not respond well to positive changes.</td>
</tr>
<tr>
<td>1975</td>
<td>Area Licensing Scheme (ALS) introduced to restrict peak hour traffic flow in the CBD. – The Park and Ride scheme is also introduced as a support measure for the ALS and the Singapore Shuttle Bus/City Shuttle Service (CSS) company is set up to provide shuttle services from the fringe car parks into the restricted city zone.</td>
</tr>
<tr>
<td>1976</td>
<td>Park and Ride scheme was unpopular and abandoned; routes for CSS extended into housing estates.</td>
</tr>
<tr>
<td>1995</td>
<td>First Road Pricing Scheme starts, along East Coast Park Expressway. Motorists buy paper licences to enter the expressway.</td>
</tr>
<tr>
<td>1997</td>
<td>Road tax structure revamped to impose more charges for using roads, rather than owning cars.</td>
</tr>
<tr>
<td>1998</td>
<td>Electronic Road Pricing (ERP) System implemented on East Coast Park Expressway, Central Expressway, Pan Island Expressway and Central Business District areas.</td>
</tr>
<tr>
<td>2003</td>
<td>Graduated pricing for ERP introduced to smoothen and optimise traffic flows at the boundaries of two successive ERP periods.</td>
</tr>
<tr>
<td>2005</td>
<td>ERP operating hours extended at north-bound CTE and Orchard Road; separate ERP cordon introduced for Orchard Road to allow the traffic there to be managed independently from the rest of the CBD.</td>
</tr>
<tr>
<td>2011</td>
<td>Shortened ERP operating hours for all four gantries along the Singapore River Line (Southbound) and CTE gantry (Northbound before the PIE Exit). The four gantries along the Singapore River Line (Southbound) are at New Bridge Road, South Bridge Road, southbound Fullerton Road and Southbound Bayfront Avenue.</td>
</tr>
</tbody>
</table>
(II) Vehicle Ownership Timeline

<table>
<thead>
<tr>
<th>Timeframe</th>
<th>Historical development / milestone</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>Fiscal measures taken to curb the growth in vehicle population. Import duties for cars were increased from 10% to 30% of the open market value (OMV).</td>
</tr>
<tr>
<td>1972</td>
<td>Further increase in the import duty of cars to 45% of OMV, together with additional registration fees (ARF) (25% ad valorem) and changes in road tax structure and petrol tax rates</td>
</tr>
<tr>
<td>1974</td>
<td>ARF increased significantly to 55% ad valorem and increased in road tax</td>
</tr>
<tr>
<td>1975</td>
<td>Preferential Additional Registration Fee (PARF) introduced to encourage scrapping of cars more than 10 years old. It ranges from 35% to 55% ad valorem to induce owners to replace old cars with new ones.</td>
</tr>
<tr>
<td>1976</td>
<td>ARF increased significantly to 100% ad valorem. Introduction of progressive surcharge on road tax.</td>
</tr>
<tr>
<td>1978</td>
<td>ARF increased to 125% ad valorem</td>
</tr>
<tr>
<td>1980</td>
<td>ARF increased to 150% ad valorem with an increase of 100 times increase in vehicle registration fee.</td>
</tr>
<tr>
<td>1983</td>
<td>ARF increased to 175% ad valorem, with PARF ranging from 45% to 65% ad valorem</td>
</tr>
<tr>
<td>1990</td>
<td>ARF drops to 160% ad valorem, but PARF pinned at 80% of OMV at point of registration.</td>
</tr>
<tr>
<td>1990</td>
<td>Vehicle Quota System (VQS) introduced to manage growth rate of vehicle population; would-be car-owners must now first bid for a Certificate of Entitlement (COE) in monthly public tenders.</td>
</tr>
<tr>
<td>1998</td>
<td>PARF and COE Schemes revised to allow rebate balance to offset Registration Fee, Additional Registration Fee (ARF) and COE.</td>
</tr>
<tr>
<td>1999</td>
<td>Government Parliamentary Committee (Communications) submits report by VQS Review Committee, resulting in reduction from four car categories of COE to two (besides goods vehicles, motorcycles and the 'Open' category) and a recomputation of the annual COE car quota.</td>
</tr>
<tr>
<td>2009</td>
<td>LTA tightened the annual vehicle population growth rate from 3% to 1.5%. (See Figure 5 for the sharp drop in vehicle numbers with the new growth rate implemented)</td>
</tr>
<tr>
<td>2012</td>
<td>LTA further tightened the annual vehicle population growth rate from 1.5% to 0.5% for the period of 2012 to 2014</td>
</tr>
</tbody>
</table>

---

**FIGURE 5** Sharp drop in numbers with 1.5% car population growth rate

<table>
<thead>
<tr>
<th>Vehicle Category</th>
<th>Category A</th>
<th>Category B</th>
<th>Category C</th>
<th>Category D</th>
<th>Category E</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>As at 31 Dec 2008</td>
<td>344,356</td>
<td>230,401</td>
<td>151,922</td>
<td>145,348</td>
<td>–</td>
<td>872,027</td>
</tr>
<tr>
<td>Total quota for May 2008 to April 2009</td>
<td>46,501</td>
<td>26,376</td>
<td>7,693</td>
<td>10,252</td>
<td>19,532</td>
<td>110,354</td>
</tr>
<tr>
<td>Total quota for May 2009 to April 2010</td>
<td>33,486</td>
<td>18,233</td>
<td>5,533</td>
<td>9,351</td>
<td>17,186</td>
<td>83,789</td>
</tr>
</tbody>
</table>

## Appendix B
— Governance Tools for Singapore Transport

### (I) Legal Instruments

<table>
<thead>
<tr>
<th>TOOL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driving License</td>
<td>Drivers must be at least 18 years of age before qualification.</td>
</tr>
<tr>
<td>Vehicle Ownership</td>
<td>Building more roads and maximising road capacity alone will not be able to ensure smooth flowing roads. Therefore, there is a need to adopt a vehicle ownership policy which could keep the car population at levels supportable by road infrastructure development as well as planned developments in public transport and traffic management system.</td>
</tr>
<tr>
<td>Vehicle Usage</td>
<td>Singapore's traffic demand management strategy is road pricing. Prices are pegged highly to help drivers internalise the external costs of driving (i.e. the impact on other road users and the environmental impacts). This serves as an effective tool to manage traffic congestion.</td>
</tr>
</tbody>
</table>

### (II) Executive Policies

<table>
<thead>
<tr>
<th>TOOL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Quota System (VQS)</td>
<td>The VQS sets a quota to the number of new vehicles to be registered in Singapore each year. This quota is calculated based on the allowable growth rate in vehicle population that is sustainable for the long term.</td>
</tr>
<tr>
<td>Certificate of Entitlement (COE)</td>
<td>Under the VQS, anyone who wants to register a new vehicle would need to first bid for a COE, which entitles him to own and use the vehicle for 10 years. COEs are allocated through the market mechanism, which provides the most efficient and equitable means of allocation. The quota is released twice a month and bidding for the COEs is done through an electronic on-line auction system. The successful bid price for the COE thus reflects the market clearing price that people are willing to pay to own a car. The COE is valid for 10 years. There are provisions for a rebate of the COE if the car is scrapped before 10 years. COE costs have been increasing in recent years.</td>
</tr>
<tr>
<td>Electronic Road Pricing (ERP) System</td>
<td>ERP implemented on ECP, CTE, PIE and CBD areas in 1998. Graduated pricing in recent years and extended hours of charging aims to reduce congestion on roads.</td>
</tr>
<tr>
<td>Road Tax</td>
<td>Fiscal measures taken to curb the growth in vehicle population. This includes heavy road tax as well as vehicle registration fees.</td>
</tr>
</tbody>
</table>
### (III) Institutions

<table>
<thead>
<tr>
<th>TOOL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Land Transport Authority (LTA)</strong></td>
<td>LTA is a statutory board under the Ministry of Transport and acts as the single government agency in charge of all land transport issues in Singapore. It was formed to integrate all relevant areas of land transportation, which includes the functions of a planning agency and regulatory body for public and private transport. It was established through the merger of (i) the Roads and Transportation division of PWD, (ii) ROV, (iii) MRTC and (iv) the Land Transport division of the then Ministry of Communications.</td>
</tr>
<tr>
<td><strong>Transitlink</strong></td>
<td>TransitLink was established to aid in the area of fare integration through its collaboration with other agencies in implementing a common ticketing system for buses, the MRT and the LRT. Together with LTA and the public transport operators, TransitLink also provides coordinated and convenient information on almost all aspects of travelling on buses, MRT and LRT. In addition to information integration, TransitLink plays an essential role in the network integration of Singapore's public transport. It took on the role of central planning and coordination of the bus network, MRT and LRT systems before LTA took over as the central bus planner in 2009.</td>
</tr>
</tbody>
</table>
### APPENDIX C
— COMPARISONS OF PUBLIC TRANSPORT FARE CHARGES AND AFFORDABILITY WITH OTHER CITIES

<table>
<thead>
<tr>
<th>Published Stored Value Fare for a 10 km Journey (S$)</th>
<th>Singapore Public Transport Affordability Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>2005: 5.0</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>2006: 4.9</td>
</tr>
<tr>
<td>Tokyo</td>
<td>2007: 4.7</td>
</tr>
<tr>
<td>Taipei</td>
<td>2008: 4.0</td>
</tr>
<tr>
<td>Bangkok</td>
<td>2009: 3.9</td>
</tr>
<tr>
<td>Shanghai</td>
<td></td>
</tr>
</tbody>
</table>

Adjusted using the 2009 Purchasing Power Parity (PPP) conversion factor published by the World Bank. The PPP is the rate of currency conversion at which a given amount of currency will purchase the same volume of goods and services in two countries.

The Singapore Public Transport Affordability Index has shown a consistent drop over the years, reflecting continued affordability of Singapore's public transportation.

Source: [http://www.nova-metros.org/Welcome.do;jsessionid=D4BE18398884F348E9E2F104C0A70A7E](http://www.nova-metros.org/Welcome.do;jsessionid=D4BE18398884F348E9E2F104C0A70A7E)
APPENDIX D
— ECONOMIC EVALUATIONS FOR FINANCING RAIL DEVELOPMENTS

As part of its economic evaluation, the LTA has adopted a Cost-Benefit Analysis (CBA) Framework from UK’s Department for Transport, which is shown below.

At the present time, monetised CBA:\(^2\)

- **includes** changes in business and non-business travellers’ journey time, vehicle operating costs, fares and other changes;
- **includes** impacts on private sector providers’ revenues and costs;
- **includes** changes in the numbers of accidents, but **excludes** impacts on personal and freight security;
- **includes** the effects of better transport interchange on traveller journey times but **excludes** other transport interchange quality factors;
- **includes** impacts of noise;
- **includes** impacts on greenhouse gases;
- **subsumes** the accessibility impacts to the extent that the cost benefit analysis takes account of all significant behavioural responses;
- **usually excludes** journey ambience impacts, although factors such as rail overcrowding, station facilities and rolling stock quality may be included in some studies, and the journey ambience impacts of walking and cycling can also be reported;
- **usually excludes** option values, although these may be included for some rail studies;
- **currently excludes** impacts on local air quality, although the Department expects to publish money values for this challenge in the near future;
- **currently excludes** reliability impacts in the Analysis of Monetised Costs and Benefits (AMCB), as the method for calculating these is still undergoing further study. However, reliability impacts can be included in the Appraisal Summary Table (AST);
- **excludes** impacts on landscape, townscape, heritage of historic resources, biodiversity, and water environment, as no money values for these have yet been established by the Department;
- **excludes** any wider economic impacts in the Analysis of Monetised Costs and Benefits (AMCB). However, wider economic impacts can be included in the Appraisal Summary Table (AST).
APPENDIX E
— “REGULATING FOR QUALITY”

The transport market in Singapore is regulated with the intention of balancing economic benefits for private operators with the social needs of the population. Various policy tools are implemented to capture public needs, customer expectations and service assurance. In particular, clear transport standards and responsibilities are outlined.

As public transport involves a large segment of the population, the Government felt a need to have a wider representation from the community in the decision making process. Hence in 1987, when the trains started their operations, it was considered an opportune time to establish a Public Transport Council (PTC) to replace Bus Services Licensing Authority (BSLA), as an independent body to safeguard the interest of commuters by ensuring adequate public transport services and affordable fares, and at the same time ensuring the long-term financial viability of public transport companies.³

In 1994, the PTC first introduced a comprehensive set of bus-service guidelines to regulate the performance of basic bus-service operators. Two compulsory regulations were implemented — Areas of Responsibilities and Quality of Services. Both bus operators have each been assigned with separate Areas of Responsibilities and each is required to meet the mobility needs of commuters within its own Area of Responsibility in planning and operating its bus services and to comply with the Quality of Service (QoS) Standards. Currently, the QoS Standards for basic bus services comprise of two categories:⁴

Operating Performance Standards (OPS) measure minimum daily or monthly operational deliverables, either at the bus network or route levels. They cover the aspects of bus reliability, loading and safety.

Service Provision Standards (SPS) measure overall bus route planning and provision of services. They cover the aspects of service availability, integration and information.

Besides improving the planning and provision of quality service in public transport, public transport usage was also encouraged through governmental policies implemented such as giving buses priorities. This was also, in part, a measure for congestion management to promote the modal shift from private cars to public transportation. The first of such schemes was the reserved bus lanes introduced in February 1974. Approximately 16 km of bus lanes affecting 23 junctions were set up within the CBD. They were only installed on kerb lanes of one-way streets and buses were given exclusive use from 7.30 am to 9.30 am and 4.30 pm to 7.00 pm on weekdays and from 7.30 am to 9.30 am and 11.30 am to 2.00 pm on Saturdays.⁵ Travel times of buses were found to improve by 20% to 40%.⁶ The success of bus lanes in the CBD led to the installation of another 15 km of bus lanes on dual carriageways outside the CBD.
With the rapidly growing economy, the Government further implemented the Full-Day bus lanes in 2005 and the Mandatory Give-way at Bus Bays in 2008 to speed up the buses and enhance their reliability. Since June 2008, the network of normal bus lanes were extended from 120 km to 155 km, and full-day bus lanes trebled from 7 km to 23 km. These measures have improved bus speeds by an average of 7% and as much as 16% on some roads.
APPENDIX F
— THE "CONSTELLATION CONCEPT" STRATEGY IN CONCEPT PLAN OF 1991

LEGEND

- URBANIZED AREA
- CENTRAL AREA
- RESIDENTIAL
- COMMERCIAL
- INDUSTRY
- BUSINESS PARK
- EXISTING EXPRESSWAY
- PROPOSED EXPRESSWAY
- EXISTING MRT
- PROPOSED MRT
- LRT
- MRT / LRT STATION
- REGIONAL CENTRE
Endnotes

1. Staggered work hours scheme is an experiment in which civil servants report to work at different times, so as to lengthen the peak period.


6. Ibid.