

**Session 6c**

**PASSENGER TRANSPORT -  
INTEGRATION**

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**AN LRT-BUS STRATEGY FOR GREATER KUALA  
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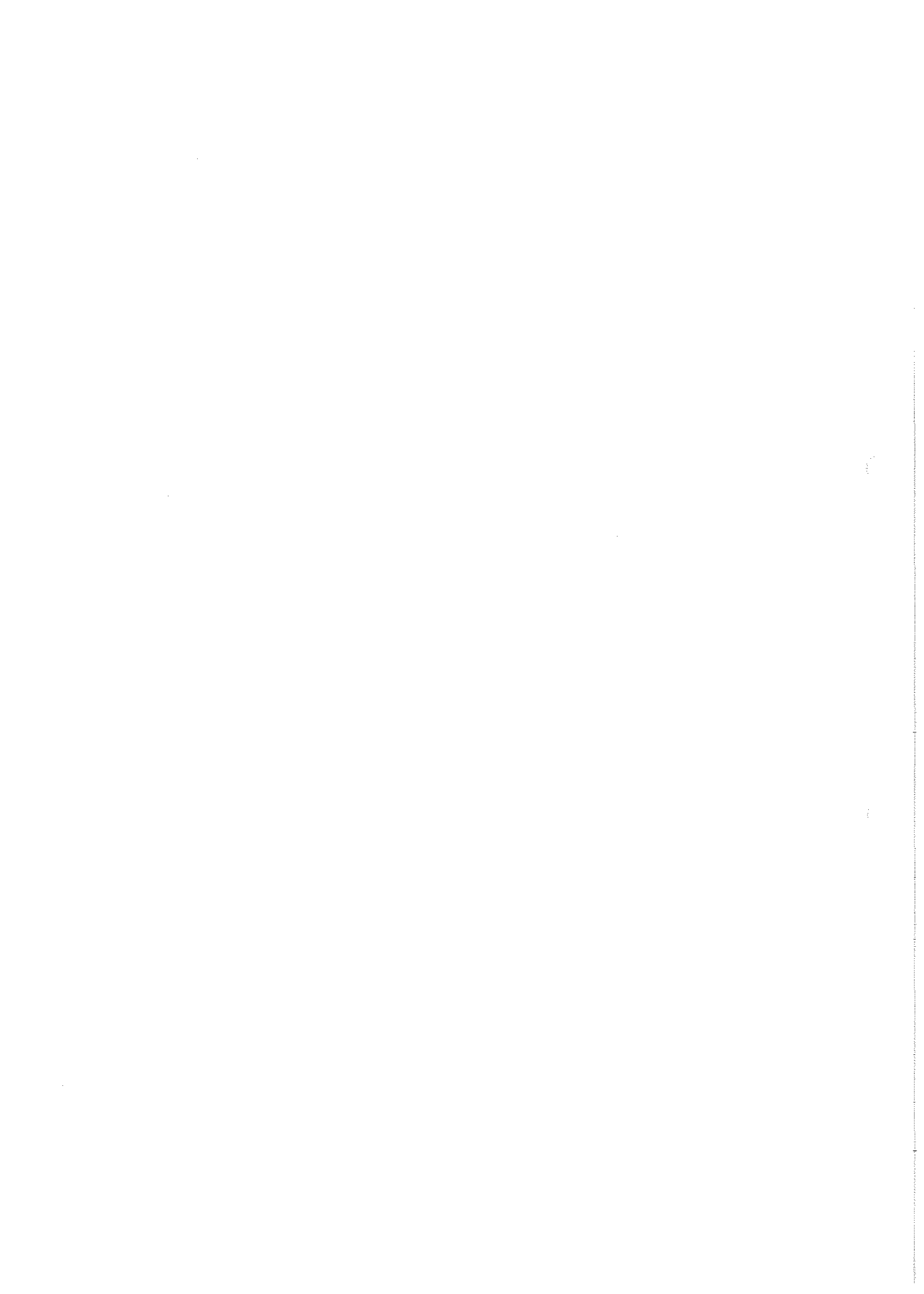
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**EXPLORING EXURBAN TRAVEL DEMAND IN THE USA  
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**ATRF 96**



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KUALA LUMPUR: WHAT FUTURE  
INTEGRATION?**

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**ABSTRACT**

The idea of an LRT-bus strategy was first mooted in the 1984 Kuala Lumpur Structure Plan. The overall policy formulation calls for a 'bus plus LRT system' as the major public transport system to handle future traffic demand in Greater Kuala Lumpur. The idea was firmly launched in 1993 when the Malaysian Government announced an integrated transport package for Kuala Lumpur comprising of a Light Rail Transit System, double-tracked electrified commuter trains and the amalgamation of existing bus companies into two or three operators. The main aim of this paper is to highlight structural reforms undertaken or envisioned in the public transport industry as transport implementors sought to actualize the chosen strategy.

The contents of this paper are three fold. The first section outlines the structure of the existing bus-operating industry comprised mainly of stage and minibus operators. While bus services in the industrialized world are normally operated on a unified, city-wide basis, the situation is somewhat relaxed in Kuala Lumpur with conventional stage buses sharing the market with more informal minibus services. Secondly, the paper examines new investment made in order to revitalize the existing rail system and the provision of additional capacity in the form of a Light Rail transport system. In this respect, bus operators would need to coordinate and integrate their services in order to remain competitive vis-a-vis these new modes. Finally, the paper discusses changes that need to be made to the regulatory and operating environment of the public transport industry in order to strive for efficient integration of all subsequent services.

The paper concludes with the observation that public transport, until now largely represented by buses, could be improved in order to offer a sufficient level of mobility. Indeed, successful transport planning depends upon the level of integration of various urban public transport modes and coordination of their operations.

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## AN LRT-BUS STRATEGY FOR GREATER KUALA LUMPUR: WHAT FUTURE INTEGRATION?

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### INTRODUCTION

The Federal Territory of Kuala Lumpur, located within the rapidly-developing Klang Valley region, is the capital city of Malaysia. The Federal Territory, covering an area of 243 sq.km., has been experiencing a rapid increase of population growth since the 1970s. This increase is encouraged in part by the abundant job opportunities available in the nation's financial and administrative capital. Kuala Lumpur has out-grown its administrative boundary to include the adjoining satellite town of Petaling Jaya, Hulu Kelang, Selayang and other urbanized areas within the Klang Valley region. This paper will refer to the present built-up area in and adjoining the Federal Territory of Kuala Lumpur as Greater Kuala Lumpur (refer Figure 1).

The rapid physical expansion of Greater Kuala Lumpur and its associated accelerated population increase has put tremendous strains upon its transport and other service infrastructure. Although the Federal Territory of Kuala Lumpur is under the jurisdiction of the City Hall of Kuala Lumpur, transport policies in Kuala Lumpur are mainly the responsibility of the Federal Government. The Ministry of Transport has the most important role amongst other government ministries as it has overall responsibility for all modes of transport. In the interest of developing an efficient transport infrastructure and policy in the Federal Territory of Kuala Lumpur, the Federal Government has commissioned a number of transport studies since the 1960s.

Although most of the studies emphasized highway construction programmes, supportive policies towards public transport could be discerned as far back as the 1973-74 Urban Transport Policy and Planning Study which directed itself, *inter alia*, towards the development of a comprehensive programme of policies and actions to maximize the use of public transport. The main purpose of the 1976 Second Kuala Lumpur Urban Transport Project was to make more efficient use of existing and planned transport facilities in the Federal Territory. The project comprised of policy measures aimed at improving public transport; measures aimed at restraining private car usage, as well as programmes for new road construction and improvement works.

After the adoption of the Federal Territory (Planning) Act of 1982, the City Hall of Kuala Lumpur was obliged to prepare a Structure Plan for the area under its jurisdiction. In line with this, the 1981 Master Plan Transportation Study was commissioned to assist in formulating a set of transport policies that would complement the overall Structure Plan strategy for the development of the Federal Territory. The recommendations of the study reiterated the need to restrain future traffic growth in the core of the city, improve public transport service, provide priority movement of high-occupancy vehicles and, more importantly, it also recommended new forms of mass transit for Kuala Lumpur (Wilbur Smith et al., (1981)).

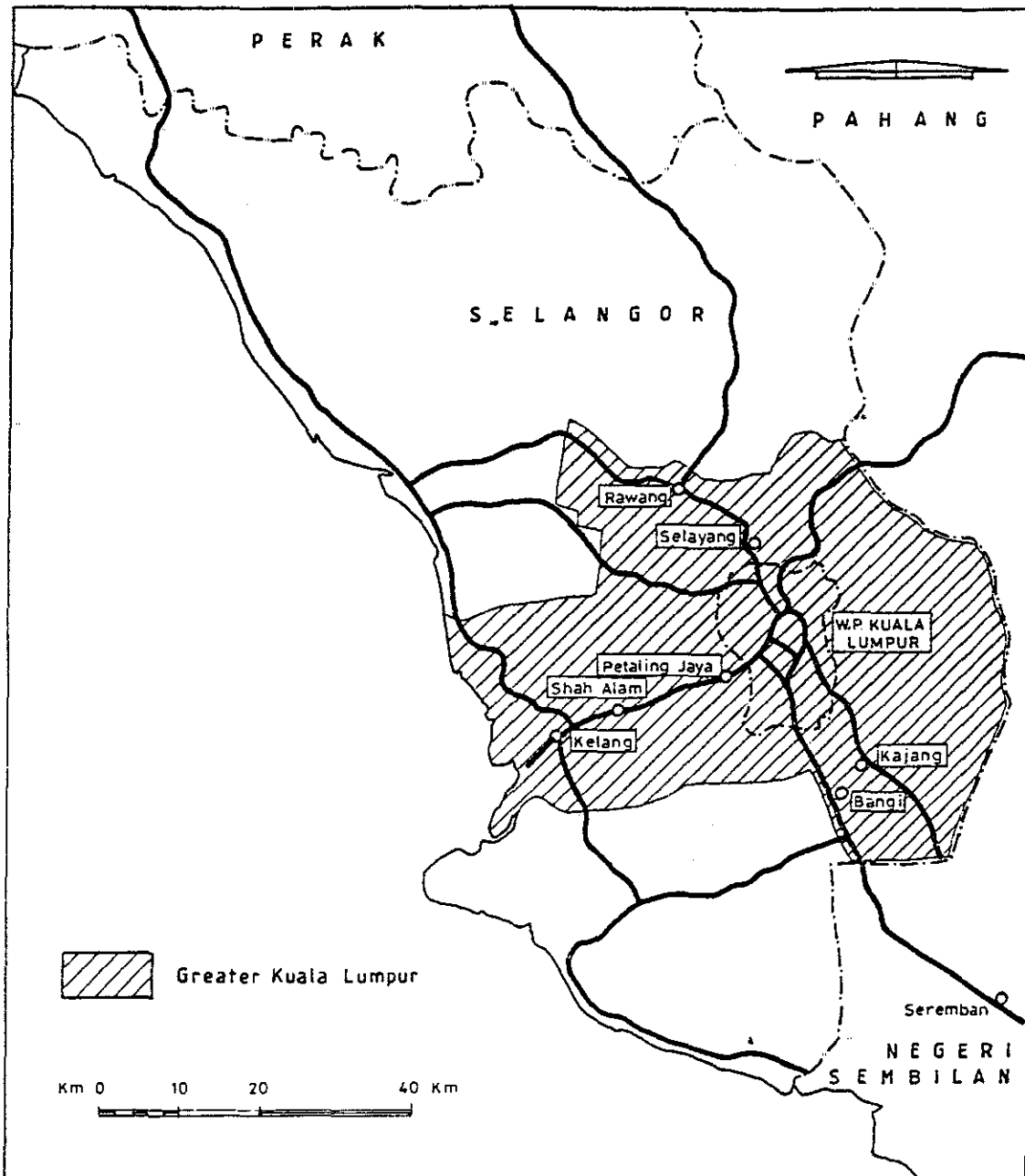


FIG 1 : MAP OF GREATER KUALA LUMPUR.

The Kuala Lumpur Structure Plan establishes a broad policy framework for the development of the Federal Territory over the plan period 1980-2000. One of the stated goals of the Structure Plan is to achieve the best possible physical structure and arrangement for Kuala Lumpur which is in turn supported by an efficient transportation system (City Hall, (1984)). The overall transport objective identified in the Structure Plan was to effect a 40 per cent to 60 per cent modal shift from private to public transport as it was envisaged that, without traffic restraint policies, there would be a need for an additional minimum of 700 kilometres of new roads to be built over the Structure Plan period.

The strategy adopted in the Structure Plan is that a 'bus plus Light Rail Transit System' shall be the major public transport system to handle future traffic demands within the Federal Territory and its fast expanding urban fringes. The 1981 study had concluded that the Light Rail Transit system was the only economically feasible solution to the needs of mass transit in Kuala Lumpur over other alternatives such as a heavy metro mass transit system, busways, monorail systems as well as the Aerobus. In this respect, bus services were to be developed with maximum penetration into designated growth areas and would be the principal means of internal circulation as well as providing an important feeder role to the Light Rail Transit System. Although the Malaysian Government approved the construction of an LRT system for Greater Kuala Lumpur in 1984, it was only in 1996 that the system, although altered in form, came into place. It is the intention of this paper to study how the adopted strategy evolved into place and how it is likely to function in the near future taking into consideration the mechanisms involved in its implementation.

## PRIVATIZING THE NATION'S TRANSPORT

Under the Sixth Malaysia Plan (1991-1995), the Malaysian economy exceeded targets set by maintaining a Gross Domestic Product growth rate of 8.7 per cent, overtaking the original target of 7.5 per cent. The economy is expected to maintain its robust growth under the Seventh Malaysia Plan (1996-2000) averaging eight per cent in the next five years. The manufacturing sector grew by 13.3 per cent under the Sixth Malaysia Plan and continued to be the most dynamic sector. The growth of the construction sector took place against a backdrop of the private sector-led implementation of major infrastructural and civil engineering projects such as the Kuala Lumpur International Airport, the Second Crossing Malaysia-Singapore, the North-South Expressway and the Light Rail Transit System.

A total of 77 projects have thus been privatized a decade since the introduction of the privatization policy in 1983 (Ministry of Finance, (1993)). The build-operate-transfer (BOT) method has been used in the efforts to privatize new projects such as roads, water supply and power projects. Under this method, the private sector constructs the facility using its own funds, operates it for a concessionary period and finally transfers it to the Government at the end of the stipulated period. Projects privatized under the BOT method include the Jalan Kuching-Kepong Interchange, the North-South Expressway and the Second Crossing to Singapore. The concession period for the North-South

Expressway Project is 21 years while for Malaysia Airports Bhd. the concession period is 60 years.

Experience shows that privatization had helped to relieve the Federal Government's financial burden. As an example, significant savings was accrued from the privatization of road construction as the Federal Government would have had to spend about RM9.3 billion to build the roads which have been privatized to Projek Lebuhraya Utara-Selatan Sdn. Berhad (PLUS). The privatized roads would be handed over to the Government after the end of the concessionary period. Privatization also provide opportunities for the private sector to increase its role in the development of the country. This is evident in the involvement of Syarikat Transit Aliran Ringan Sdn. Berhad (STAR) in the Light Rail Transit (LRT) construction and KLIA Berhad in the development of the Kuala Lumpur International Airport in Sepang.

Privatization had also helped to speed up the development of the nation's infrastructure and this has contributed to further economic growth. The North-South Expressway (NSE) was completed in 1994 about 16 months ahead of schedule. The NSE, which is 890 kilometres long, is a tolled highway which stretches from Bukit Kayu Hitam at the Kedah-Thai border in the north to Johor Bahru in the south. It runs parallel to the old trunk road which forms the backbone of the west coast of Peninsular Malaysia. The NSE has enhanced the accessibility of many villages and secondary towns. New townships and industrial estates are increasingly being developed near the various exit points of the NSE. The NSE is also expected to provide a boost to the domestic tourist industry as it would also encourage more travelling by road.

Privatization, however, is not without costs to the Federal Government. To encourage the private sector to participate in privatization, especially for BOT projects, various concessionary benefits, in terms of tax incentives and soft loans have been given by the Government. In the case of the North-South Expressway, the Government agreed to provided concessionary loans to PLUS amounting to RM 1650 million. Privatizing the North-South Expressway and handing over some existing highways to PLUS deprived the Malaysian Highway Authority (MHA) of its toll collection, the only source of revenue to the Authority needed to service its existing loans. The Government therefore had to assist MHA in servicing its debt through a grant.

#### **KUALA LUMPUR URBAN BUS SYSTEM : CURRENT REORGANIZATION**

Stage carriage buses presently remain as the major means of public transport in the Greater Kuala Lumpur area. Stage bus operations within Greater Kuala Lumpur are earlier operated by eight private bus companies. These companies operated services which are effectively protected by route franchises which meant that they do not directly compete with each other for patronage. Administratively, these operations are regulated by the Government through its agencies such as the Commercial Vehicles Licensing Board (CVLB) and the RTD (Road Transport Department) which grants route franchises, sets route schedules and fare rates, as well as licenses vehicles. The stage bus services are characterised by heavy demand, especially during peak hours.

Another component of the bus public transport system are the mini buses which were introduced in 1975 as part of the Second Kuala Lumpur Urban Transport Programme. The mini buses were originally conceived as supplementary to the stage bus operations. At the same time, the system was also intended to offer a higher quality of public transport service in order to attract car users to use public transport. In line with the objective of encouraging more private sector enterprise within the public passenger transport industry, a view then encouraged by the World Bank, mini buses were initially operated by individual entrepreneurs (World Bank (1985)). No mini bus licences were granted to the existing stage bus companies. The franchise given to each licensee embodies the right for the licensee to operate one bus on a specific route and includes the general terms and conditions of operation. In contrast to the stage bus operations, no single licence has a monopoly over any route.

Between May 1975 to April 1976, the CVLB granted 400 mini bus licences to 167 operators. However, it was only by the end of 1977 that all 400 buses were in operation. About 26% of all licences granted were given to 'one man-one bus' operators. The largest number of licences (i.e. 35) given to a single operator was granted to the Federal Territory Minibus Cooperative. Later in 1983, after recognizing the problems of 'one man-one bus' operations in terms of financial capability and vehicle maintenance problems, the CVLB decided to award 100 licences to 2 major operators. 50 minibus licences were granted to the Sri Jaya Transport Company (also providing stage bus services) and another 50 to a cooperative owned by the Federal Territory Minibus Operators Association.

The 1981 Master Plan Transportation Study Report pointed out that one factor that could be attributed to the poor quality of bus public transport service was the financial capability of the stage bus operators to expand their fleet and upgrade their services. The Kuala Lumpur Structure Plan had then recommended the rationalization of the existing stage bus companies into more economic units of operation. Consolidation was deemed desirable as the existing number of existing operators was not conducive to operational efficiencies. The streamlining exercise was to have been implemented in stages by merging eight stage bus operators into two or three companies. However, it was only in September 1993 that a public-listed company known as Diversified Resources Berhad (DRB) was given the approval to organize a consortium to streamline the bus services in Kuala Lumpur (Jamilah, (1995)). DRB invited other bus operators in the area to merge with its subsidiary, Intrakota Consolidated Sdn Bhd. It has since acquired Toong Fong Omnibus Co Sdn Bhd, SJ Kenderaan Sdn Bhd, SJ Ninateknik Sdn Bhd and Syarikat Pengangkutan Malaysia Sdn. Bhd. Intrakota was given the franchise to operate all urban bus services within a 15-kilometre radius from the Central Business District (CBD) of Kuala Lumpur. The other consortium, Park May Sdn. Bhd., itself a subsidiary of the Renong conglomerate, was to operate bus services beyond the 15km radius.



The Government also made a decision for a single company to provide mini bus services within the inner city of Kuala Lumpur from 1994. Intrakota first began its services in July 1994 with Midi buses known as the 'Pekan Rider'. An initial fleet of 50 29-seater city buses was introduced in a move to phase out the existing 25-seater mini buses. The new buses, with standing room for 13 passengers, are assembled locally by DRB and will be introduced in phases until 1997. These buses are one-man-operated vehicles with an automatic ticketing system. Intrakota has also introduced bigger buses known as Maxi in December 1994 with a maximum capability of 115 passengers.

In terms of fleet size, there are presently about 1200 mini buses operating in Greater Kuala Lumpur. These buses belonged to over 200 mini bus operators comprising of individual operators, co-operatives and private limited companies. The majority of mini bus operators have unanimously decided not to surrender their permits to enable Intrakota to take over their services in the city. The operators have suggested that the city bus operations be divided into two sectors with Intrakota servicing the west side while the minibus co-operative operated in the east (Bernama, (1994)). However, it is understood that the licensing authorities are standing firm in their decision not to renew the licences of the smaller operators when they expire, hence eventually phasing out the operators in favour of Intrakota.

#### NEW INVESTMENT IN RAIL-BASED SYSTEMS

The 1981 Master Plan Transportation Study Report specifically recommended the implementation of an LRT system with exclusive rights-of-way and a capacity of 20000 passengers per hour per direction. The proposed network has four corridors radiating outwards from the city centre to the northwest, northeast, southwest and southeast. The first phase of the project will link the two townships of Sentul and Petaling Jaya, passing through the heart of the city. The coaches are expected to travel at an average speed of 34 km per hour proposing to link the Petaling Jaya terminus to the city centre within fifteen minutes.

In 1984, the Federal Government approved the construction of the LRT system for Greater Kuala Lumpur. At that time, the construction of the first phase of the system was expected to cost RM 521.9 million. Bearing escalation and other indirect costs, the total cost was about RM 697 million. Under this proposal, the Government was to hold maximum equity initially but this would be reduced over time as the Government sells off its shares in the LRT company to private companies and to the general public. A company was incorporated in January 1985 to handle the project. The Government equity contribution was to have been derived from the sale of Government-owned land within the Federal Territory which have been zoned and approved for development. In the end, the Government failed to raise enough funds from land sales in view of the mid-1980s recession. The estimated project costs have then escalated to over RM 755 million. The scheme was eventually shelved indefinitely.

The LRT project was revived with the signing of an umbrella franchise agreement for System 1 Phase 1 of Kuala Lumpur's Light Rail Transit between the Malaysian Government and STAR (Sistem Transit Aliran Ringan) - the franchise holder - in December 1992. It was to be an entirely privatised project undertaken by STAR on a build, operate and own basis. Its shareholders are UK-based Taylor Woodrow International and German-based AEG Westinghouse Transport Systems. The equity structure of the company was made out in accordance with foreign investment policy guidelines - a 55:45 local to foreign participation mix. Commercial financing for the RM 1.2 billion System 1 Phase 1 of the LRT comes in the shape of RM 851 million of bank loans with the Government aiding with a support loan of RM 165 million.

The Employees Provident Fund (EPF) is a leading shareholder with a 25 per cent stake in STAR (Sabri (1993)). This makes it the second largest shareholder in the company after Anglo-German consortium KLTG Assets Sdn Bhd which has a 30 per cent interest. KLTG is a 50:50 joint venture between Taylor Woodrow International and AEG Westinghouse Transport Systeme GmbH of Germany. The other five local shareholders are LUTH (Lembaga Urusan dan Tabung Haji) which has a 10 per cent stake, LTAT (Lembaga Tabung Angkatan Tentera), KWAP (Kumpulan Wang Amanah Pencen), STLR Sdn Bhd (a Finance Ministry-initiated company formed in the 1980s to undertake mass transport system in Kuala Lumpur), and Shell Malaysia/Sarawak and Sabah Retirement Fund each with a 5 per cent stake. STAR's foreign shareholders other than KLTG are American International Assurance Co Ltd with a 10 per cent stake and Apfin Investments Pte Ltd. with 5 per cent. Except for KLTG and STLR, all STAR shareholders are established investment funds.

System 1 Phase 1 of the STAR-LRT will run on electrically-powered double tracks over 12km primarily utilising existing railway reserves between Ampang and Puduraya. There are 13 stations altogether namely Ampang (depot), Cahaya, Cempaka, Pandan Indah, Pandan Jaya, Maluri, Miharja, Pudu, Hang Tuah, Plaza Rakyat, Masjid Jamek, Bandaraya and Sultan Ismail (see Figure 2). The stations are approximately 1500 metres apart in the suburbs and 700-1000 metres in town. There are four stations along the 2.5 km for the LRT Phase 1 viaduct stretch that passes the city centre while along the at-grade stretch, there are nine. Suburban stations will be served by feeder buses, as well as 'park and ride' car parks. The trains will comprise two cars with a maximum capacity of nearly 800 passengers. The LRT can transport an estimated 35000 passengers per hour per direction at an average travelling speed of around 35km/h. Trains are scheduled to run every 3 minutes during peak periods while off-peak frequency will depend on demand. It would take 25 minutes to travel the whole stretch of System 1 Phase 1 route from Ampang to Sultan Ismail.

System 1 Phase 2, also to be undertaken by STAR, consists of two stretches of track totalling 15 km. and is scheduled for completion by June 30, 1998. The two tracks are extensions of System 1 Phase 1, with one heading for the Commonwealth Games Complex in Bukit Jalil and another stretching to Bandar Baru Sentul. System 1 Phase 2 will run from Chan Sow Lin to Komplek Sukan Negara and the Commonwealth Games Village and from PWTC to Sentul Timur. For the Phase 2 stretch there will be 4 stations

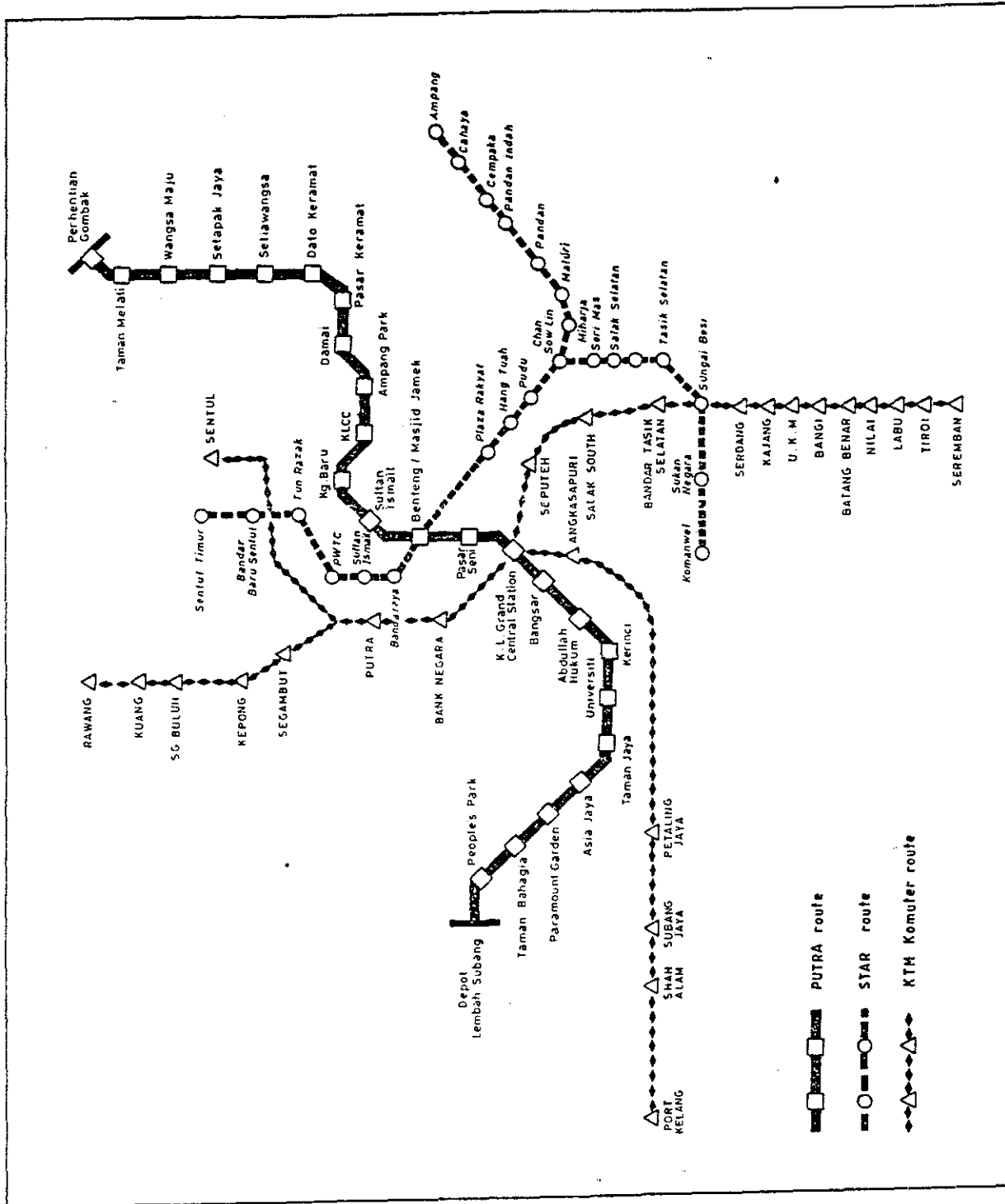


FIG. 2 : RAIL TRANSIT ROUTE IN GREATER KUALA LUMPUR .

ie. at Putra World Trade Centre (PWTC), Jalan Tun Razak, Bandar Baru Sentul and Sentul Timur.

Discussions held between STAR and the Ministry of Transport have determined fares within the range of RM0.75 and RM2.95 depending on distance travelled and the location of destination. STAR acknowledged that fares have to be competitive to buses and taxis. The fares will be charged on a mixed zonal and distance-related basis. Fares charged in the suburbs will commensurate with mini bus fares while within the city sector LRT fares will be comparable to taxi fares. STAR is entitled to revise fares yearly on a CPI-related formula. The LRT will operate 18 hours a day, between 6 am to midnight.

STAR-LRT plans to have trains leaving the stations every three minutes during peak hours, and every seven minutes during off-peak hours. The trains would also be stopping for 18 seconds at each station to allow for three-minute intervals between the trains. Stakes on the success of STAR-LRT are high with a total of RM3.4 billion invested in the project. STAR hopes to have the capacity of transporting 33200 passengers per hour per direction by the time the entire system is operational in 1998, when each train would expand and carry three LRVs.

The LRT System 2 is being undertaken by a subsidiary of the Renong conglomerate. Projek Usahasama Transit Ringan Automatik (PUTRA) Sdn Bhd. has awarded a multi-billion ringgit contract to a Canadian consortium to construct the Kuala Lumpur's System 2 LRT system from Gombak to Petaling Jaya (see also Figure 2). The consortium comprises of Bombardier (supplier of rolling stock or trains), S.C.Lavalin (guideway) and B.C. Transit (system management). These were the three parties involved in the development and operation of Vancouver's Skytrain. The construction of the System 2 LRT track is now in progress covering 28.9 km between Gombak in the east and People's Park in Petaling Jaya in the west. It will pass through Kuala Lumpur's central business district as well as the self-contained RM3 billion integrated Kuala Lumpur Sentral (Central) station.

During the gestation period before the LRT system came into place, commuters within the Greater Kuala Lumpur area were presented with another rail-based mode. Keretapi Tanah Melayu Berhad (KTM) (the former Malayan Railway) became a corporatised entity in August 1992. The year 1995 saw the introduction of electric commuter trains for the Greater Kuala Lumpur area catering for the short-distance travellers with an average journey distance of about 15 km. The KTM Komuter service began plying between Rawang and Kuala Lumpur, its first service sector, in August 1995. The second service sector which connects Sentul-Kuala Lumpur-Port Klang has been operational since October 1995. KTM Komuter now runs on a 15.3 km long double-track network served by 26 stations and 18 halts. The service runs every half-hourly during peak hours from 6 am to 9 am and 4 pm to 7 pm and hourly during off-peak hours.

KTM plans to link the various rail-based and bus transport services at its stations. An integrated development known as the KL Sentral is being marketed as the hub for transportation. The centrepiece of KL Sentral will be the new railway station, Stesyen Sentral Kuala Lumpur. As a railport, Kuala Lumpur Sentral will be the hub for KTM's Inter City Express and Commuter trains, the Light Rail Transit serving Kuala Lumpur, Putrajaya and its outskirts, and the Express Rail Link (ERL) Airport Express trains for the KL International Airport at Sepang (Johnny, (1995)). KL Sentral station will serve as the City Terminal for the KLIA where passengers will be able to check in their luggage and take a 35-minute ride by the ERL to Sepang. It is anticipated that by year 2000, more than 100000 daily commuters will use this station and it will have a capacity to handle 50.5 million passengers a year. The developer of KL Sentral is a joint-venture company known as KL Sentral Sdn. Bhd. with three stakeholders - Malaysian Resources Corporation Berhad (MRCB), KTM and Pembinaan Redzai.

## COORDINATING BUS AND RAIL TRANSIT IN THE GREATER KUALA LUMPUR AREA

The existence of multiple public transport operators offering potentially competing services points to the need for a coordinated system of bus-rail transit operations. In expressing the virtue of coordination, the Malaysian Transport Minister puts it, "This means that whenever the train arrives, the buses are there and when the buses arrive, the trains are available, enabling a smooth interchange of modes of transport" (Vijayan, (1994)). Discussions had already been held between the STAR-LRT operator and Intrakota regarding the realignment of routes and schedules in order to feed in passenger traffic into the rail transit system and to eliminate unnecessary competition between the operators.

Intrakota has agreed to provide 19 feeder bus routes to service the STAR-LRT service catchment. The suburban feeder routes will basically ply routes between housing estates such as Taman Cahaya, Taman Dagang and Pandan Indah. These routes should ideally also cover the major suburban employment centres such as commercial or industrial hubs and schools. Feeder routes in the city will shuttle between the stations and employment centres which are outside of the walk-in catchment distance. Intrakota will provide the feeder service every ten minutes and this is parallel to the LRT service provided by STAR-LRT.

STAR-LRT is also providing about 200 parking bays at each of the five stations along the route for the convenience of the commuters (Ampang, Cahaya, Cempaka, Pandan Indah and Pandan Jaya). STAR provided parking bays at the suburban stations in order to encourage car users to use the STAR-LRT and leave their cars at home. The parking charges will be decided by Ampang Jaya Municipal Council (MPAJ) as the council will manage the parking area. Charges are expected to be minimal.

Intrakota has also indicated that it will charge RM 0.70 for feeder service from the residential areas to the STAR-LRT stations. The RM0.70 fare is for a two to four kilometres ride. City commuters may also in future choose a common ticket to travel, choosing from KTM, the LRT system or the mini buses (Muhammad, (1994)). Negotiations are underway with various companies on the one-card system under which commuters may move from KTM Komuter trains, LRT or mini buses for their destinations. Both Intrakota and Park May have introduced stored-value cards as added convenience for their passengers.

STAR's System 1 Phase 1 will have interchange stations with its Phase 2 southern and northern extensions to Bukit Jalil and Bandar Baru Sentul (refer Figure 2). For the southern route, the interchange station is at Chan Sow Lin, which is located between Miharja and Pudu Stations along the Ampang-Jalan Sultan Ismail Phase 1 line. Up north, commuters can get off at the Sultan Ismail station to board the trains to Bandar Baru Sentul. The LRT system will also interphase with KTM electric commuter train service. PUTRA's Gombak-Petaling Jaya line will pass through the Kuala Lumpur Sentral station. The Putra World Trade Centre (PWTC) station along STAR's Jalan Sultan Ismail-Bandar Baru Sentul extension will also be within walking station to KTM's PWTC station along its Rawang-Seremban line.

Unfortunately, there will be no interchange station directly linking both STAR's route and PUTRA's line. However, their lines 'cross' at the Masjid Jamek area and both systems have stations which will 'interphase' with each other. STAR will have an elevated station (Masjid Jamek) at the intersection of Jalan Tun Perak/Jalan Melaka/Jalan Benteng along the Jalan Tun Perak stretch of the viaduct. PUTRA's underground line, on the other hand, passes at right angles to STAR's route. An underground station (Benteng) is located just after the intersection. Commuters switching from one line to the other would only need to walk no more than 30 m to the other station.

Any LRT system will only be as successful as its integration with the forms of transport that interact with it. Due to the nature of the technology and costs involved, LRT stations are less likely to be accessible to potential passengers than a network of buses could be. The location of the station and the design of feeder bus routes are two important factors facilitating the interchange of passengers between the two modes involved (Kompfner, (1979)). The other obvious, though often neglected, factor in facilitating such interchange is the design of the station itself. The basic function of a station is to assist in the transfer of passengers from one mode or vehicle to another in an efficient, convenient, comfortable and safe manner. Sufficient space in the vicinity of the station must be furnished for feeder buses or trains to discharge passengers, and in suburban areas, parking near the station should be provided.

The station serves as a focal point for the feeder system, and adequate provision for each arriving service must be included if the total system is to be successful. The design for station access should minimize walking times and furnish a safe and convenient means of transferring from the arrival mode to the transit station (Hoel, (1982)). In the case of the STAR-LRT System 1 stations, the Government has had to request the STAR management to install escalators in the elevated stations to enable ease of access for the

elderly. STAR-LRT management has ruled out the possibility of access of use for the disabled. There has also been claims by the Intrakota management that some of the STAR-LRT stations are not bus-friendly in the sense that buses are unable to come right up to the stations but has instead to drop off its passengers some distance away.

However, there are in Toronto examples of LRT stations where the rail track, a bus lane and a lane for 'kiss and ride' are on the same level only a few yards apart. It is certainly not difficult to arrange for buses to serve most types of LRT station with such an easy interchange. It is unlikely that a LRT system could, at any distance from the city centre, attract enough riders from the immediate vicinity of its stations to be economic, so feeder bus services would be normally required. If the rail headways are short enough, then it would not be necessary to arrange for timed transfers between bus and rail to a schedule. Passengers dislike transferring from one mode to another during their journey, so it is important to ensure that such transfers are as convenient as possible. Provision of shelter at stations, and adoption of a unified fare structure, preferably offering through ticketing, can also help. It is essential to ensure that priority is given to bus interface with separate protected roadways, minimal walking distances, good signing and graphics, and full weather protection.

## CONCLUSION

The Government's continuous efforts towards modernization and incorporation has led to the emergence of a few large public transport operators within the Greater Kuala Lumpur Region. Consolidation of the bus-operating industry, when completed, would lead to two operators, both subsidiaries of public-listed companies, running bus public transport services. In the case of the Light Rail Transit mode, there are also two companies running two different LRT systems while KTM, through its Komuter trains, is providing a more regional rail transport service. Although consolidation is thought to lead to greater co-ordination of services, this may not necessarily be achieved easily. In this respect, the Government has to ensure that all these operators are able to provide an integrated and acceptable standard of public transport service for the commuters.

Experience elsewhere, as with the San Francisco Bay Area Rapid Transit (BART), has shown that institutional constraints had hampered the objective of achieving cost-effective and efficient coordination of public transport services (Lyons (1979)). The problem of BART-bus service coordination was then seen more from the technical point of view, such as realignment of routes, rather than as a primarily institutional problem of negotiation and implementation. Playing down the politics of inter-operator positions among the individual rail and bus agencies could ultimately lead to a continuation of duplicated transport services and inadequate feeder-bus service to rail transit stations.

Earlier negotiations between BART and AC, the major bus operator in the East Bay, had identified that interfaces between BART and established bus public transport networks were to be recommended. Foremost amongst these was the operation of feeder services to and from BART. Other recommendations included the elimination of or reduction in routes paralleling BART, particularly AC's transbay service, which was often seen as in

direct competition with BART in this essential corridor, and rerouting of local bus service to serve BART stations. Proposed route additions or adjustments to serve BART were generally adopted, whereas proposed reductions in routes and service levels paralleling BART were not. In some instances, even where these bus lines parallel BART, they continue to provide a more convenient, no-transfer, and often faster journey than BART for many public transport users.

What was clear from this example is that, with no third party available to play the role of mediator, there was no incentive for operators to reach a resolution of their differences. This may yet happen in the Kuala Lumpur case whereby the operators had entered into a voluntary agreement regarding service coordination. What is needed is for a single authority with sufficient legislative mandates to provide the best incentives for service coordination. As reiterated earlier, coordination issues should be addressed early in the planning and design phases of the light rail system development. One basic issue in system design is the purchase of fare-collection equipment that is flexible enough to implement a transfer system to buses and therefore does not constitute a barrier to service coordination. In addition, there should also be an option of bus services provided under contract to the rail transit company to provide a feeder service. It is hoped that, with careful planning, the goal of an LRT-bus service coordination may be within reach of commuters in the Greater Kuala Lumpur area.

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#### REFERENCES

- Bernama (1994). *No takeover, minibus men tell Intrakota*. In New Straits Times 20 October, Kuala Lumpur.
- City Hall of Kuala Lumpur (1984). *Kuala Lumpur Structure Plan*. (City Hall:Kuala Lumpur).
- Hoel, L.A. (1982). *Guidelines for planning public transportation terminals*. Transportation Research Record 817.
- Jamilah, M. (1995). "Stage bus operations in Kuala Lumpur: The period before consolidation." *Malaysian Journal of Tropical Geography*, 26 pp 111-120.
- Johnny, Y. (1995). *On the right track*. In Malaysian Business September, Kuala Lumpur.



Kompfner, P. (1979). *Notes on light rail transit in Great Britain*. Supplementary Report 482. (TRRL: Crowthorne)

Lyons, F. (1979). *Institutional and political considerations of BART and bus coordination in the San Francisco Bay Area*. Transportation Research Record 719.

Ministry of Finance Malaysia (1993). *Economic Report 1993/94*. (Percetakan Nasional Malaysia Berhad: Kuala Lumpur).

Muhammad, A. (1994). *Three-way ticket for KL commuters*. In New Straits Times 25 July, Kuala Lumpur.

Sabri, S. (1993). *EPF believed to have 25pc stake*. In New Straits Times 26 August, Kuala Lumpur.

Vijayan, M. (1994). *LRT will only reduce jams*. In New Straits Times 23 December, Kuala Lumpur.

Wilbur Smith and Associates and Jurutera Konsultant (S.E. A.) Sdn. Bhd. (1981). *Kuala Lumpur Master Plan Transportation Study: Final Report*. (Kuala Lumpur)

World Bank (1985). *Urban Transport Sector Policy Paper*. (World Bank: Washington, D.C.)

