

The World Bank

Study on Urban Transport Development

Final Report



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STUDY ON URBAN TRANSPORT DEVELOPMENT

FINAL REPORT

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ABBREVIATIONS AND ACRONYMS

ALS	Area License Scheme (Singapore)
APE	Agency Performance Evaluations
AQMS	Air Quality Monitoring Stations
ARA	Agency Responsibility Analyses
ARF	Additional Registration Fee (Singapore)
BARRTS	Bangkok Advice on Rationalization of Rapid Transit Systems
BERTS	Bangkok Elevated Road and Track System
BLT	Build, Lease, and Transfer
BMA	Bangkok Metropolitan Administration
BMA	Bangkok Metropolitan Area
BMR	Bangkok Metropolitan Region
BMTA	Bangkok Mass Transit Authority
BOO	Build, Own, and Operate
BOT	Build, Operate, and Transfer
BTSC	Bangkok Mass Transit System Co. Ltd.
CCEPC	Central Council for Environmental Pollution Control (Japan)
CNG	Compressed Natural Gas
CoE	Certificate of Entitlement (Singapore)
CTD	City Transport Department
DMA	Dhaka Metropolitan Area
DOTC	Department of Transport and Communications (Manila)
EDSA	Epifano de los Santos Avenue (Manila)
ERP	Electronic Road Pricing
ETA	Expressway and Rapid Transit Authority of Thailand
GDP	Gross Domestic Product
GDTPCB	Greater Dhaka Transport Planning and Coordination Board
GNP	Gross National Product
IFC	International Finance Corporation
JBIC	Japan Bank for International Cooperation (formerly OECF)
JHPC	Japan Highway Public Corporation
JICA	Japan International Cooperation Agency
JNR	Japanese National Railways
LRT	Light Rail Transit
LRTA	Light Rail Transit Authority (Manila)
LTA	Land Transport Authority (Singapore)
MOCB	Ministry of Communications (Bangladesh)
MOCJ	Ministry of Construction (Japan)

ABBREVIATIONS AND ACRONYMS (Continued)

MOTC	Ministry of Transport and Communications (Thailand)
MOTJ	Ministry of Transport (Japan)
MRTC	Metro Rail Transit Corporation (Manila)
MTC	Metropolitan Transport Company (Bangkok)
NMT	Non-Motorized Transport
NMV	Non-Motorized Vehicle
OCMRT	Office of the Commission for the Management of Road Traffic (Bangkok)
OECD	Overseas Economic Cooperation Fund, Japan (now JBIC)
PADECO	Tokyo-based consultancy undertaking this study
PPP	Public-Private Partnership
PTPS	Public Transport Priority Systems
RIDA	Research Institute of Development Assistance, OECD
SEATAC	Southeast Asian Agency for Regional Transport and Development
SET	Special Excise Tax (Seoul)
SMRTC	Seoul Metropolitan Rapid Transit Corporation
SMSC	Seoul Metropolitan Subway Corporation
SRT	State Railway of Thailand
TDM	Traffic Demand Management
TMA	Tokyo Metropolitan Area
TMG	Tokyo Metropolitan Government
TMR	Tokyo Metropolitan Region
TRTC	Taipei Rapid Transit Corporation
VQS	Vehicle Quota System (Singapore)
WB	World Bank

CURRENCY EQUIVALENTS

	26 June 1995	26 June 2000
Japan (Yen)	1 USD = 84.29 JPY 1 JPY = 0.011 USD	1 USD = 105.28 JPY 1 JPY = 0.0095 USD
Philippines (Peso)	1 USD = 25.63 PHP 1 PHP = 0.039 USD	1 USD = 43.00 PHP 1 PHP = 0.023 USD
Singapore (Dollar)	1 USD = 1.397 SGD 1 SGD = 0.716 USD	1 USD = 1.734 SGD 1 SGD = 0.577 USD
South Korea (Won)	1 USD = 759.80 KRW 1 KRW = 0.0013 USD	1 USD = 1,119.50 KRW 1 KRW = 0.00089 USD
Taiwan (Dollar)	1 USD = 25.77 TWD 1 TWD = 0.0388 USD	1 USD = 30.78 TWD 1 TWD = 0.032 USD
Thailand (Thai Baht)	1 USD = 24.65 THB 1 THB = 0.041 USD	1 USD = 39.10 THB 1 THB = 0.026 USD

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SUMMARY OF MAIN ISSUES AND LESSONS LEARNED

A. INTRODUCTION

1.1 **Study Background.** The combination of rapid urbanization and motorization has been a key cause of numerous transport problems in developing cities in Asia. It has resulted in a deterioration in accessibility, service levels, safety, comfort, operational efficiency, and the urban environment. While the development models pursued by cities in the past have not necessarily been effective in resolving many of their problems, experience gained within the region—especially in the development and management of urban transport in Japan—is considered to be highly relevant to urban transport issues in Asian cities. The World Bank and the Ministries of Transport and Construction of Japan have therefore formulated the present study in order to consolidate information and lessons learned from the experience both in Japan and in developing countries. The results of this study are expected to contribute to the development of the Bank's urban transport sector strategy.¹

1.2 The main objectives of the study are to:

- identify and analyze possible alternative systems/models for urban transport provision in developing countries;
- review past attempts in Asian cities to develop public transport systems and to improve road traffic, and identify issues and reasons for success/failure in implementation; and
- identify conditions necessary for successful implementation of the possible systems/models for developing countries.

1.3 **Study Methodology.** The study reviewed the development and management of urban transport systems in the wider framework of urban development mainly in nine metropolitan areas/cities in Japan and Southeast Asia. These cities were selected to encompass a variety of successful and unsuccessful experiences in urban transport development. The experience of each case study city was reviewed by focusing on particular characteristics of their approach to urban transport development; in addition, as called for by the Terms of Reference, the experience of other countries around the world has been incorporated as appropriate to cover a wider range of issues relating to financing, administration/institution, urban transport and poverty, and motor vehicle safety and environmental measures. A list of the case study cities and a presentation of their socioeconomic characteristics is provided in Table 1-1.

¹ The World Bank is preparing an Urban Transport Sector Strategy Review, which will be the first comprehensive examination of this subsector by the Bank since its 1986 Policy Paper on *Urban Transport*. The framework of the Review will emphasize the role of urban transport in its wider context: as a crucial input for efficient urban development, as an important determinant of the quality of urban life, and as an essential service to the urban poor.

Table 1-1 Socioeconomic Characteristics of the Study Cities

City	Country GNP/capita (US\$) ^a	Population (million) ^b	Population Density (pop./km ²)	Car Ownership (per 1000 pop.)	Journey to Work by Private Transport (%) ^c	Journey to Work by Public Transport (%) ^c
Tokyo	34,720	12.0	5,460 ^d	230 ^e	29	49
Nagoya	34,720	2.2	6,650 ^f	390 ^g	N.A	N.A
Kobe	34,720	1.5 ^h	2,760 ⁱ	260 ^j	N.A	N.A
Hamamatsu	34,720 ^k	0.58 ^k	2,264 ^k	422 ^k	N.A	N.A
Singapore	22,710	3.2 ^l	5,000	110 ^m	22	56
Bangkok	1,850	6.0	3,950	220 ⁿ	60	30
Manila	1,050	9.5	12,320	90 ^o	28	54
Seoul	8,580	10.4	17,000	220 ^p	21	60
Taipei	13,250	6.0	10,000	210 ^q	N.A	N.A

See Appendix C for notes.

1.4 As **Japanese Case Study Cities**, *Tokyo*, *Kobe*, *Nagoya*, and *Hamamatsu* have been selected. *Tokyo* was selected because it has a well-developed urban rail system and substantial experience in integrated urban rail and land development primarily led by the private sector. Also, the use of a range of support measures by the public sector in Tokyo is instructive for developing countries. *Kobe* was selected because it is well known for its active involvement in urban land development along public transport corridors; the municipality has also developed an innovative approach to finance the cost of urban rail development through value capture. *Nagoya* was included because it has developed an advanced bus system and associated traffic management measures that give priority to buses. *Hamamatsu*, which is smaller than the other Japanese case study cities, has been considered as its success in reviving buses is instructive for developing countries.

1.5 As **Asian Case Study Cities**, *Bangkok*, *Metro Manila*, *Seoul*, *Singapore*, and *Taipei* have been studied. In December 1999 *Bangkok* succeeded in putting its first private sector light rail transit (LRT) system into service, but it has had difficulty in gaining sufficient patronage for a variety of reasons that should provide valuable lessons. Also in December 1999, Line 3 of *Metro Manila's* LRT system was opened. It is instructive to review Metro Manila's history of developing urban rail systems in an environment where a large number of paratransit vehicles dominate. *Seoul* presents an interesting case study where the city introduced an innovative Transport Demand Management (TDM) measure in which the transport tax is reduced for organizations that reduce peak-hour car use among their employees through, for example, carpooling, and the introduction of flexible work hours (flex time). *Singapore* pioneered the adoption of policies to address transport problems by rationing scarce urban road space using the price mechanism and promoting innovative techniques for transport management. *Taipei*, which provides another case study of the transport problems caused by rapid growth and neglected infrastructure, is attempting to reverse this trend by focusing modern and sustainable

urban design in key areas. Land space is being reallocated to create a pedestrian-friendly environment while an overdue MRT system is developed.

1.6 The review of this range of experience raises a number of critical issues with respect to the development of efficient and equitable urban transport systems, with important implications from the lessons for cities in developing countries and elsewhere. These issues and lessons include:

- Whether Urban Rail is Essential for Efficient Transport in Large Cities
- Utilizing Bus Rapid Transit (or LRT) for Small to Medium Demand Corridors
- Importance of Integrating Urban Development and Land Use Control
- Applicability of the Japanese Model of Integrated Urban Rail/Land Development to Developing Countries
- Timing of Urban Rail Investments: Better Early than Never
- Importance of Traffic Demand Management
- Importance of Network and Modal Integration
- Financing Mass Rapid Transit Development
- How Administrative and Institutional Lessons Relate to Urban Transport
- Whether Urban Transport in Developing Countries is Unfair to the Poor
- Need for Appropriate Motor Vehicle Safety and Environmental Measures

Each is addressed below.

B. WHETHER URBAN RAIL IS ESSENTIAL FOR EFFICIENT TRANSPORT IN LARGE CITIES

1.7 The answer to this question depends on the city and pattern of development. Urban rail becomes particularly important when high-density urban development expands to create distances that are too great for efficient bus transport, and usually when employment remains centralized—Tokyo and Seoul being the obvious cases. For such cities, a system of urban rail with coordinated feeder services is no doubt the most efficient method of transport. When a city follows a strategy of road-based development and a land use pattern that specifically avoids concentration of desire lines, bus and private cars can serve travel demand and urban rail may not be required—examples of this type of city development can be found in the United States. However, in cities in developing countries with relatively weak planning institutions and land use control, the dispersed development strategy may not work well. Metro Manila followed such a development pattern and successfully incorporated jeepneys (minibuses operated like shared taxis) and bus services, but since the metropolis eventually reached a stage where the concentration of travel demand could not be efficiently handled by the road-based system, the development of an urban rail system has become essential. As shown below, in many of the case study cities, governments have come to understand that road building alone cannot efficiently serve travel demand and that a high-capacity public transport network is essential for securing mobility and sustainability of urban transport systems.

1.8 *Tokyo's* extensive urban transport system, among the most highly developed in the world, is largely characterized by an intensive use of rail systems. It is likely that the population and employment growth in the Tokyo Metropolitan Region would not have been achieved

without the development of an extensive rail network. High-speed, frequent, and reliable rail services helped expand the area within commuting distance, while allowing employment to grow apace in central Tokyo. The concentration of employment and economic activities in central Tokyo contributed to higher urban productivity in the metropolis due to such factors as economies of scale and positive economic externalities (e.g., information spillover effects, specialization benefits for the service sectors).² The metropolis tended to extend along rail corridors radiating outward, as exemplified by the particularly rapid increase in suburban population along major commuter lines.

1.9 *Seoul, Singapore, and Taipei* have also adopted rail-oriented strategies. *Seoul's* first subway opened in 1974 and was expanded to four lines in the city's heaviest traveled corridors where road expansion was not feasible. Completion of the routes will double the size of the network and subsequently accommodate 50% of daily public transport journeys. In *Singapore*, the Mass Rapid Transit (MRT) system was only opened in 1987, but the decision to build the system was taken in the early 1980s, ten years after car restraint policies began. By 1990 the full initial system of 67 kilometers was operational. *Taipei's* transport infrastructure has not kept pace with the overall growth of the economy and the accompanying rise in living standards. Roads are generally narrow and due to increased auto ownership, the city's once extensive bus system faced substantial decreases in service levels and patronage. Although some bus priority measures have been successfully implemented, and part of its MRT system is in operation, early completion of an urban rail network has become one of Taipei's most important policy objectives.

1.10 In *Bangkok*, the progress of economic development and increasing car ownership without an urban rail system resulted in one of the world's worst cases of traffic congestion and air pollution. In the mid-1970s, a transport plan for the Bangkok Metropolitan Region recommended developing urban rail systems in the city. An attempt was made in the 1980s to build rail systems with the use of private funds, but resulted in failure. In the late 1980s, two elevated rail projects were proposed by private concerns and proceeded toward implementation. One of them, however, was stalled for various reasons, while the other eventually led to the opening of the country's first urban rail system. Meanwhile, subway systems were planned and their construction is currently underway, adding to Bangkok's overdue public transport system.

1.11 The combination of rapid population increase and income growth in *Metro Manila* has placed increasing demands on urban services, resulting in an overburdened transport system. As is typical in a large metropolis in a developing country, Metro Manila suffers worsening traffic congestion as well as serious environmental degradation. Although Metro Manila has been heavily dependent on public transport modes, road-based modes such as buses and jeepneys (shared taxi with fixed routes) are dominant at present. The LRT system that began operation in 1984 carries only a small percentage of trips in Metro Manila. Further LRT development is being undertaken with the active participation of the private sector, and the role of LRT role is expected to grow as the system is expanded.

² There have also been arguments made against metropolitan growth of this magnitude, including the higher costs for transport development to meet increasing travel demand, risk management concerns in case of disasters (e.g., earthquakes), and longer travel times.

C. UTILIZING BUS RAPID TRANSIT (OR LRT) FOR SMALL TO MEDIUM DEMAND CORRIDORS

1.12 Along small to medium demand corridors, road-based public transport with exclusive facilities can serve as an efficient urban transport system. The dedicated on-road busway system in Nagoya, for example, minimized the requirement for capital-intensive rail systems in the city center, although the importance of rail systems was still acknowledged to avoid escalating car use. The Kobe municipal government built a “new transit system” called Portliner as a major transport mode linking the reclaimed Port Island to the city center; the government concluded that buses would not provide sufficient capacity for the peak-hour traffic demand. The system uses elevated guide-tracks and fully computer-operated vehicles with rubber tires. It was constructed jointly by the municipal government and a newly established “third sector” company, Kobe New Transit. Bus rapid transit or LRT can also be used as feeder mode to urban rail; Tama New Town Monorail in the Tokyo Metropolitan Region is an example of such a system.

1.13 **Bus Rapid Transit System of Nagoya.** The Nagoya case suggests that the investment cost for bus rapid transit systems such as the “Key Route Bus System” and “guideway bus system” is several times lower than that for subway development, while the average speed is not necessarily lower particularly on the elevated section of the guideway bus system. The average speed of subways is generally in the order of 35 kph, while the estimate for the elevated section of the Nagoya’s guideway bus system is 30 kph. The infrastructure cost of the Key Route Bus System is substantially less than that of the guideway bus system, but its capacity is proportionately less.

1.14 Nagoya’s experience suggests that wide roads are essential for developing an effective bus rapid transit system and the system can be applied in developing countries. The Key Bus Route System adopted by the city of Nagoya required bus lanes to be exclusive during peak hours. The guideway bus system also required a wider roadway to secure space for infrastructure installation as well as to minimize traffic disruption during construction. In the case of a system that uses existing roads (such as the Key Route Bus System), it is desirable to improve and widen alternative routes as undertaken by the city of Nagoya to make room for automobiles that would divert due to the introduction of the system. The bus rapid transit system of Nagoya has the potential of being replicated in developing countries without substantial modification, and in practice, successful examples can be observed in a number of Latin American cities.

1.15 Necessary conditions for the success of the dedicated on-road busways include: (i) availability of a modest amount of funding to construct dedicated on-road busways on existing road space (elevated busways require greater financial resources preferably from the public sector); (ii) availability of road space to accommodate a dedicated busway; (iii) availability of alternative routes to accommodate diverted general traffic; and (iv) coordination among related agencies particularly with the police agency and public/private bus operators.

1.16 **Busway versus Light Rail.** During the planning stages of Manila’s LRT3 urban rail line (EDSA line), consideration was given to a segregated busway that could later be converted to light rail. This would have been an intermediate and economic step toward a longer-term

solution as passenger demand was estimated to lie awkwardly between over-demand for the existing situation and under-demand for mass transit. A busway has a lower capacity and is cheaper to both construct and operate than a railway. It can allow passengers to travel without modal interchange, which may attract more passengers than light rail in the short term. However, light rail is more desirable in terms of travel speed, on-time performance, comfort, and pollution. The decision not to proceed with a busway was based largely on its expected short lifetime before conversion would have become necessary and also on the qualities that light rail offers in terms of attracting riders from other modes. Ground-level systems were examined but were rejected due to anticipated conflicts at intersections.

D. IMPORTANCE OF INTEGRATING URBAN DEVELOPMENT AND LAND USE CONTROL

1.17 An urban transport system will have a profound effect on a city and on the way it develops. It will influence locations of new commercial and residential areas and how people travel, thereby affecting the character and lifestyle of the city. It is also clear that the spatial distribution pattern of land use activities and their densities influence the distribution of transport demand and opportunities for mass rapid transit development. Therefore, it is important to integrate transport development with urban development and land use control. Sub-issues include: (i) the role of land use policies in rail-oriented metropolitan area development; (ii) the importance of land use planning and development controls; and (iii) the use of land use planning to minimize travel demand.

1.18 **Role of Land Use Policies in Transit-Oriented Metropolitan Area Development.** Expansion of the Tokyo Metropolitan Region resulted not only from the provision of suburban rail services, but also various land use policy measures. The National Government embarked upon comprehensive development planning for Tokyo Metropolitan Area, which was largely characterized by the setting of long-term land use policies. The first development plan called for controlling population and employment concentration in central Tokyo. Various measures were taken, including restriction of the construction of new factories and educational facilities in central Tokyo, development of distribution facilities (such as warehouses, truck terminals, and wholesale facilities) in outer areas, development of large-scale public housing in suburban areas, and construction of satellite towns. Zoning to control the type of land use and density was introduced in the early stages of urbanization, and high-density development encouraged around railway stations.

1.19 **Importance of Land Use Planning and Development Controls.** Effective land use planning at an early stage will reduce the possibility of project delays due to difficult land acquisition. The first land use planning exercise for Greater Bangkok came in 1960, followed by revisions, but with little effort made to take actions to implement the plans. It was not until 1992 that the Government issued the first statutory land use plan. The lack of effective land use planning was partly responsible for the insufficient pace of road development, particularly of distributors and collectors linking to major roads, which has resulted in a large volume of unused or low-density land in the central area. Development patterns in Greater Bangkok have largely been characterized by road-oriented dispersal of population and commercial activities which, with a lack of appropriate development controls, has resulted in sprawling of the city. Furthermore, zoning regulations permit a fair extent of mixed land use, and building codes

provide rules that encourage construction along wider roads, thereby promoting arterial-oriented development toward outer areas.

1.20 Disorderly urban development in Metro Manila is partly due to the lack of adequate development controls. Metropolitan growth has largely come from rapid suburbanization, generally occurring in a dispersed fashion, as well as a significant concentration of business, commerce, and housing in the core area. Disorderly development with highly mixed land use prevails along major roads and in the suburbs, with squatter settlements among the major concerns in many parts of Metro Manila. In addition, the hierarchical road network has created multiple sub-centers at major intersections. These developments have created dispersed travel patterns that can be suitably met by highly competitive and flexible paratransit services, which coupled with rapid motorization, lead to an extremely congested road transport. Zoning regulations are generally ineffective, with a lack of clear land use policies and guiding principles. They also do not impose controls on allowable densities for each district with such measures as the floor-to-area ratio. Such a “pro-development” regulatory environment is partly responsible for Manila’s disorderly development.

1.21 **Use of Land Use Planning To Minimize Travel Demand.** The location of concentrated housing areas clearly has an impact on the distribution of transport demand. For example, if more people had been retained in or near the Central Area of Singapore, this would have reduced the level of long-distance passenger transport leading to less congestion on major arteries. The Government of Singapore is now seeking to address these issues through its constellation plan, which will take commerce and industry to the already decentralized workforce. The main new industrial estates in Singapore were relatively isolated from residential areas resulting in transport problems for employees that could have been avoided by providing neighboring housing. Labor pools in areas of the new towns could have been employed locally by attracting private developers to make some investment in these less expensive areas.

E. APPLICABILITY OF THE JAPANESE MODEL OF INTEGRATED URBAN RAIL/LAND DEVELOPMENT TO DEVELOPING COUNTRIES

1.22 The rapid concentration of businesses and employment that occurred in central Tokyo escalated land prices, making it increasingly difficult to provide housing at a reasonable cost. Consequently, housing demand accelerated in the suburbs, where housing development, both public and private, progressed on a large scale. One notable approach to accommodating housing demand was rail-oriented new town development, which proliferated across Japan. Major private railway companies that operate suburban rail services in Greater Tokyo branched out over time into businesses closely related to the railway industry, including real estate development, retailing, and bus operations.

1.23 Among the key features of this project was the use of “land readjustment” to assemble the land needed to accommodate the railway and to develop real estate. In this approach, rather than acquiring all of the land, the rail company organizes landowners to form a cooperative that consolidates properties, redevelops them without transferring ownership, and returns smaller

but fully serviced parcels to landowners.³ This mechanism, however, has long been used effectively for land development in Japan. For example, the Tokyu Corporation and its affiliated companies have actively promoted development in a variety of ways in order to increase population and rail ridership, including selling land, constructing housing, developing and attracting shopping centers, and inviting schools.

1.24 Several rail-oriented new towns have also been developed in Japan through the initiative of the public sector. Among the notable examples is Tama New Town in western Tokyo, which is a joint venture of the Tokyo Metropolitan Government, the nation's Housing and Urban Development Corporation (HUDC), and private sector partners including railway companies. The Kobe municipal government also undertook integrated rail and new town development by following the experience of private rail companies. In addition to developing residential areas, the municipal government initiated various kinds of development projects along the rail corridor in cooperation with private partners. These developments included industrial and research parks, a freight distribution center, a sports stadium and other sports facilities, colleges and other research and educational facilities, and shopping centers. The development bureau of the municipal government acted as land developer, and the transport bureau constructed the rail system using various funding instruments.

1.25 **Success Factors in Japanese-Style Integrated Development.**⁴ In summary, there are three categories of success factors contributing to Japanese-style integrated urban rail and land development: (i) a strong regulatory and institutional framework, (ii) appropriate spatial planning strategies, and (iii) investment decisions in an “appropriate” socioeconomic environment. Each is elaborated in Table 1-2.

Table 1-2 Success Factors in Japanese-Style Integrated Development

Category	Success Factors
Strong Regulatory and Institutional Framework	• Comprehensive legal framework supporting integrated development. • Licensing scheme effectively protecting rail operators from excessive competition as well as to provide opportunities to rail operators with affiliated bus enterprises to reorganize their bus routes to feed rail services. • Variety of financing options such as interest subsidies, soft loans, fiscal investment loans, and commercial loans. • Tax-free commuting allowances encouraging the use of public transport. • Social and cultural background to attain high level of coordination among institutions and individuals involved in railway development. • Efficient administrative infrastructure to support the transfer of benefits. • Availability of highly competent technical, financial, and management teams. • Railways providing a high level of service (with regard to frequency, reliability, and safety), contributing to general consensus that railway is an essential mode of transport in an urban area.

³ Usually most of the land required for rail construction is obtained through land acquisition because the “land readjustment” process is time consuming.

⁴ Although Tokyo has a well coordinated and smooth-running urban rail system, it has its own problems of long commuting time and severe overcrowding during morning peak hours.

Table 1-2 Success Factors in Japanese-Style Integrated Development (Continued)

Category	Success Factors
Spatial Planning Strategies	• Integrated land use and transport planning process at national and local levels; well respected government policies on land use and transport development, which provide incentives to attract investment along corridors. • Land readjustment technique to assist in efficient acquisition of rights-of-way for rail. • Strategic location of urban arterials to provide the space and right-of-way to construct an underground rail system. • Railway construction to promote under-developed areas near the city center. • Development of residential areas as well as other uses along rail corridors; such high-density development creates passenger demand. • Development of rail stations as intermodal transport terminals and activity centers.
Socioeconomic Environment	• Railway network well developed before motor vehicles became widespread. • Convenience of travel provided by well coordinated rail network with a hierarchical structure: i.e., intracity subway, private suburban lines, Japan Rail's medium to long-distance suburban lines, and high-speed shinkansen ("bullet train") for long-distance commuting. • Private railway development profitable through land development along the corridor. • Increased property values caused by rail construction, which enables value capture to finance part of the investments. • Increased attractiveness of residential and commercial development along the railway corridor, which in turn, contributes to an increase in railway users.

Source: This Study

1.26 Applicability to Developing Countries. An assessment of the applicability of the Tokyo model to cities in developing countries requires a close examination of the existing conditions of each city. However, general observations reveal major constraints in its applicability. First, cities in developing countries tend to have underdeveloped urban rail systems (or none at all), and there is little consensus that urban rail is an essential part of urban transport. Since existing railways in most developing countries in Asia have been developed to serve long-distance travel, service levels within urban areas are insufficient for rail to function as part of the urban transport system. In addition, since railways are not elevated, there are at-grade (level) crossings within urban areas, which require trains to slow down before passing. Illegal settlements are sometimes found in and around rail corridors, making modernization of the system difficult. In some countries, motorization progressed rapidly before urban rail was developed, particularly Thailand, Malaysia, Indonesia, and the Philippines. In this context, those cities with rapid motorization may have to adopt strategies other than the Japanese model. On the other hand, in other countries such as China, Vietnam, Cambodia, and Myanmar, where motorization rates are still relatively low, there is a possibility that the model could be applied successfully, although it may still require modification. If a city has centralized employment and high-density development, and if land is owned by the government (such as in China or Vietnam), the chance of success would increase.

1.27 It should be noted, however, that institutions for urban transport policy making and administration are relatively weak in developing countries. There is a lack of sufficient staff with technical and financial competency in both the public and private sectors. Policies are often not well coordinated; bus services may compete with railways. There is also a chronic shortage of financial resources to support capital-intensive urban rail investments. Public railway management is not very efficient, and in most cases, operating costs are not recovered.

1.28 In the face of these constraints, strategies for the development of urban rail in developing countries may include: (i) involvement of the private sector (domestic or foreign) to introduce technology and efficient management, although public financing of railway construction may be necessary if private sector undertakings are to be financially viable; (ii) granting of property development rights along the corridor to cross-subsidize part of the railway construction cost; (iii) improvement of existing rail system by removing level crossings, and construction of intermodal transfer facilities; (iv) securing of rail rights-of-way at an early stage of urbanization—the right-of-way can be used, for example, for a dedicated busway until demand warrants the construction of a fixed track system; and (v) provision of technical assistance to promote policy coordination and training of staff capable of planning, design, and public financing.

F. TIMING OF URBAN RAIL INVESTMENTS: BETTER EARLY THAN NEVER

1.29 When urban rail is to be developed, the timing of investments (and investment decisions) can be critical. When in the relatively early stages of economic development such investments may not yield high rates of return, but if investment decisions are postponed until the economy develops, urban rail development can become more difficult or nearly impossible. This is because land prices tend to increase as an urban economy develops, making acquisition of the right of way for rail transit more difficult; also, as car ownership increases, a greater percentage of trips are likely to be made by city and accordingly it will be more difficult to find public transport corridors that are economically and financially viable.

1.30 In many cities in *Japan*, decisions on urban rail development have been made at a relatively early stage of economic development, which has allowed cities to become more transit oriented. Planning decisions on land use and transport development by governments are usually well respected, and therefore they provide incentives to attract investment along corridors. The integrated approach to urban rail and land development by private rail companies has also followed a similar path—they identified relatively under developed corridors close to the city center and invested in both rail and land development. In the Tokyu case, it took about 20 to 25 years for the corridor population to grow to over 300,000, but the decision to build a rail system and purchase land for rail construction was made at the outset of the project. It is also instructive to know that the company initiated housing development along the corridor several years before it commenced railway construction in order to accumulate funds to finance the rail investment; this strategy also helped to assure sufficient ridership at the time the railway opened.

1.31 When applying this approach to developing countries, it is recommendable to secure transit corridors at an early stage of economic development, and perhaps initially use them as dedicated busways. Fixed track systems may be introduced when corridor demand grows. This

strategy was taken in the public transport development plan of Tama New Town in Tokyo. However, it should be noted that this approach requires a strong planning institution and land use control.

1.32 *Taipei* faced a number of problems that could have been avoided if investment decisions for urban rail had been taken earlier. With its population of over 6 million, Taipei is now realizing its limitations in road-based public transport, and is therefore accelerating MRT construction. The construction cost for five MRT lines with 88 route km is being shared by national, provincial, and municipal governments, and the introduction of private funds is also under consideration. Construction of the Mucha Line highlighted the problems and eventual jeopardy potentially facing MRT projects due to their size and complexity. While developed countries have a history of constructing rapid transit schemes, the public of less developed countries has not adapted to such technology and is uncertain of it. The lack of public confidence when problems are encountered tends to place unwarranted pressure on engineering staff who are constantly forced to defend themselves.

1.33 The decision in Taipei to construct several lines at similar times has been cited as one reason for its problems in implementation. This decision did not allow experience and knowledge to be accumulated and applied to new projects or for lessons to be gained from mistakes. The benefits of a combined budget application to central government and the commitment toward improving transport have been highlighted as reasons for this approach. The recently opened Hsinchung Line was opened ahead of schedule and no doubt benefited from the experience of the previous projects. Nevertheless, as Taipei is now being transformed into a rail-oriented city and its investment decisions can be regarded as viable, an important lesson is that late may be better than never when building an urban rail system for a city of this size.

1.34 A more unfortunate case can be found in *Bangkok* where urban rail construction started much too late. With its car ownership approaching one of the highest among Asian cities, Bangkok is now heavily dependent on automobiles and buses. A number of urban rail development projects failed in the past for various reasons, and the city has developed a network of urban expressways that provide additional constraints on the selection of economically and financially viable rail corridors. Although the recently opened Skytrain transit system runs through the most heavily traveled public transport corridors, it attracts only one sixth of forecast ridership, and the concession company is facing a constant threat of default in loan repayment. The reasons for these failures and difficulties are complex, and the timing of investment decisions alone cannot be blamed. However, the experience of Bangkok clearly indicates that a delay in urban rail construction can compound the size and complexity of problems.

1.35 Poor ridership, as witnessed in some projects, may be considered a result of unsuccessful planning and raises questions about the value of a well-meaning project if the public is not using it. Project timing is an important and complex consideration involving issues such as available finance, modal competition, incomes and employment, and land acquisition in addition to general market and economic fluctuations. Some Asian projects have suffered due to the unforeseen economic crisis resulting in currency devaluation and job losses, which reduce commuter travel. Such an event can obscure the suitability and timing of the approach

adopted although a reactive approach, created by pressure to build in a deteriorating situation, can cause essential factors for the project's viability to be overlooked.

1.36 While urban rail development at a relatively early stage of economic development allows cities to become more transit oriented, investment in such systems is not generally affordable, nor the best use of scarce capital funds. However, the adoption of private vehicle restraint, promotion of bus priority and low emphasis on road building are policy choices that will make mass transit more viable at an earlier date than otherwise. If a city has been following a road based strategy of development, a delay in urban rail construction can compound the size and complexity of problems.

1.37 In the absence of a well-defined transport strategy, urban rail can be considered to be better late than never but the costs, at least in the short term, from retrofitting, will be high. When overdue, potential patronage may appear attractive to private investors but forecasts are not always realized. A project that is "early" can at least allow for the integration of appropriate development but may find adequate financing difficult to obtain.

G. IMPORTANCE OF TRAFFIC DEMAND MANAGEMENT

1.38 The experience of the case study cities suggests that public transport development can best be approached with rigorous traffic demand management measures as an integral part of strategy. Seoul and Singapore limited the growth of private vehicles at early stages and all had strong car restraint measures in place before ownership levels reached 70 cars per 1,000 population.

1.39 In *Singapore*, the mass rapid transit system was opened in 1987, about 15 years after private vehicle restraint was introduced. By 1990 the full initial transit system was operational, at which time private car ownership was only 101 per 1,000 population. Singapore has highlighted the importance of integration and balancing public transport with private car constraint measures in a "carrot and stick" approach. With the introduction of the Vehicle Quota System (VQS) and other ownership and use taxes including its congestion pricing scheme, the city raised sufficient funds to construct the initial phase of its MRT system. Singapore largely adopted the principle that aggregate taxation on motor vehicles and their operation should at least cover the costs of the externalities they cause and of the infrastructure networks they use. Furthermore, in Singapore it is generally accepted that car restraint addressing car use rather than car ownership is preferable and should be sought at the earliest opportunity.

1.40 *Seoul* has been transformed into a public transport oriented city by the introduction of high taxes on car ownership and use. By 1986 Seoul had a substantial mass transit system in place and car ownership was at just 50 cars per 1,000 population. As with Singapore, without this early car restraint, motorization would have been much higher when public transport was introduced, with consequent impact on its viability. The Government of the Republic of Korea imposed a number of car ownership and user taxes partly to alleviate congestion but also to conform to national policies aimed at encouraging saving and restricting luxury items. For a representative low-priced vehicle, the ownership taxes combined to almost 40 percent by the mid 1980s. Furthermore, the Special Excise Tax (SET) and the value added tax (VAT) on fuel

combined to create an inflated price for gasoline. In addition, all vehicle purchasers are required to pay a no-interest, US\$1,000 bond, repayable after five years. Other constraints on car ownership include a lack of credit availability and high insurance rates in part due to high accident levels. Another interesting TDM measure implemented in Seoul has been the use of a traffic tax reduction for business owners. If a business owner, for example, agrees to implement measures such as employee carpooling, staggered work hours, company commuter buses, and/or provision of subsidies for public transport, the owner will benefit from a reduced traffic tax based on a predetermined schedule.

1.41 In *Tokyo's* case, the pre-war national promotion of rail investment, mainly due to the influence of large corporate conglomerates and the use of local coal, ensured an initial bias toward public transportation. Then, the post-war national economic strategy of constraining private consumption to maximize investment and exports effectively restrained motorization. Consequently, despite rapid industrialization and increasing incomes, Tokyo's car ownership was only 16 cars per 1000 in 1960 reflecting a relatively low level of car ownership compared to poorer cities at that time. The bias toward rail has been maintained as national and local governments have imposed various motor vehicle taxes (including a vehicle acquisition or excise tax, an annual automobile registration tax, and a surcharge based on vehicle weight) as well as relatively high gasoline taxes.⁵ Equally important in constraining car ownership has been a strict parking space requirement; those intending to register a car must present evidence verifying the availability of an off-street parking space. Moreover, the general narrowness of roads in Tokyo provides little space for on-street parking, and off-street parking in central Tokyo is very costly. All of these factors, combined with the more recent integration of road building with rail and the strict control of illegal parking, have tended to discourage ownership and unnecessary use of the automobile.

1.42 It can be concluded that, without traffic demand management or car restraint, the viability of mass transit is undermined. The cities with the most successful public transport systems have long histories of restraining private vehicle use while those that have implemented urban rail in highly motorized environments have not realized the expected modal change. In the early stages of the traffic limitation strategies of such cities, buses were the main mode of transport and the emphasis on car restraint represented a low cost approach to a bus city system. Excessive private car use obstructs the development of road-based bus systems. Furthermore, if restraint is not pursued at an early stage, public acceptance may prove particularly difficult.

H. IMPORTANCE OF NETWORK AND MODAL INTEGRATION

1.43 Successful urban rail development is usually associated with careful planning of network and modal integration. Rail passengers typically depend on walking, cycling, or bus rides as feeder modes. Therefore, it is particularly important that these modes are efficiently integrated to gain maximum benefit from rail investment. The main lessons are: (i) the importance of intermodal facility; (ii) the need for changing the role of the bus to achieve effective rail development; and (iii) the importance of network integration.

⁵ Japan has a system of earmarking some of these tax revenues for financing the maintenance, improvement, and construction of roads, which has greatly helped the country expand its national road network. This policy is mainly aimed at raising sufficient funds for road construction.

1.44 Importance of Intermodal Facilities such as Station Plazas. In addition to network and capacity expansion, the rail system in Greater Tokyo has been improved through various development and/or redevelopment activities around rail stations. Typically, this approach has included the development of station plazas with pedestrian-friendly environments in addition to intermodal facilities such as bus terminals and taxi stands. Bicycles are extensively used for short shopping trips and as a feeder to railway systems. Bicycle parks and car parks are commonly seen in suburban rail stations in metropolitan areas.

1.45 *Singapore* has helped to show that maintaining and developing coordinated public transport, particularly alongside car restraint measures, is integral to the success of transport in a city and is best realized when fares offset costs. Buses provide feeder services to MRT and fares and timetables for rail and bus services are integrated. Singapore boasts the world's first stored-value fare card that can be used interchangeably for bus and rail travel. Officials have also recognized that the MRT system needs to be expanded and are seeking to upgrade feeder connections and add tertiary systems such as "travelators" and grade-separated sidewalk networks.

1.46 Need for Changing the Role of the Bus To Achieve Effective Rail Development. The introduction of rail mass transit will have an important effect on the operation and ridership of bus services. While many mass transit systems generally enjoy high use in the long run, a high proportion of patrons change their mode of travel from bus rather than from the private motor car. Many cities have thus shown a decline in bus patronage as rail has gradually increased. This result is evident in *Metro Manila* with an observed reduction in travel by bus and paratransit modes operating along LRT corridors. *Singapore* observed a similar tendency but was successful in reorganizing bus use as feeder services, which would have maintained the importance of the bus mode in the transport network. The *Tokyo* case study showed that, following the completion of railway construction, a bus company (owned by the rail company) successfully rearranged their bus routes to provide feeder services for rail users.

1.47 Less successful examples of modal integration can be seen in cities in developing countries. Many of *Seoul's* transport improvements have taken place in a relatively piecemeal fashion without an integrated plan. The disappointing ridership and deficits of the Seoul subway can be explained by competition from bus services. In *Metro Manila*, problems in modal interchange and within-mode transfer have long created serious bottlenecks. Due to the importance of addressing this issue, a project has been formulated with the assistance of the World Bank to improve interchanges between and among buses, jeepneys, and LRT lines, and manage traffic congestion. In *Bangkok*, the lower-than-anticipated ridership of Skytrain can be attributed mainly to a lack of modal integration in that high fares are charged in relation to those for buses on parallel routes; bus fares are about a third the level of rail fares (set at current levels to provide sufficient income for investors) and crowded buses can often be observed while overhead trains are virtually empty.

1.48 Importance of Network Integration. Connectivity and the integration of public transport networks is particularly important for public transport users. A certain degree of transfer between trains and buses may be inevitable but it is important that they are well connected and systems are integrated so that destinations can be reached by public transport alone. In Tokyo's metropolitan area the rail systems of different operators are generally well

connected and sometimes there is agreement to run the same train on the rail lines of different operators, thereby eliminating the passengers' need for changing trains.

I. FINANCING MASS RAPID TRANSIT DEVELOPMENT

1.49 The development of mass rapid transit systems requires a substantial amount of capital investment. The case study cities presented a variety of approaches to financing these systems. Sub-issues and lessons learned in this issue category include: (i) government subsidies and assistance; (ii) use of road-sector tax revenues in transit development; (iii) use of road space to minimize construction costs; (iv) value capture and role of government; (v) and private sector participation.

1.50 **Government Subsidies and Assistance.** When fare revenue is not expected to offset capital investment, it is important for the government to provide subsidies. Urban rail systems in Japan, for example, could not have expanded without government subsidies. This financial assistance may be in the form of direct subsidy for construction costs or interest payments, loans with favorable terms, and equity participation. Table 1-3 shows government subsidy programs for urban railway projects in Japan. Another in-kind subsidy that can be provided by the government involves the separation of infrastructure construction from operation. In this approach, which has been adopted for rail development in Singapore, the public (or semi-public) sector entity builds and owns the rail infrastructure, while private companies undertake rail operations. This approach effectively reduces the cost and risk associated with urban rail development.

Table 1-3 Government Subsidy Schemes for Urban Railway Projects in Japan

Subsidy Program (Year of Establishment)	Outline
Low-Interest Loans by Japan Development Bank (1959)	This program assists private railway companies with, for example, grade separation work at rail crossings, line extensions, double-track construction, platform expansion, and maintenance facility upgrading.
New Town Railway Construction (1972)	The program supports new town rail development; the central and local governments each subsidize up to 18% of the eligible construction cost for a total subsidy of 36%.
Railway Construction Public Corporation Program (1972)	The Railway Construction Public Corporation constructs the railway and transfers it to a railway company. Repayment is made over a period of 25 years; interest payments exceeding 5% are subsidized by the central and local governments.
Subway Construction Scheme (1978)	Subsidies are provided for the construction of underground railway systems mainly by public corporations and municipal governments. A subsidy corresponding to 70% of eligible construction expenses is provided.

Source: This Study

1.51 Use of Road-Sector Tax Revenues in Transit Development. In Japan, in addition to the subsidy programs outlined above, there is a program for supporting construction of monorail and automated guideway systems.⁶ This national subsidy program is funded by the special account for improving roads with contributions from general road taxes. This fund is based on the user-pay principle and it has been used mainly for motor vehicle facilities, but the use of this fund to support public transport infrastructure is justified in that the substructure above the road system can be seen as part of urban road facilities. This national subsidy program also applies to the construction of bus guideway systems and railway station plazas, the latter which are transport nodes characteristic of Japanese cities. In *Singapore*, MRT development was funded from motor vehicle tax revenues as well Central Provident Fund resources and land value gains. The road transport sector gradually became a large fund generator and allowed investment in many aspects of urban development.

1.52 Use of Road Space to Minimize Construction Costs. Urban road space should be viewed not only in terms of its primary objective (i.e., serving road traffic), but also as space that can be used for the construction of urban rail systems (underground or surface) at a later stage.⁷ The construction cost of the subway in Kobe was kept low mainly because of the open-cut construction method made possible by wide roads achieved through land readjustment. In Bangkok, the recently opened Skytrain transit system has been built above existing roads. This approach may be adopted in other cities in developing countries, but elevated structures above roads deteriorate the urban environment therefore require careful assessment.

1.53 Value Capture and the Role of Government. When substantial funds are required for initial investment, value capture methods can be adopted to benefit from the increase in land values around rail nodes. This approach has been used widely in Tokyo with rail companies acquiring low-priced agricultural land prior to rail construction; subsequent land value increases have been appreciable in Japan, and additional benefits to the rail companies are the ridership generated by the new development. Integrated land development is undertaken along rail corridors (often with the use of land readjustment), thereby creating higher-valued land as well as achieving efficient movement of road traffic. Manila's LRT1 project is considered to have missed value capture opportunities that could have significantly reduced both its debt burden and risk in ridership revenue.

1.54 The role of government is particularly important in providing the necessary institutional and regulatory framework for successful value capture. The Government of Japan issued administrative guidance on integrated rail and new town development, mandating contributions of the land developer to the rail enterprise with several provisions to be included in their agreement. This explicit regulation facilitated the cross subsidization of rail construction with profits earned from real estate development, as exemplified by the Kobe case study. Undoubtedly, it is desirable to institutionalize a value capture mechanism in order to ensure the cost sharing of a land developer for rail construction. However, its practicality becomes a major issue unless beneficiaries are easily identified, or the extent and distribution of the benefits across beneficiaries are reasonably well estimated.

1.55 Private Sector Participation. Private sector participation is noticeable in many of the case study cities. It is generally realized that it is difficult for the public sector to meet the

⁶ This program is administered by the Ministry of Construction, Japan.

⁷ In Japan, land required for urban arterials and rail rights-of-way are secured by statutory land use planning.

increasing financial demands for infrastructure improvement and that funds should be sought in other ways. There is also a move toward improved efficiency by engaging the services of the private sector. The diversification of private railway companies into businesses involving real estate development and retailing can be sufficiently profitable to reduce the need for government subsidy while still conforming to land use policies. The Tokyu Corporation in Japan was particularly successful in this regard.

1.56 *Public-Private Partnership.* Many large-scale projects also rely on a partnership approach that can be undertaken in a variety of ways. For example, in the Tama New Town development in Tokyo most of the land and housing development was carried out by the public sector while private railway companies built and operated supporting rail lines. In Kobe, a third-sector approach was adopted whereby ownership of infrastructure was separated from rail operation. Public sector investment and ownership of infrastructure reduces the capital requirements of privately operated railways while private sector resources and skills are maintained in operation. In this way, responsibilities are clearly designated although there may be potential conflicts of interest arising.

J. HOW ADMINISTRATIVE AND INSTITUTIONAL LESSONS RELATE TO URBAN TRANSPORT

1.57 Most weaknesses in urban transport policy implementation in developing countries stem from inadequate administrative and institutional arrangements.⁸ To address these issues, both the vertical and horizontal perspectives need to be considered. The vertical perspective refers to the relative authority of national versus local (i.e., state/provincial and metropolitan/municipal) governments, while the horizontal perspective refers to the way metropolitan areas organize the delivery of urban transport within their boundaries.

1.58 **Vertical Perspective.** In the vertical dimension, the key issue is that of centralization versus decentralization. On the one hand, decentralization offers a number of advantages over centralization, e.g., enabling objectives and conditions to be shaped by local conditions and preferences, improving responsiveness and accountability to system users, and promoting experimentation with innovative approaches to urban transport problems. On the other hand there may be weaknesses with decentralized approaches, e.g., where decentralized decisions result in spillover effects across jurisdictional boundaries, raise issues related to scale economies, or raise issues related to inter-jurisdictional trade; decisions related to the level and structure of vehicle and fuel taxes and vehicle emission standards would fall in this category and hence are taken at the national level in most countries.

1.59 A number of conditions must be obtained for decentralization to be successful: (i) clear assignment of functional responsibilities among government levels, (ii) matching of revenue sources with functional responsibility, and (iii) establishment of a system of accountability that balances central authority and local political participation. Decentralized systems work better when based on rules rather than on negotiations, and political autonomy requires matching financial autonomy. It is important to avoid the cases of the “overcontrolled local sector,” “laissez-faire decentralization,” and the “perversely regulated local sector.”

⁸ The World Bank, *Urban Transport Sector Strategy Review, Concept Paper*, Draft 4, November 17, 1999, paragraph 15.

1.60 Horizontal Perspective. In the horizontal dimension, the key issues relate to centralized metropolitan government versus geographic/jurisdictional and functional fragmentation. While geographic/jurisdictional fragmentation moves the government closer to the people by creating smaller government bodies, there are many disadvantages, e.g., diseconomies of scale, disparities in tax burdens and services in different jurisdictions. Functional fragmentation also creates problems such as overlaps among the responsibilities and activities of different organizations and the creation of vested interests in protecting and expanding assets and revenues sources.

1.61 It is possible to conceive of a hybrid approach with elements of both geographic/jurisdictional and functional fragmentation. For example, the draft Concept Paper for the Urban Transport Sector Strategy Review suggested that parking strategy in a metropolitan area, including supply and pricing issues, might be best formulated at the metropolitan level, while issues of parking management and enforcement may be better addressed at the lowest level in the spatial hierarchy.

1.62 Some developing country metropolitan areas (e.g., Seoul) have sought to address the typically adverse impacts of geographic/jurisdictional and/or functional fragmentation through centralized metropolitan governments. This approach provides for an ease in coordination of activities and implementing plans, has a reduced likelihood of duplication of services relative to alternative systems, allows for economies of scale in service provision, and internalizes externalities. However, large metropolitan governments may be difficult to manage and not provide a ready mechanism for responding to differences in demand within the metropolitan area for the package of services to be delivered. The problem may be addressed with small subarea administrative units, but usually is not done so.

1.63 Metropolitan-Region Wide Transport and Coordinating Agencies. A number of other developing country metropolitan areas have addressed the problems of geographic/jurisdictional and/or functional fragmentation with a more incremental approach by establishing metropolitan-region wide transport and coordinating agencies. Key elements for the sustainability of such coordination arrangements may include the following: (i) it should be based on a permanent structure, designed to outlive executive or legislative mandate periods; (ii) it should be accepted by the parties as an additional asset and not a threat to their autonomy or decision-making powers (even though the balance of power may shift at its inception or over time); (iii) it will not interfere with jurisdictions that belong to the concerned parties, notwithstanding the fact that it will be granted a specific political status and its own specific powers; and (iv) it should not assume the functions of a public enterprise nor should it be in charge of operations of any kind [Rio de Janeiro].

1.64 While these conditions for long-term sustainability may restrict the scope of work to only a few functions, they may provide a basis for developing further coordination responsibilities over time; experience suggests that the planning function provides the best support for actions aimed at transport coordination. Within the planning function, actions might start with (for example) investment policy and fare coordination, and subsequently encompass physical planning, traffic management, and systems operations; such a phasing in should be supported by a common strategic vision of the metropolitan transport system [Rio de Janeiro].

Experience also suggests that all funds destined for the transport system should be controlled by the same body [Bangkok].

1.65 The option of retrofitting existing institutions with coordination functions requires that such institutions have the necessary coverage, mandates, and capacities to provide effective coordination [Dhaka]. However, it may be important that a coordinating agency not be a new level of government and not assume the powers of existing governments; rather, it may be better for it (at least at the outset) to provide a forum to review all proposals in relation to their compliance with an agreed transport strategy, evaluate alternatives, and make recommendations based on a regional, intermodal perspective. Where political constraints hinder the establishment of a metropolitan transport coordination agency, one approach may be to demonstrate the advantages of coordinated action, based on strong technical capability, to deal with commonly recognized problems—this approach to coordination is problem-oriented and “bottom-up” [Buenos Aires].

K. WHETHER URBAN TRANSPORT IN DEVELOPING COUNTRIES IS UNFAIR TO THE POOR

1.66 More than 1.3 billion people in the developing world, which is about one fifth of the world's population, currently exist on less than US\$1 per day. The income disparity between the rich and poor is significant—the poorest 20 percent of the world's population now claims just 1.1 percent of global income, while the richest 20 percent claims 86 percent. The income disparity seems to be increasing as well. Between 1960 and 1994, the ratio of the income of the richest 20 percent to the poorest 20 percent increased from 30:1 to 78:1. Since this trend is likely to be found in most Asian cities, an important question to be addressed is whether urban transport in developing countries has been fair or unfair to the urban poor. The finding presented here is that it has not been equitable, particularly in motor vehicle oriented cities.

1.67 The biases built into policy decisions in these cities originate from policy makers' common misunderstanding of the goal of urban transport in securing mobility for “vehicles” rather than “people.” A fundamental need of any population group should be access to basic services and markets. However, the poor tend to suffer in the development of transport systems because the provision of transport infrastructure in developing countries tends to favor higher-income groups with an emphasis on motorized transport. Chronic traffic congestion leads to a high proportion of urban transport investment spent mainly on improving motor vehicle lanes without giving sufficient consideration to the improvement of transport modes such as walking, non-motorized vehicles (NMVs), and public transport systems, which are frequently used by the poor. The main lessons are the need to: (i) develop a public transport system that is affordable to the poor; (ii) improve non-motorized transport facilities and reduce barriers to the supply of informal transport services; and (iii) facilitate participation of the disadvantaged in transport planning.

1.68 **Develop a Public Transport System That is Affordable to the Poor.** Low-income persons frequently make use of buses so methods to improve bus availability are likely to be more cost effective than expensive new rail transit projects. However, bus services in these cities are sometimes inefficient due to an inappropriate regulatory framework. Deregulation of bus services may be desirable in Asian cities because it introduces competition, efficiency, and

financial sustainability. However, care must be taken because commercialization or privatization may lead to higher fares that can adversely affect the affordability of services to the poor. In such cases, a strategy involving appropriately targeted subsidies and incentives may be required to better integrate the poor into the transport system. Reliability and the comfort of bus services can also be improved by providing various bus priority measures

1.69 Improve NMT Facilities and Reduce Barriers to the Supply of Informal Transport Services. Walking and the use of NMVs are the most frequently used modes among the poor. However, there is general lack of consideration of pedestrians and NMV safety, and a high incidence of pedestrian and NMV casualties arising from conflicts with motor vehicles. As low-income groups are particularly vulnerable to accidents, improvement of pedestrian and NMV facilities would provide them with safer means of transport as well as improve their mobility.

1.70 In many cities in developing countries, the informal sector has proven its viability in providing inexpensive, convenient transport that is not necessarily located along main corridors. The contribution of this sector to transport and employment should not be underestimated and cooperation between public authorities and operators should be a key feature of any urban transport strategy. Although developing countries undervalue NMVs and restrict their use, perceiving them to be hindrances physically, socially, and technologically, informal transport and the use of NMVs can improve mobility for the poor. Therefore, the reduction of barriers to the supply of informal transport services is recommended, subject to reasonable and enforceable levels of safety. As for privately owned NMVs, Japan and many Western countries are actively encouraging bicycle use and many other cities would benefit from the integration of NMVs into transport networks.

1.71 Facilitating Participation of the Disadvantaged in Transport Planning. Consultation with the poor is often neglected but can provide meaningful insight into their needs and reduce conflicts of interest. Without broad-based consultation, the main voices to be heard tend to be well-organized and wealthy industries related to motor vehicles, oil, and construction. In addition, this approach would minimize the impacts of displacement by transport projects. Gender issues also require more prominence in the decision-making process as the special requirements of women are often overlooked.

L. NEED FOR MOTOR VEHICLE SAFETY AND ENVIRONMENTAL MEASURES

1.72 Vehicular traffic in urban areas generates negative externalities that can interfere with the urban environment. In particular, vehicular traffic concentration, common in cities around the world, contributes to the intensity and spread of air and noise pollution, as well as to traffic accidents caused by vehicle safety deficiencies. In the short term, this damages the quality of life, while in the longer term it can affect urban development patterns. In order to improve this situation, regulation of fuel quality, gas emission quality, and vehicle inspection systems are urgently required. While some countries have already introduced such regulations, they are not always fully implemented or enforced. In Japan, well-organized measures for addressing urban environment and vehicle safety issues affecting the quality of life have been developed. Main lessons from the Japanese experience in this area include: (i) necessity for appropriate regulatory framework for environmental protection and vehicle safety; (ii) inspection system

and the role of private agencies; and (iii) the importance of an appropriate monitoring system. Each is addressed below.

1.73 Necessity for Appropriate Regulatory Framework for Environmental Protection and Vehicle Safety. In response to research concerning the pathological effects of air pollution caused by rapid industrial growth in the mid-1960s, the Government of Japan enacted comprehensive legislation in the form of a Basic Law for Environmental Pollution Control. This Law established environmental standards for air quality, noise, and vibration. Several additional pollution countermeasures including using the vehicle inspection system to regulate vehicle exhaust emission levels were implemented subsequently. Implementation of an appropriate regulatory framework in the relatively early stages of motorization significantly contributed to a reduction in mobile-source air pollution in urban areas. In order to ensure vehicle safety and reduce mobile-source air pollution, it is extremely important to establish legally designated and clearly defined vehicle standards specifying technical requirements with respect to safety and the environment. Standard setting should be based on the assessment of effects on the reduction in road traffic accidents and environmental pollution.

1.74 Inspection System and Role of Private Agencies. The objective of the vehicle inspection system is to ensure the roadworthiness of vehicles on public roads with respect to safety and environmental regulations; it requires an appropriate institutional framework for its effective implementation. In Japan, a fiscal instrument has also been used for ensuring the undertaking of an adequate level of vehicle inspection and testing across the country; a special account system has been used to earmark part of the vehicle inspection fees for building and operating the government inspection stations (as well as providing training programs for inspection and testing). In addition, within the institutional and regulatory framework established by the national government, private garages play an important role in the nationwide system of securing vehicle safety and emission standards, performing nearly 70 percent of the 30 million vehicle tests/inspections performed annually. These private garages are licensed, supervised, and audited by local Land Transport Offices, thereby ensuring the quality of their inspections.

1.75 Importance of an Appropriate Monitoring System. There are 492 stations to monitor air quality and vibration in Japan. These monitoring stations have been established by prefectural and municipal governments under supervision of the Environment Agency. Without these permanent monitoring stations, implementation of effective vehicle emission and vibration control measures may not have been possible.

2

TOKYO: RAIL-ORIENTED METROPOLITAN GROWTH

A. CITY BACKGROUND

2.1 The Tokyo Metropolitan Area (TMA), which includes the Japanese capital, has a population of 12 million¹ and generates about 17 percent of the country's total GDP, which is the second largest in the world. Its core area consisting of 23 wards and covering 621 square kilometers, is significantly concentrated with 8 million inhabitants, and it provides employment to 6.6 million people (1994) living both inside and outside the TMA. Within a 50 km radius (still within commuting distance from the center) is Greater Tokyo or the Tokyo Metropolitan Region (TMR),² which had grown to a population of 32 million by 1995.

2.2 Tokyo's extensive urban transport system, among the most highly developed in the world, is largely characterized by an intensive use of rail systems. Rail accounts for 41 percent of trips originating and terminating in the 23-ward area, significantly higher than those for other transport modes including auto (15 percent), bus (3 percent), and motorcycle (17 percent), with the remainder on foot.³ The TMR's rail network totals 2,143 km in route length, by far the world's largest, including 876 km of the privatized East Japan Railway Company (JR East), 996 km of other private railways, and 271 km of publicly operated subways.⁴ Historically, private railway companies have played major roles, particularly in building and operating suburban lines and in making efforts to increase ridership (mostly undertaken by their affiliated companies) through real estate development, retailing, and bus operations. Buses are operated both publicly and privately, mainly as a mode to complement the rail network or to provide feeder services. Bus operation is strictly regulated by the government particularly in terms of the fares as well as entry into and exit from a particular route or area.⁵ Non-motorized transport, including bicycles, is used extensively for short shopping trips and as a feeder to railway systems.

¹ This is the population of the TMA that is administered by the Tokyo Metropolitan Government. Population data used in this section are those as of April 2000 unless noted otherwise.

² The TMR ("Shuto Kotsu-ken" in Japanese) is defined as the area located within 50 km from Tokyo Station, including the TMA, and part of the surrounding and nearby prefectures of Kanagawa, Saitama, Chiba, and Ibaraki.

³ Based on the results of a person-trip survey carried out in 1998.

⁴ Source: Urban Transport Statistics (Toshi Kotsu Nenpo), 1998. Tokyo's subway lines are operated by two entities: the Teito Rapid Transit Authority (Eidan Lines) and the Tokyo Metropolitan Government (Toei Lines). Eidan is a public corporation whose shares are held by the National Government (majority) and the Tokyo Metropolitan Government (minority). Currently, eight lines are operated by Eidan and four lines by Toei.

⁵ The Road Transport Law that regulates bus operations specifies that those intending to provide bus services must submit to the Transport Minister an application for a license specifying types of operation (e.g., route buses, charter buses), routes, or areas where they intend to operate. The Transport Minister provides a license in consideration of, for example, the transport demand, the balance between supply and demand, and adequacy of the services to be provided in terms of benefits to the public. In practice, there is a strong tendency to avoid direct competition for a particular route or area based on the supply-demand balance consideration.

B. MAJOR URBAN TRANSPORT SYSTEM DEVELOPMENTS

2.3 Overview. While much of Tokyo's public transport network (including suburban and intercity rail lines and tramways in central Tokyo) was built by the early 20th century, postwar transport development began in 1946 with the decision to construct a subway network including the first line built and made fully operational by 1939. Subways had long been pursued as a major public transport mode to cope with the traffic problems in central Tokyo, which had previously been served by trams, buses, and taxis. A series of revisions to the plan, as well as an emphasis on early development, eventually led to the Government's decision in 1957 to construct five lines with a total route length of 108.6 km.

2.4 From a wider perspective, the Government of Japan embarked upon comprehensive development planning for Greater Tokyo under the Metropolitan Region Development Law of 1956, which helped to build the nation's capital region making it suitable as a political, economic, and cultural center and to promote its orderly development. The first development plan of 1958, largely characterized by the setting of long-term land use policies, called for control of the concentration that was rapidly taking place in central Tokyo, as well as promotion of the dispersal of population and employment toward outer areas. Subsequently, various land use policy measures were taken to achieve these goals.

2.5 While suburbanization of population occurred at an accelerating rate (a long-term trend since the early 20th century), employment concentration in central Tokyo continued at a rapid rate up to the mid-1960s, leading to a continued increase in commuter traffic from the suburbs to the core area. As a result, the rail system faced a serious capacity problem with the peak-hour load factor⁶ typically well above 250 percent. In response, capacity expansion programs were planned and implemented for suburban and intercity rail lines. The subway network was also expanded. Meanwhile, rail-oriented new town development was initiated, often with participation from private railway companies. These developments all contributed to the creation of the rail-oriented urban transport system still pursued today.

2.6 Government efforts were also devoted to developing the road network in Greater Tokyo in order to meet growing traffic demand. With reference to the networks of some of the world's largest metropolises (e.g., Paris, Moscow, Berlin, Chicago), several arterial roads, both circumferential and radial, as well as other major roads were planned in the early 20th century, and were gradually developed over a period of decades. The rapid growth of vehicular traffic during the postwar period also led to the establishment of the Metropolitan Expressway Public Corporation (MEPC, serving metropolitan Tokyo-Yokohama) in 1959 to construct and operate metropolitan toll expressways. Despite these efforts, however, road provision in Tokyo is considered insufficient (partly due to difficulty with right-of-way acquisition), which, coupled with various motor vehicle taxes and parking requirements, left automobile ownership at a relatively low level, thereby promoting rail use further.

2.7 Postwar Subway Development. The National Government has been strongly committed to subway development to alleviate traffic congestion in central Tokyo and to meet the growing demand for commuting from the suburbs. After the 1946 decision on subway construction, the need for early development was repeatedly emphasized in reports prepared by

⁶ Defined in terms of the number of passengers during the peak hour in relation to seating capacity.

committees established under the Capital Construction Law of 1950 and the Metropolitan Region Development Law of 1956. Moreover, the Urban Transport Council, established in 1955 as an advisory body to the Ministry of Transport (and later merged into the Transport Policy Council in 1972), recommended, in its first report submitted in 1956, building several subway lines as well as linking up subways with commuter lines to reduce trip times and congestion resulting from transfers. The reports by the Urban Transport Council (or the Transport Policy Council), regarded as a master plan, have strongly influenced individual project planning. These reports and recommendations eventually led to the decision in 1957 to construct five subway lines, some of which were to be directly connected with suburban commuter lines.

2.8 The National Government continued taking strong initiatives as further concentration in central Tokyo continued. The level of employment in Tokyo's 23-ward area increased by more than 2 million (from 3.2 million to 5.5 million) between 1955 and 1965, with much of the increase in suburban commuters. In response, in its 1960 report, the Urban Transport Council recommended building additional subway lines and abolishing tramways that were considered to be a main cause of traffic congestion. This report led the Council to recommend a 10-line plan that resulted in a decision in 1962 to construct eight lines, and the approval of additional lines in 1964. Later, a further network expansion plan was put forward and approved based on the recommendations of the Council.

2.9 The Tokyo Metropolitan Government (TMG) has played an active role in the subway planning process by preparing its own plans and participating in the nationally led master planning process. Various proposals made by the TMG were reflected in both master plans and final decisions.⁷ In addition, the new City Planning Law of 1968 empowered local governments to determine a "city plan,"⁸ including that for urban railways, allowing closer coordination and integration with land use plans and other projects. Moreover, the TMG enacted an ordinance on Environmental Impact Assessment in 1981, calling for the involvement of the local government in railway planning for the timely consideration of its environmental impacts.

2.10 **Rail-Oriented New Town Development.** The rapid concentration of businesses and employment that occurred in central Tokyo escalated land prices, making it increasingly difficult to provide housing at a reasonable cost. Consequently, housing demand accelerated in the suburbs, where housing development, both public and private, progressed on a large scale. One notable approach was rail-oriented new town development, which proliferated across Japan.

2.11 *Private Sector New Town Development.* Major private railway companies that operate suburban rail services in Greater Tokyo branched out over time into businesses closely related to the railway industry, including real estate development, retailing, and bus operations.⁹ Among them, the Tokyu Corporation has been the most successful at integrating railway and

⁷ Among these were TMG's long-pursued proposals to build and operate subways. Recognizing the need to expedite subway development, the Urban Transport Council recommended the participation of an entity other than Eidan, leading eventually to the Government's decision in 1957 permitting the TMG itself to proceed with subway construction and operation.

⁸ A "city plan" is a plan prepared based on the City Planning Law.

⁹ These companies include: Tokyu, Odakyu, Keio, and Seibu, which operate lines mainly west of central Tokyo; Tobu in the north; and Keisei in the east.

real estate development in suburbs, particularly with the new town development known as the “Tama Den-en Toshi (Tama Garden City) Development Project,” which is widely viewed as one of the most successful land development initiatives undertaken by any private Japanese company.¹⁰

2.12 This project, located 15-35 km southwest of Tokyo, was planned to transform a vast, hilly, and sparsely inhabited area into a planned community of some 5,000 hectares with half a million residents, as well as to construct a railway of 22 km (Den-en Toshi Line) passing through the newly developed area and linking it to central Tokyo. From 1959 to 1989 nearly 3,000 hectares were developed for a population of 440,000, nine times that in 1966. The Den-en Toshi Line carried about 729,000 riders per day in 1994, and the project as a whole is considered profitable.

2.13 Among the key features of this project was the use of “land readjustment” to assemble the land needed to accommodate the railway and to develop real estate. Rather than acquiring all of the land, Tokyu organized landowners to form a cooperative that consolidates properties, redevelops them without transferring ownership, and returns smaller but fully serviced parcels to landowners. This mechanism has long been used effectively for land development in Japan, and was successfully implemented by Tokyu. A unique aspect of this project was that Tokyu undertook the whole construction without charging the cooperatives for the redevelopment works; in return, Tokyu acquired the reserved housing sites after completion of the redevelopment. The first readjustment phase ended successfully, which accelerated the formation of cooperatives, thereby leading to large-scale area development within a relatively short time. Tokyu and its affiliated companies actively promoted the area’s development in a variety of ways in order to increase population and rail ridership, including selling land, constructing housing, developing and attracting shopping centers, and inviting schools.

2.14 Parallel to the land development, railway construction was planned and approved by the government in 1960. The first phase (14.2 km) was completed in 1966, followed by a second phase (5.9 km), which started in 1967 and was completed in 1984.¹¹ The total construction cost was 22 billion yen, with 50 percent financed by commercial loans and the rest from the Japan Development Bank. No direct government subsidy was provided. Previously, the area was served by the bus system largely operated by Tokyu. Following the completion of the railway, bus routes were substantially rearranged mainly to provide feeder services for rail users.

2.15 *Publicly Sponsored Rail-Oriented New Town.* Several rail-oriented new towns have also been developed in Greater Tokyo at the initiative of the public sector. Among the notable examples is the Tama New Town in western Tokyo, which is a joint venture of the Tokyo Metropolitan Government, the nation’s Housing and Urban Development Corporation (HUDC), and private sector partners including railway companies. Today, this new town has 200,000 inhabitants within a 3,000-hectare area, with the target population set at 360,000.

¹⁰ In Japan, the concept of integrated railway and real estate development was pioneered in the early 20th century by Hankyu Railway Company in the Osaka-Kyoto area. Due to its success, Hankyu’s approach was quickly emulated by railway companies in Tokyo and other parts of Japan.

¹¹ In addition to these developments, the Shin-Tamagawa Line, which connects the Den-en Toshi Line with the city center, was opened in 1977. Unlike the Den-en Toshi Line, the Shin-Tamagawa Line was supported by the Railway Construction Public Corporation Program.

2.16 The Tama New Town Development Program, master planned by the public sector, was initiated in the mid-1960s, with the first stage of residential occupancy commencing in 1971. Housing development has been undertaken primarily by public entities,¹² including HUDC, the Tokyo Metropolitan Government, and the Tokyo Metropolitan Housing Supply Corporation, with most upfront infrastructure financed through land readjustment schemes. Originally, the two rail lines to serve Tama New Town were to be built by two private companies, Keio and Odakyu, but construction was delayed mainly due to the delay in financing arrangements. In 1972, the Government instituted a program to support the construction of urban private railways, whereby rail lines can be built by a state-owned entity, called the Japan Railway Construction Public Corporation, with its funds made available partly through Treasury Investment and Loans (TILs).¹³ After completion, the rail lines are turned over to private operators, with the construction cost to be repaid over a long term¹⁴ and part of the interest payments subsidized by the national and local governments. Keio and Odakyu elected to use this scheme, which helped advance their railway construction projects, eventually leading to the opening of the entire routes by 1990. The interest payments on the investment were borne in part by the public-private property developers.

2.17 **Capacity Expansion for Commuter Lines.** In Greater Tokyo, it is apparent that the suburban population increased particularly rapidly along major railway lines, which provide high-speed, frequent, and reliable services for commuters to the city center. For example, from 1955 to 1980, the total population in municipalities along the Tokaido and Chuo Lines increased at average annual rate of 3.6 and 3.3 percent, respectively, which was significantly higher than the national rate of 1.1 percent and the rate of 2.1 percent for the Tokyo Metropolitan Area.¹⁵ Both of these lines radiate from central Tokyo and were formerly owned by Japanese National Railways (JNR).

2.18 By the mid-1960s, the rapid increase in suburban population had caused a severe capacity problem on commuter lines. For example, the peak-hour load factor on JNR's commuter lines in Tokyo averaged well above 250 percent. In response, JNR began implementation of a large-scale project in the mid-1960s intended to increase the capacity of its five commuter rail lines radiating from Tokyo.¹⁶ By 1980, the total invested in this project was about 680 billion yen, equivalent to about 1.35 trillion yen at 1980 prices. Both capacity and ridership during peak hours increased by 50 percent from 1965 to 1980 on the five lines collectively. At the same time, private railway companies operating suburban lines also expanded their respective capacities to meet the rapidly growing commuting demand.

¹² Public awareness of this housing development may have provided the rail operators with confidence with respect to future traffic demand, although it may not have been sufficiently high for them to assume all of the risks associated with rail construction, as pointed out subsequently.

¹³ The TILs program is a mechanism to channel private funds (such as postal savings accounts, employee pension funds, national pension funds, and postal life insurance premiums) into projects aimed at social and economic development, including railways and toll expressways.

¹⁴ The payback period was set at 25 years, except for new town rail lines (as in this case), for which it is 15 years.

¹⁵ These figures were calculated using data reported by Taro Kondo, "Foundation for Revitalizing Japan National Railways: On the Evaluation of Five Commuter Lines Improvement Strategy," *Transportation and Economy (Unyu to Keizai)*, March 1983, pp. 55-67 (in Japanese). The Tokaido Line extends to the southwest from Tokyo, and the Chuo Line to the west. Population along the Sobu Line that extends to the east also increased fairly rapidly, at an average annual rate of 2.8 percent in 1955-80. In this period, the rate of population increase along the Johban Line to the northeast was not as high (2.4 percent per year). In recent years, however, population along the Johban and Sobu Lines tends to have increased more rapidly than in other parts of the metropolitan area.

¹⁶ These include the Tokaido, Chuo, Tohoku, Johban, and Sobu Lines.

2.19 Redevelopment around Railway Stations. In addition to network and capacity expansion, the rail system in Greater Tokyo has been improved with various kinds of development and/or redevelopment activities around rail stations. Typically, this has included the development of station buildings with various commercial functions, station plazas with pedestrian-friendly environments in addition to intermodal facilities such as bus terminals and taxi stands. These developments usually included improvement of traffic management in the area and street improvement in commercial and residential areas. Effective use of such station space as well as redevelopment of the surrounding areas and intensive and better organized land use were enhanced by an improved rail services and feeder services, thereby further promoting residential and commercial development. This approach of using a rail station as a center of suburban development increased transit ridership, thereby improving the financial performance of the urban transport system. Development and/or redevelopment has been undertaken using legally designated land development programs including “land readjustment” and “urban redevelopment.”¹⁷

2.20 Government Support for Urban Rail Financing. While urban rail is the preferred transport mode in Japan’s large metropolises, including Tokyo, urban rail (particularly subways) faced severe financial difficulties due to large upfront capital requirements. In response, national and local governments have provided various forms of financial support for urban rail construction. For subways, a program was initiated in 1962 to subsidize part of the interest payment on investment; this program was amended in 1967 into a direct subsidy for construction. Initially, the rate of a subsidy was modest at 10.5 percent of eligible construction costs. As the network expanded, however, construction costs became higher, increasing the extent of support required. Since 1978, a subsidy of 70 percent of eligible construction costs has been provided (coverage amounts to some 50 percent of total construction cost) with the condition that the National Government will provide half of the subsidy (35 percent) only if the local government contributes an equivalent amount.

2.21 Government support has also been provided for urban private railways, including financing and construction by the Japan Railway Construction Public Corporation, as mentioned earlier. Upon completion of construction, rail lines are turned over to private operators, with the construction cost to be repaid over a 25-year period¹⁸ (15 years for new town rail lines). Under this program, national and local governments also provide a subsidy to partially cover interest payments on the investment. In addition, the Japan Development Bank has provided low-interest loans for private railway development and improvement.

2.22 Limiting Automobile Use. The limited use of automobiles in Tokyo reflects a relatively low level of car ownership compared with large metropolises in other developed countries,¹⁹ which has resulted primarily from the high cost of ownership and use of

¹⁷ The key feature of this urban redevelopment program is the rearranging of property ownership and leasing arrangements in the redevelopment process (following procedures designated by the Urban Redevelopment Law of 1969), thereby facilitating construction of new buildings and other facilities in the built-up areas. For example, existing landowners will receive shared ownership over the redeveloped land as well as partial ownership of the buildings and facilities built. In short, this program is a “three-dimensional” version of land readjustment.

¹⁸ The repayment period is set at 30 years for Japan Railways.

¹⁹ In 1990, for example, car ownership in the Tokyo Metropolitan Area averaged 275 autos per 1,000 inhabitants, compared with about 350 in Greater London and more than 600 in most United States cities. Robert Cervero, *The Transit Metropolis: A Global Inquiry*, Island Press, Washington, D.C., 1998..

automobiles in the metropolitan area. The national and local governments have imposed various motor vehicle taxes (including a vehicle acquisition or excise tax, an annual automobile registration tax, and a surcharge based on vehicle weight) as well as high gasoline taxes.²⁰ This policy is mainly aimed at raising sufficient funds for road construction, rather than simply controlling motor vehicle use. Japan has a system of earmarking some of these tax revenues for financing the maintenance, improvement, and construction of roads, which has greatly helped the country expand its national road network.²¹

2.23 Equally important in constraining car ownership has been a strict parking-space requirement; those intending to register a car must present evidence verifying the availability of an off-street parking space. Moreover, the general narrowness of roads in Tokyo provides little space for on-street parking, and off-street parking in central Tokyo is very costly. All of these factors, coupled with the high-quality rail services, and the strict control of illegal parking, have tended to discourage the use of the automobile.

2.24 The popularity of public transport has been greatly enhanced by commuting allowances. Most Japanese companies bear the full commuting costs of their employees, who thus do not have to worry about commuting expenses (except travel time) in deciding the location of their residences. As a consequence, distant suburbs linked to the city center with high-speed railways are more attractive than they would be otherwise. A tax incentive is an important element in this mechanism. Employers in Japan may fully deduct from their corporate income taxes the costs of commuting allowances (as high as 100,000 yen per month at present) for their employees. Commuting costs by rail up to this ceiling are fully covered; relatively short-distance automobile commuters, however, can obtain only a tax-free allowance approximately equal to gasoline costs (and this allowance may not even cover gasoline costs in central Tokyo due to the low average travel speeds and consequent inefficient fuel consumption).

C. ISSUES AND LESSONS

2.25 **Metropolitan Expansion through Rail Network Development.** It is likely that the population and employment growth experienced in Greater Tokyo would not have been achieved without the development of an extensive rail network.²² High-speed, frequent, and reliable rail services helped expand the area within commuting distance, while allowing employment to grow apace in central Tokyo.²³ The metropolis tended to extend along rail

²⁰ Japan's gasoline taxes are three to four times higher than in the United States. Robert Cervero, *The Transit Metropolis: A Global Inquiry*, Island Press, Washington, D.C., 1998. There is an estimate that the total amount of taxes users pay over the life of one automobile (about nine years) averages approximately its purchase price. Japan Institute for Social and Economic Affairs (Keizai Koho Senta), at <http://www.kkc.or.jp/japanese/journal/alaarte/ala0926.html>.

²¹ In fiscal 1999, total tax revenues paid into the Road Development Special Account amounted to 5.80 trillion yen (both national and local taxes combined), covering 45 percent of the total road investment in the year.

²² However, it is not clear to what extent rail-based services have contributed to metropolitan growth in Tokyo; other factors have included increased housing demand due to a reduction in extended families living together, increased in-migration of population from rural areas, rapid land price appreciation prices in suburban areas, and accelerated infrastructure improvements in these areas.

²³ Among the arguments in favor of this development is that the concentration of employment and economic activities in central Tokyo contributed to higher urban productivity in the metropolis due to such factors as economies of scale and positive economic externalities (e.g., information spillover effects, specialization benefits for the service sectors). There have also been arguments made against metropolitan growth of this magnitude,

corridors radiating outward, as exemplified by the particularly rapid increase in suburban population along major commuter lines. This trend has been strengthened further by the capacity expansion of commuter lines and the network extension of subways (particularly toward outlying areas) undertaken since the 1960s. The dispersal of population that occurred in this manner was in line with the government's postwar land use policies, although rail development in Greater Tokyo has been a century-long process caused not only by government policies on metropolitan form, but also by other various factors including the urgent need to cope with traffic congestion in central Tokyo, the urgent need to respond to rapidly growing residential demand, profit motives of the private railways that developed much of the Tokyo's private rail network by the early 20th century, and some accidental events such as earthquakes.²⁴

2.26 The Role of Land Use Policies in Expanding the Metropolitan Area. The expansion of the metropolitan area into the suburbs resulted not just from the provision of suburban rail services, but various land use policy measures also appear to have contributed to this process. The National Government embarked upon comprehensive development planning for Greater Tokyo, which was largely characterized by the setting of long-term land use policies. The first development plan called for controlling population and employment concentration in central Tokyo. Various measures were then taken, including control of the construction of new factories and educational facilities in central Tokyo,²⁵ development of distribution facilities (such as warehouses, truck terminals, and wholesale facilities) in outer areas,²⁶ development of large-scale public housing in suburban areas,²⁷ and construction of satellite towns.

2.27 Strong Initiatives of the National Government in Urban Public Transport Planning. For Greater Tokyo as well as other major metropolitan areas, the National Government took a strong initiative in planning large-scale public transport networks including subways and suburban railways. In 1955, the Ministry of Transport established, as its advisory body, the Urban Transport Council (later merged into the Transport Policy Council) to comprehensively examine major urban transport issues and to set policy goals and development strategies. Reports submitted by the Council to the Transport Minister are regarded as a strategic framework in which planning for individual projects is based, and therefore their recommendations are highly influential in the entire planning process. Since its creation, the Council has prepared several reports on rail network development in Tokyo, and many of its recommendations were eventually implemented.

including higher costs for transport development to meet increasing travel demand, risk management concerns in case of disasters (e.g., earthquakes), and longer travel times.

²⁴ According to various sources, Tokyo's suburban population growth, which started to emerge in the early 1900s, was accelerated by the Great Kanto Earthquake that took place in September 1923. The quake hit the center of Tokyo severely, thereby inducing a number of the residents in the city center to move out to suburbs. This process helped, and was reinforced by, a boom of new construction of suburban rail lines, opening more than 500 km of route length in Greater Tokyo from 1924 to 1935.

²⁵ This was attempted by the Law Concerning the Control of Factories and Other Facilities in the Urbanized Areas in the Tokyo Metropolitan Region of 1959.

²⁶ This was attempted by the Law Concerning the Development of Urbanized Areas for Distribution Activities of 1966.

²⁷ The development of large-scale residential areas undertaken by the public sector was facilitated partly by the New Residential Urbanized Area Development Law of 1963, which provided project implementing bodies (including local governments and the Housing and Urban Development Corporation) with strong powers regarding land acquisition.

2.28 Building Consensus in the Planning Process. While the National Government has undertaken master planning as noted above, the Tokyo Metropolitan Government (TMG) has actively participated in this process by preparing its own plans and proposing them to the Urban Transport Council (or the Transport Policy Council). The Council, with its members normally composed of academics, officials of concerned local governments, and others, receives opinions from concerned bodies including local governments and railway operators. Indeed, many of the opinions offered by the TMG were reflected in the final reports of the Council. Involving concerned bodies in the master planning process has contributed to the reaching of a consensus at an early stage, which has facilitated coordinated planning of individual projects.

2.29 Decentralized Urban Transport Planning. Planning for individual urban transport projects in Japan has been largely decentralized, allowing close coordination among transport planning and other development activities, e.g., planning for the rail and road networks, development of station plazas and bus terminals, and urban redevelopment. Local governments, the main bodies involved in planning urban transport projects, follow designated city planning and environmental impact assessment procedures in coordination with other concerned bodies including the Ministry of Transport, the Ministry of Construction, railway operators, road operators, other local governments, and the public. The role of local governments was strengthened by the City Planning Law of 1968, which empowers them to formulate a “city plan” including a plan for urban railways; previously, this power was accorded to a concerned (national) Minister.

2.30 The Role of Public Sector in Integrated Rail and Land Development. The Japanese experience demonstrates that integrated rail and land development can promote dispersal of population in an orderly fashion while retaining dependence on the city center for employment. In Greater Tokyo, several rail-oriented new town developments created large-scale residential areas with good access to central Tokyo. The role of the public sector in new town development has varied across cases. In the case of Tama New Town, master planning and most of the land and housing development were undertaken by the public sector. Private railway companies also participated in the project, deciding to build and operate rail lines to serve the area. However, due to the project’s financial risk, construction was undertaken with a government support scheme for rail construction and financing. Upon completion of the rail lines, they were turned over to the private operators. Conversely, Tama Den-en Toshi (Tama Garden City), another notable example of integrated rail and real estate development, was developed mostly by the private sector, which successfully exploited value capture opportunities. The governmental role was largely limited to granting the railway company a license for rail construction and operation in particular area, which helped shield the company from competition.

2.31 Use of Land Readjustment to Secure Land for Urban Rail. Typically, rail-oriented new towns have been developed with the use of land readjustment to assemble the land required to accommodate railways and to develop real estate. With this approach, rather than acquiring all of the land, developers (whether private or public) organize landowners to form a cooperative that consolidates (often irregularly shaped) properties, redevelops them without transferring ownership, and returns smaller but fully serviced (and usually rectangular) parcels to landowners. Public infrastructure including roads, drainage, sewerage, and parks are funded through the sale of the reserved land contributed by cooperative members, thereby relieving developers of a large upfront financial burden.

2.32 Strong Government Support for Urban Rail Financing. Recognizing the difficulty of covering full rail construction costs with fare revenues, the National Government (jointly with local governments) has provided various forms of financial support for urban rail development, including direct subsidies for construction costs and interest, provision of loans with favorable terms, and equity participation. For subway construction, the extent of support was modest in the early years largely because investment costs were relatively low due to less difficult construction with the use of underground space below streets.²⁸ As the network expanded, however, the construction costs became increasingly high, and the government responded by substantially increasing the level of subsidy. It is almost certain that Tokyo's subway network would not have been expanded as much as it was without strong financial support by the public sector. Private railways benefited, primarily through long-term loans with favorable conditions as well as subsidies to partially cover interest payments on the initial investment.²⁹

2.33 Promotion of Redevelopment around Transport Terminals. In addition to the macro-level land use policies mentioned above, the Government of Japan instituted various land use control and planning measures intended to guide “healthy” urban growth and “orderly” development. These measures have included, among others, determination of areas where urbanization is to take place (termed “urbanization promotion areas”) or to be restricted (“urbanization control areas”), and mandating the preparation of a land use plan for urbanization promotion areas with several conditions determined for each use (including allowable densities) based on the building codes and other regulations. These measures (e.g., land use planning) provided a basis for the development of urban transport facilities as well as various land development schemes including “land readjustment” and “urban redevelopment.” In Japan, these land use control/planning measures and land development schemes have been strictly enforced in accordance with the legally designated regulations and procedures.

2.34 In many cases, these measures have contributed to the development of more efficient urban transport systems, particularly through the implementation of various kinds of (re)developments around rail stations. Typically, these developments included the development of station buildings with various commercial functions, station plazas with pedestrian-friendly environments, bus terminals. Effective use of such station space, redevelopment of the surrounding areas, and intensive and better organized land use patterns were facilitated by good rail access and feeder services, thereby attracting residents and businesses. This approach of using rail stations as a development core increased transit ridership, making the urban transport system more efficient. Another important measure has been rail track elevation or grade

²⁸ This has partly resulted in the relatively strong financial performance of the Teito Rapid Transit Authority (Eidan) in Tokyo, which began its subway network development many years ago. Eidan is among the few subway operators in Japan that has been making operating profits (after depreciation but before interest and taxes, as well as excluding subsidies) for many years. In contrast, the subways operated by the Tokyo Metropolitan Government, which are relatively new, have not performed nearly as well.

²⁹ Government subsidies for private railway companies date back to the early 20th century. Under the Law for Subsidizing Local Railways of 1919, a subsidy was provided for “(private) local railways” (including suburban commuter lines) during the first ten years of their operation, with the amount of subsidy set at the difference between 5 percent of the investment costs and operating profits, while the deficits were not subject to a subsidy. Later, the terms were made more generous. This subsidy program, albeit with less generous terms, existed as early as 1911. This system to relax the debt service burden in the initial years of operation was among the major factors to promote the entry of private firms into the rail industry, thereby leading to the expansion of the private rail network in the years preceding World War II.

separation of rail track and urban roads, with its implementation funded by the government. In many cases, integrated land development has been undertaken along rail corridors (often with the use of land readjustment), thereby creating higher-valued land as well as achieving efficient movement of road traffic.

2.35 Success Factors in “Tokyo-Style” Urban Rail Development. In summary, there are three categories of success factors contributing to Tokyo-style integrated urban rail and land development: (i) a strong regulatory and institutional framework, (ii) appropriate spatial planning strategies, and (iii) investment decisions in a “proper” socioeconomic environment. Each is elaborated below:

2.36 *Strong Regulatory and Institutional Framework:*

- Comprehensive legal framework supporting integrated development.
- Licensing scheme to protect rail operators from excessive competition as well as to provide opportunities to rail operators with affiliates bus enterprises to reorganize their bus routes to feed the rail services.
- Variety of financing options such as interest subsidies, soft loans, fiscal investment loans, and commercial loans.
- Tax-free commuting allowances encouraging the use of public transport.
- High level of coordination among individuals and institutions involved in railway development.
- Efficient administrative infrastructure to support the transfer of benefits.
- Availability of highly competent technical and financial teams.

2.37 *Spatial Planning Strategies:*

- Integrated land use and transport planning process at the national and local levels; government policies on land use and transport development well respected, and therefore provide incentives to attract investment along the corridor.
- Land readjustment technique available to assisted in efficient acquisition of rail rights-of-way.
- Strategic location of urban arterials to provide the space to construct an underground rail system.
- Railway construction to promote under-developed areas near the city center.
- Strategy to develop residential areas as well as other uses along rail corridors; such high-density development creates passenger demand.
- Strategy to develop rail stations as intermodal transport terminals and activity centers.

2.38 *Socioeconomic Environment:*

- Railway network well developed before motor vehicles became widespread.
- Railways providing a high level of service, contributing to general consensus that railway is an essential mode of transport in an urban area.
- Private railway development profitable through land development along the corridor.

- Increased property values caused by rail construction, which enables value capture to finance part of the investments.
- Increased attractiveness of residential and commercial development along the railway corridor, which in turn, contributes to an increase in railway users.

2.39 Is the Tokyo Model Applicable to Developing Countries? An assessment of the applicability of the Tokyo model to cities in developing countries requires close examination of the existing conditions of each city. However, general observation of cities in developing countries reveals the following points:

- Institutions for urban transport policy making and administration are relatively weak in developing countries. There is a lack of sufficient staff with technical and financial competency in both the public and private sectors.
- There is a chronic shortage of financial resources to support capital intensive urban rail investments.
- Policies are often not well coordinated; bus services may compete with railways (e.g., as in Bangkok)
- The urban rail system is either nonexistent or underdeveloped, and therefore there is no consensus that urban rail is an essential part of urban transport. Existing railways have been developed to serve long-distance traffic, and service levels within urban areas are not sufficient for rail to function as part of urban transport system. Since railways are not elevated there are at-grade (level) crossings within urban areas, and trains have to slow down before passing through the crossings. Sometimes, illegal settlements are found in and around rail corridors, making modernization of the system difficult.
- In some countries, motorization progressed rapidly before urban rail was developed (particularly in Thailand, Malaysia, Indonesia, and the Philippines); however, in other countries (e.g., China, Vietnam, Cambodia, Myanmar), motorization rates are still relatively low.
- Public railway management is not very efficient, and in most cases, even operating costs are not recovered.

2.40 In the face of the above problems, strategies for the development of urban rail in developing countries may include:

- Securing of rail rights-of-way at an early stage of urbanization—the right-of-way can be used, for example, for a dedicated busway until demand warrants the construction of a fixed track system.
- Involvement of the private sector (domestic or foreign) to introduce technology and efficient management, although public financing of railway construction may be necessary if private sector undertakings are to be financially viable.
- Provision of technical assistance to promote policy coordination and training of staff capable of planning, design, and public financing.

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3

KOBE: THE MUNICIPAL GOVERNMENT ACTING LIKE A PRIVATE DEVELOPER

A. CITY BACKGROUND

3.1 The city of Kobe, located about 25 km west of the city of Osaka and having a land area of 544 square kilometers, had a population of nearly 1.5 million just before the Great Hanshin Earthquake devastated the city in January 1995. Geographically, the city is divided into two parts: a narrow, densely populated southern band lying along the coastline (2-4 km in width and about 30 km in length); and a sparsely inhabited, hilly area in the northwest. Nearly 80 percent of the city's population is concentrated in the southern part, which accounts for only 30 percent of the city's total land area.

3.2 Kobe's urban transport system is rail intensive (although not as much as that of Tokyo) partly because of its proximity to Osaka, the country's second largest city, where an extensive rail network was developed earlier than in other major Japanese cities (including Tokyo). The city's rail network totals 174 km in route length, consisting of 36 km of the West Japan Railway Company (JR West); 115.3 km of other private railways; 22.7 km of the municipal railway, which is partially underground; and 10.9 km of "third sector" (public-private) lines. The urban route bus system is operated both publicly and privately, primarily as a mode to complement the rail network and to provide feeder services for rail riders. Over the past two decades the city's bus system has suffered a gradual loss of ridership largely due to motorization and improved rail services.

B. MAJOR URBAN TRANSPORT SYSTEM DEVELOPMENTS

3.3 **Overview.** Much of the rail network in Kobe was developed in the early 20th century with active participation by the private sector, which primarily established intercity links along the coastline. By 1936, the Kobe-Osaka link was served by Japanese National Railways (JNR) and two private railways, Hanshin and Hankyu; the link to the west was served by JNR and another private operator operated the rail line extending to the northeast.

3.4 It was in the 1960s that further rail network development took place in Kobe, at the initiative of the municipal government. Immediately after World War II, the city began planning high-speed railways to connect the four privately operated lines entering the city, which had previously been disconnected, with the transfers among them relying on streetcars and buses. The aim of the project was to integrate the public transport systems in central Kobe as well as to improve intercity links to the east, west, and northeast. The connecting rail links were built and operated by a company jointly established by the municipal government and the four private railway companies, and their operation began in 1968.

3.5 Meanwhile, rapid urbanization led to significant concentration in the city center with disorderly urban sprawl intensifying toward the hillside areas, thus requiring planned urban development in the suburbs. At the same time, rapid economic growth increased the need for expansion and improvement of the port of Kobe as well as the development of industrial areas. In order to meet these demands in total, the municipal government launched a large-scale project to build an island (called “Port Island”) by reclaiming the seashore with earth material taken from underdeveloped hilly areas. These inland areas were then developed as a new town with a newly constructed municipal railway providing access to the city center. Port facilities as well as industrial, commercial, and residential areas were developed on the island, with construction of a new transit system (called “Portliner”) linking the island to the city center.

3.6 The construction of Port Island was initiated in 1966 and completed in 1980; operations commenced in 1981. During this period a series of new town developments were undertaken, and the first section of the municipal railway was opened in 1977, followed by extensions in later years. In addition, another island (called “Rokko Island”), primarily for residential, commercial, and recreational use, was constructed in the same way as Port Island, and it was also connected to the city with a new transit system (called the “Rokko Liner”).

3.7 **Kobe Rapid Railway (*Kobe Kosoku Tetsudo*).** The municipal government took initiative to build railways interconnecting the four existing private rail lines; Kobe Rapid Railway Company, established for this purpose, is owned jointly by the municipal government and these four railway companies.¹ This public-private partnership approach (termed the “third sector” approach in Japan) was later adopted across the country for a variety of public infrastructure developments; the Second National Comprehensive Development Plan, a national-level master plan approved by the Cabinet in 1969, had proposed the active use of this approach to channel private funds into large-scale development projects. Main areas for which the approach has been applied include industrial estates, freight distribution complexes, housing and urban development, tourism development, and transportation services.² In the case of Kobe Rapid Railway, the public-private partnership (PPP) approach was considered reasonable because of the need to coordinate the four railways and reduce the burden on municipal finances. The participation of the city enabled formation of a successful financial arrangement. The funds raised by the issuance of municipal bonds were used as collateral for commercial loans.³ Construction proceeded relatively well, and operation of the rail system began in 1968. The total construction cost of the 7.6 km rail lines, mostly below existing streets, was 16 billion yen, which was relatively low mainly due to the open-cut construction technique that was made possible by the widening of roads undertaken through land readjustment.

¹ A total of 40 percent of the shares were held by the municipal government, another 40 percent by the four private railway companies, and 20 percent by other companies. The mayor of the city of Kobe became the chairman of the board, with each of the presidents of the four railways named board members. The president’s position is held by a representative from the municipal government.

² The respective roles of the public and private sectors in this approach vary across cases. In the case of Kobe Rapid Railway, the company was established to build and operate the railway. As described later, Kobe New Transit, another third sector company, is responsible for operating new transit systems as well as installing equipment and facilities needed for rail operation, while rail infrastructure was built by the municipal government.

³ Although the relevant literature does not specifically address this issue, it is likely that municipal bond issues provided commercial banks with confidence in the commitment of the municipal government to the operation and management of the railway over the long term.

3.8 One interesting feature of this railway is the separation between the ownership of infrastructure and rail maintenance and operation. Although this system was adopted from the outset in the Kobe case, it was formally introduced nationally in 1988. The Railway Enterprise Law of 1987 categorized rail enterprises into three types: Type I to own and operate railways; Type II to only operate them; and Type III to only own them; previously establishing a railway company that undertakes non-transport operations was not permitted.⁴ Following this law, Kobe Rapid Railway was reorganized as a Type III enterprise, with the four private railways undertaking rail operations as Type II enterprises.

3.9 **Municipal Railway and New Town Development.** The municipal government undertook integrated rail and new town development by following the experience of private rail companies. In addition to developing residential areas, the municipal government initiated various kinds of development projects along the rail corridor in cooperation with private partners. These developments included industrial and research parks, a freight distribution center, a sports stadium and other sports facilities, colleges and other research and educational facilities, and shopping centers. The Development Bureau of the municipal government acted as land developer, and the Transport Bureau constructed the rail system using various funding instruments.

3.10 *Financing Sources of the Municipal Railway.* The 22.7 km railway system, about 60 percent underground, connects three northwestern suburban new towns with the city center. The total construction cost was about 247 billion yen. The underground section was constructed with support from the subsidy scheme for underground rail construction, where the national and local governments subsidized about 50 percent of the construction cost. The investment in the surface section was partly subsidized by the national and local governments with the scheme for new town rail construction.⁵ Kobe Municipal Railway was eligible for these subsidies, which have been provided for publicly constructed rail systems.

3.11 Besides these subsidies, three other types of funding sources (based upon value capture or impact fees) were used to finance the rail construction. First, the rail right-of-way for the surface section was contributed to the rail operator (the Transport Bureau) by the land developer, which in this case was the city's Development Bureau. This approach was based on administrative guidance jointly issued by the Ministries of Finance, Transport, and Construction in 1972, mandating developers' contributions to new town rail construction.⁶ Second, the land required to develop two stations along the underground section was contributed by land developers including the Development Bureau, the former Housing Development Public Corporation, and private developers, based on development guidelines

⁴ Because of this constraint, Kobe Rapid Railway had previously owned and operated the railway under an arrangement whereby the four private participants leased rolling stock with train operators to the railway once their trains entered its network.

⁵ These schemes were described earlier in the section on Tokyo.

⁶ This administrative guidance, applied to new town railways built by the public or the third sector, required the railway enterprise and the new town developer(s) to reach an agreement that includes the following provisions: (i) the (land) developer bears half the construction cost for ground-level rail infrastructure; (ii) in the new town area, the developer transfers the rail right-of-way to the rail enterprise at its original price; (iii) outside of the new town area, acquisition of the rail right-of-way becomes the responsibility of the rail enterprise, although the developer pays to the rail enterprise the difference between the original price of the property and its actual purchase price; and (iv) the central government and local governments will, respectively, subsidize up to 18 percent of the construction cost, with these subsidies to be granted in annual installments over six years only after the operation has begun.

issued by the municipal government in 1973. In addition, for part of the underground section, the land developers were required to bear total construction costs for ground-level infrastructure as well as to contribute to the local government's portion required by the subsidy program for underground rail construction. Third, rail investment and operation was cross-subsidized by profits generated from land development and other associated businesses; profits earned by the Development Bureau were put into the city's general account, helping the city to service debt on the rail investment and cover operating losses.

3.12 New Town Development. Major housing developments initiated by the municipal government along the rail corridor include Suma New Town, Seishin New Town, and Seishin Minami (South) New Town, with a combined planned population of about 150,000. One important feature of these new towns has been that in addition to housing development, the municipal government planned and developed (with private partners) various facilities and services (as mentioned earlier), which can attract people from the city center and beyond for employment, schooling, and recreation, thereby increasing reverse-flow rail ridership. This concept is particularly important for profitable rail operations because it avoids over-dependence on one-way commuter traffic. In a recent year (1993), the railway carried about 95 million passengers, averaging 260,000 passengers per day.

3.13 New Transit Systems. The municipal government decided to build a "new transit system" called Portliner as a major transport mode linking the reclaimed Port Island to the city center; the government concluded that buses would not provide sufficient capacity for the peak-hour traffic demand. The system uses elevated guide-tracks and fully computer-operated vehicles with rubber tires. It was constructed jointly by the municipal government and a newly established third sector company, Kobe New Transit, with the majority of its shares held by the municipal government and the rest by commercial banks and other private firms.

3.14 Rail infrastructure was built by the municipality with public funds, while the investment in other facilities⁷ was made by Kobe New Transit, which is fully responsible for the maintenance and operation. The company is also permitted to undertake real estate development and other businesses such as operation of cultural, recreational, and parking facilities, retailing, and restaurant enterprises in these facilities as well as management of rail stations. The primary reasons for adopting a third sector approach included: (i) full undertaking by the local government would have been financially difficult; (ii) efficient operation was expected to be achieved using financial and human resources of the private sector; and (iii) the entity was expected to be more responsive in the management by incorporating related businesses.

3.15 The public funds used for building the rail infrastructure partly came from the road development special account, or the special road funds.⁸ The use of the road funds for building the infrastructure portion of a "new transit system" such as urban monorail or Portliner was permitted on the grounds that these systems will alleviate road traffic congestion, make road transport more efficient, and make more effective use of scarce road space.⁹ In addition, land

⁷ These facilities included stations, electric systems, signaling and communications systems, rolling stock, and other systems, and facilities required for transit operations.

⁸ See the chapter on Tokyo for sources on the special road funds.

⁹ However, no formal evaluation is required as to whether the alleviation of road congestion yields sufficient benefits to justify the amount of road funds to be used for transit system investment.

acquisition costs and compensation payments were borne by the municipal government in order to reduce the transit operator's financial burden. As in the case of the new town, the municipal government in effect cross-subsidized transit construction using profits earned from the development of the island. The Rokko Island Project was undertaken essentially in the same way in terms of the roles of the public and private sectors¹⁰ as well as the funding arrangements.

3.16 Financially, Portliner has been managed fairly well due to a number of factors including:

- less of a capital requirement for the transit operator;
- mixed land use (with residential, industrial, commercial, and recreational areas, and other service facilities) on the island, which leads to bi-directional flow of passengers;
- private sector management, which is considered more efficient than public sector management; and
- undertaking of other income-generating activities, including real estate, parking, retailing, and catering services.

C. ISSUES AND LESSONS

3.17 **Strengths and Weaknesses of the “Public Developer” Approach.** The city of Kobe actively and effectively performed a developer's role in a series of integrated land and rail development projects. This public developer approach has at least the following advantages when rail is built by the public sector:

- As a single entity (local governments) with (arguably) consistent organizational objectives and fewer conflicts of interest, it is relatively easy to arrange a mechanism to internalize benefits generated from improved accessibility (a value capture mechanism), which contributes to cross-subsidizing of the rail construction.
- It is possible to plan and implement, in a concerted fashion, a variety of development projects that will increase transit ridership (as those undertaken by the city of Kobe to increase reverse-flow transit riders).
- The upfront investment well ahead of project implementation (e.g., land acquisition) can be justified in terms of achieving the smooth implementation of a project with less of a profit motive and more concern for improving public welfare.

3.18 However, there are potential disadvantages of the public developer approach, including the following:

- It may be politically controversial for local governments to undertake large-scale land development projects (such as the Port Island project) due to the potentially high risks involved, with the project's success relying largely on increases in property values.
- Conversely, the public sector might excessively exploit its monopolistic power over the land development market.

¹⁰ The transit system, Rokko Liner, is also operated by Kobe New Transit.

- There are efficiency and market responsiveness concerns in the public sector's undertaking land development. In the case of Kobe, prior to the large-scale projects mentioned above, the municipal government undertook a series of reclamation projects with (modest) profits, which helped establish its reputation as an effective developer.

3.19 The Role of the National Government in Value Capture. The National Government issued administrative guidance on integrated rail and new town development, mandating contributions of the land developer to the rail enterprise with several provisions to be included in their agreement. This explicit regulation facilitated the cross-subsidizing of rail construction with profits earned from real estate development, as exemplified by the experience of Kobe. It is important as well as desirable to institutionalize a value capture mechanism in order to ensure the cost sharing of a land developer for rail construction. However, its practicality becomes a major issue unless beneficiaries are easily identified, or the extent and distribution of the benefits across beneficiaries are reasonably well estimated.

3.20 Minimization of Rail Construction Cost with Secured Rights-of-Way. Urban road space should be viewed not only in terms of its primary objective (i.e., serving road traffic), but also as space that can be used for the construction of rapid transit systems (underground or surface) at a later stage. The construction cost of the subway owned by Kobe Rapid Railway was kept low mainly because of the open-cut construction method made possible by a relatively wider road width that was achieved through land readjustment.

3.21 Separation of Infrastructure Construction from Rail Operation. Kobe Rapid Railway and Kobe New Transit adopted a variation of this method. In the case of Kobe Rapid Railway, this third sector railway company owns the rail infrastructure, while the four private railway companies undertake rail operations. In the case of Kobe New Transit, rail infrastructure was built by the public sector, while this third sector company invested in other facilities as well as transit operation. An advantage of this method is the mobilization of the specialized skills of both the public and private sectors. A socially optimal level of investment in infrastructure may not be achieved solely through private sector undertakings, but may require the involvement of the public sector.

3.22 Strengths and Weaknesses of the Third Sector Approach. The city of Kobe adopted a third sector approach for some of the rail system developments, with generally favorable results. For Kobe Rapid Railway, the participation of the municipal government helped finance rail construction, with the use of funds raised through the issuance of municipal bonds, which then were used as collateral for commercial loans. For Kobe New Transit, the original motives for using the third sector approach, rather than a purely public undertaking, were primarily to reduce financial burden on the municipal budget and to use resources and skills available in the private sector.

3.23 A number of third sector companies have been established in Japan to undertake various kinds of activities including urban rail transport. In general, relatively successful cases (the case of Kobe New Transit is considered fairly successful) have resulted from factors including (i) clear division of responsibilities between the public and private sectors;¹¹ (ii) integration or

¹¹ In the case of Kobe New Transit, the responsibility for building rail infrastructure was fully assumed by the public sector, while the company concentrated on operational aspects of the transit project.

coordination with other regional development activities, which enhances the revenues of the third sector company (as well as its own undertaking of these activities);¹² and (iii) active involvement of (local) commercial banks, which disciplines the third sector company through monitoring.

3.24 Potential problems with the third sector approach center around corporate governance issues, which include: (i) potential conflicts of interest between the public and private participants resulting partly from unclear division of responsibilities; (ii) potential lack of managerial responsibilities and discipline due to joint public-private management, with management staff (both public and private) generally on a part-time basis or “on loan” from their “mother” organizations, and a general tendency to rely on municipal finances in case of financial problems; (iii) a possible lack of clarity in the organizational objectives and poorly prepared business plans, which lead to poor financial performance; and (iv) potential corruption due to licensing requirements and government regulations applying to the third sector.

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¹² The relatively favorable performance of Portliner resulted partly from publicly led mixed land use on the island, which has contributed to a bi-directional flow of transit riders. Also, Kobe New Transit is permitted to undertake real estate transactions and other activities (e.g., operating cultural, recreational, and parking facilities, and retailing and restaurant enterprises in these facilities as well as in stations).

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4

NAGOYA: EXPERIMENTING WITH BUS RAPID TRANSIT

A. CITY BACKGROUND

4.1 The city of Nagoya, with a population of 2.16 million (April 2000), is located at the center of the Chukyo Metropolitan Region, one of the three major metropolitan regions in Japan. The Chukyo Region is less densely populated than the Tokyo Metropolitan Region and does not contain many large metropolises. While the Keihanshin Region has three large cities (Osaka, Kyoto, and Kobe), Nagoya is the only large metropolis in the Chukyo Region, with several mid-scale cities located at some distance around it. Partly reflecting these geographical and demographic conditions, the region experienced a more rapid pace of motorization in the postwar period than the other two metropolitan regions.¹

4.2 Heavy dependence on autos is evident from the modal split in the city. For all of the trips in the city of Nagoya, automobiles are the dominant mode of transport, accounting for 69.6%, compared to 24.5% by rail and 2.5% by bus. This modal split significantly contrasts with that of Tokyo and Osaka, where rail dominates and autos have a much more limited role. The share of buses in Nagoya is also lower than in Tokyo and Osaka, indicating the strong impact of motorization in the region, which has led to relatively light use of public transport systems. The rail network in the city of Nagoya totals about 174 km of route length, consisting of 37 km of the (the Central Japan Railway Company, JR Tokai), 60.5 km of other private railways, and 76.5 km of the municipal subway. As with other large cities in Japan, the bus route systems in and around Nagoya are operated both publicly and privately primarily as a mode to complement the rail network or to provide feeder services. In recent years, Nagoya has begun experimenting with bus rapid transit as an alternative to urban rail, with the city attempting to give buses a larger role.

B. MAJOR URBAN TRANSPORT SYSTEM DEVELOPMENTS

4.3 **Overview.** Nagoya is renowned for its wide roads, largely attributed to the postwar restoration projects that were undertaken with relative success.² Through extensive use of land readjustment, a grid-like network was developed with roads generally much wider than those in other large Japanese cities. In the early postwar period, streetcars and buses dominated public transport inside the city. In the outer areas, there were several radial intercity or suburban rail lines that were largely developed in the prewar period, including those of the former Japanese

¹ For example, car ownership in Aichi Prefecture (of which Nagoya City is the capital) was about 520 vehicles per 1,000 inhabitants in the late 1980s, compared with about 380 for the Tokyo Metropolitan Area and 350 for Osaka Prefecture.

² In Nagoya, postwar restoration projects (e.g., large-scale land readjustment and infrastructure development) were implemented relatively smoothly, in part because the war almost completely devastated the city center making entirely new development easy to implement. Other contributing factors included administrative guidance on housing restoration issued by the government immediately after the war to secure a setback (two meters) from existing roads and space separation from the next building. Such measures were not taken in Tokyo.

National Railways and a few private railway companies, with Nagoya Tetsudo (Nagoya Railway, abbreviated Meitetsu) the largest. However, the extent of the rail network in and around Nagoya was (and still is) considerably smaller than that in Tokyo and Osaka.

4.4 Nagoya's subway development came much later than that of Tokyo with then first line in Nagoya not opened until 1957. Later, the network was gradually expanded with the construction of new lines and their extension. By 1974, publicly operated streetcars were entirely abolished. Further development of subways was undertaken based on a master plan prepared by the Urban Transport Council in 1972; consequently, subway became the major public transport mode in the city. Meanwhile, private suburban railways jointly with the municipal government carried out various capacity expansion programs, including through-train operations with subway routes in order to meet growing transport demand particularly for commuters from the outer areas.

4.5 Despite these efforts, motorization progressed at a particularly rapid rate in Nagoya as well as in the surrounding areas due to Nagoya's relatively low population density for a major metropolitan area, good road conditions, and relatively less extensive rail network. As a result, the share of public transport modes decreased over time, while traffic congestion became increasingly serious particularly along the major roads extending radially from the city, and then on to the network inside the city. At the same time, subway construction costs increased to high levels. Buses lost ridership gradually as a result of increased motorization and the expansion of subway network. In the late 1970s, as a measure to tackle these urban transport issues, the city of Nagoya initiated the introduction of new bus rapid transit systems, a "Trunk Route System" and a "Guideway Bus System" (both detailed below), thereby attempting to meet growing travel demand in an efficient way as well as revitalize bus transit.

4.6 **"Key Route" Bus System.** A high-capacity bus system operating along heavily traveled routes was originally proposed in 1977 by a study group on comprehensive transport planning, and later put into the city's comprehensive transport planning study report in 1979. The system was to play a major role in the city's transport system similar to the role played by subways and other rail systems, but not as a feeder mode to railways. Key concepts of the system included:

- the use of center lanes as exclusive bus lanes with the bus stops constructed in the median space;
- installation of bus priority signals;
- bus stop spacing substantially longer (800-900 m) than that of ordinary buses, thereby increasing average speed; and
- use of higher capacity (larger) vehicles.

4.7 The candidate routes were selected giving the priority to candidate: (i) routes running along a planned subway line so as to provide temporary substitution; and (ii) routes or an area where mass transit is considered necessary, but no immediate subway construction is envisaged. A total of eight routes were proposed (totaling 81.4 km of route length), and the city's transport bureau began operating the first route (10.5 km) in 1982. This system, however, used side (rather than middle) lanes and did not achieve the expected average speed and on-time performance.

4.8 The use of center lanes for exclusive bus use began in 1985 with the second Key Route Bus System (the 10.2 km Shin-Dekimachi Route) jointly operated by the city and a private bus operator (Meitetsu Bus). This joint operation was necessary because both the city and Meitetsu formerly provided bus services along the route.³ This route was selected as a model case mainly because:

- travel time to the city center along this route was relatively longer since the area was not served by the two existing subway lines, resulting in a relatively high level of expected benefits;
- existing demand was comparatively high, and further increases were expected from ongoing residential development (including land readjustment) along the route; and
- modal shifts from autos, which were used extensively for commuting purposes, could be expected.

4.9 Key features of the system included: (i) high-frequency operation with 1-2 minute peak-hour headways and about 3-minute headways even during the daytime; (ii) exclusive use of the lanes during peak hours (7:00-9:00 and 17:00-19:00 on weekdays) and priority use during off-peak hours; (iii) use of the same commuter passes and coupon tickets for both Municipal Bus and Meitetsu Bus services; and (iv) a flat fare along the route with discounts for transfers to other routes. In order to accommodate the “squeezed” general traffic on the bus route, the municipal government widened and improved the nearby street parallel to the bus route. The total project cost (including the costs incurred by the city, the private operator, the road operator, and the police) was fairly modest at nearly 4.5 billion yen.

4.10 The effect of this system was generally favorable, with the following “immediate” results obtained: (i) an increase in bus ridership along the route (from 20,200 riders per day to 23,500)⁴; (ii) an increase in the average operating speed from 15 km per hour (with the previous conventional bus operation) to 20 km per hour; (iii) modal shifts from other transport modes to bus, although minimal from autos; (iv) a decrease in automobile traffic along the route by about 20 percent with diversions to alternative routes. As expected, however, driver associations and some local residents opposed the system and further expansion.

4.11 In the planning of this new system, interagency coordination was essential because of the various new issues involved, including the installation of bus stops in center of the road, use of exclusive bus lanes, specification of the bus fleet, and the need for new traffic control systems. As a result, a committee was established composed of the representatives of concerned agencies (including the Ministries of Transport and Construction, and the National Police Agency) as well as academics and other experts. A legal study group was set up in the committee to examine various legal issues that would arise from introducing the system (e.g., traffic control and road management issues).

4.12 Of the eight routes proposed, the Key Route Bus System was adopted for the two routes mentioned above, with the rest served by a conventional bus system. In the 1990s, it was decided that one of the remaining six routes would be developed with a “guideway bus system” (described below), and the others by subway lines.

³ The Central Japan Railway Company operated buses along the route, although it did not participate in the Key Route Bus System primarily because its previous operation only partially covered the planned route.

⁴ This figure is that immediately after the system was introduced; ridership increased to 27,000 by 1990.

4.13 Guideway Bus System. The guideway bus system, developed for the first time in Japan in Nagoya, involved buses running on an exclusive busway (guideway) constructed above the median strip of existing roads. The system provides high-speed and high-capacity bus transit services with good on-time performance by separating bus operations from other road traffic in the city center. Outside of the city center, buses run on existing roads, thereby integrating the new system with existing bus routes in suburbs. The use of this “dual” system enables guideway infrastructure development in stages, and extension is possible when warranted by increased demand.

4.14 The system is to be introduced for the Shidami Route, one of the eight routes originally selected for development of the Key Route Bus System. This route extends to Shidami, about 15 km northeast of the city center. In this area, the large-scale Shidami Human Science Town Project—including new industries, educational and research functions, technological innovation activities, and residential development in conjunction with land readjustment projects—is under development. Since a rail-based transit system was found in the planning stages to be barely financially viable for the expected transport demand, the guideway bus system was considered appropriate due to its reduced capital requirements.

4.15 The total route length of the system is 11.3 km, of which 6.8 km is an elevated section on which “guided” operation will occur and the rest the surface road section where buses will be operated manually in addition to using public transport priority systems including priority bus lanes and transit priority traffic signals. At the terminal in the city center, it will be possible to make convenient transfers between and among two rail lines, the subway, and buses.

4.16 The planned total construction cost of the elevated section is 26.6 billion yen. The municipal government is responsible for building the elevated guideway portion using public funds of about 20.4 billion yen. Half of the construction cost will be subsidized by the national government with monies from the special road fund. Investment in other facilities is to be made by a third sector company, Nagoya Guideway Bus, established jointly by the city of Nagoya, the Central Japan Railway Company, Meitetsu, and others (including commercial banks), which is to spend 6.2 billion yen to construct a portion of the station facilities, a user information system, and other facilities necessary for bus operational control. The company will also spend one billion yen to purchase 30 buses. The total paid-in capital will be three billion yen, and the city government is to provide interest-free loans to the company to fill the gap. Bus operation along the route will be undertaken jointly by the city and two private operators (JR Bus and Metitetsu).

4.17 It is estimated that system ridership will total about 36,000 passengers per day in 2008 when traffic demand will stabilize. The average speed on the elevated section is estimated to be about 30 km per hour, which is significantly higher than that of conventional bus transit.⁵

⁵ On the surface road section, the average speed was estimated at about 17 km per hour, substantially lower than that for the elevated section.

C. ISSUES AND LESSONS

4.18 Merits and Demerits of Road-Based Urban Transport System. As exemplified by the case of Nagoya, wide roads in a large metropolis provide a higher level of mobility for automobiles (as well as road-based public transport) and help minimize investment in capital-intensive rail systems. At the same time, with the superior mobility provided by autos, coupled with less extensive provision of mass transit services, the city tends to be developed less densely. This makes mass transit development (particularly rail) less effective or more costly per unit of traffic. Lack of mass rapid transit in turn can increase auto ownership and use, as experienced by many large cities in Western countries. Over the long term, serious road traffic congestion and accompanying environmental problems may develop.

4.19 Bus Rapid Transit as a Low-Cost Solution. The Nagoya case suggests that the investment cost for a guideway bus system is several times lower than that for subway development,⁶ while the average speed is not necessarily lower, particularly on for elevated route sections. The average speed of subways is generally of the order of 35 km per hour, while the estimate for the elevated section of Nagoya's guideway bus system is 30 km per hour. While the infrastructure cost of the Key Route Bus System is substantially less than that of the guideway bus system, its effectiveness is proportionately less. **The elevated structure has been designed so that it can be converted to LRT system, but the city authority expects that the introduction of articulated buses would be implemented first as the demand increase.**

4.20 Interagency Coordination for the Development of Rapid Bus Transit System. One major issue with respect to new bus systems⁷ is the need for intensive interagency coordination among various concerned organizations including local governments, ministries enforcing laws and regulations on urban transport, the Police Agency responsible for traffic control, and private bus operators.

4.21 In the planning of the Key Route Bus System, an interagency committee composed of representatives of concerned agencies (including the Ministries of Transport and Construction, and the National Police Agency) as well as academics and other experts was established. The Committee examined various possible measures (including the installation of bus stops in center of the road, the use of exclusive bus lanes, specification of the bus fleet, and the need for new traffic control systems) and prepared a plan consistent with the existing legal and regulatory framework.⁸ A legal group within the committee examined various legal issues arising from introduction of the system (e.g., traffic control and road management issues). Such coordination is often difficult due partly to a reluctance to deal with issues not conforming to current practice. In the case of Nagoya, however, it appears that interagency coordination was facilitated in part by the city's setting a clearly defined policy to give bus transit a greater role in urban transport.

⁶ According to the available information, the construction cost of the elevated section is about US\$40 million per km, while that for subways (based on the subway construction undertaken relatively recently in Nagoya) is about US\$200-350 million per km.

⁷ These new services are regulated by the Ministry of Transport in the same manner as other bus services; see the first page of the Tokyo case study in this report (Chapter 2) for a description of how bus services are regulated in Japan.

⁸ The committee examined the issues involved with reference to laws and ordinances governing road development, road structures, road traffic control, specifications and safety standards of road vehicles, road signs, and other relevant matters.

4.22 Integrated Land and Transit Development. For guideway bus system development, it is important that government efforts be placed on both development of bus rapid transit and development of land along the route to increase ridership. Though it has not been implemented due to time and other constraints, value capture methods could have been employed to internalize benefits generated from improved accessibility. **The city currently plans along the route, development of a high-tech industrial park and urban development by using “land readjustment.” Upon completion of these development, value capture can be made by the increased tax revenue.**

4.23 Bus Rapid Transit Systems and Road Development. Nagoya’s experience suggests that wider roads are essential for developing an effective bus rapid transit system. The Key Bus Route System adopted by the city of Nagoya required bus lanes to be exclusive during peak hours. The guideway bus system also required a wider roadway to secure space for infrastructure installation as well as to minimize traffic disruption during construction. In the case of a system that uses existing roads (such as the Key Route Bus System), it is desirable to improve and widen alternative routes as done by the city of Nagoya to make room for automobiles that would suffer from the introduction of the system.

4.24 Applicability of the Nagoya Experience to Developing Countries. While the Tokyo model would have to be substantially modified to be applied elsewhere, the Nagoya model may be more easily replicated without substantial alteration in developing countries and perhaps the transitioning countries of the former Soviet Union. In practice, successful similar examples can already be observed in Latin American cities;⁹ also, bus priority lanes are found now in many Asian cities. Necessary conditions for the success of dedicated on-road busways include: (i) availability of a modest amount of funds to construct such busways on existing road space (elevated busways require greater financial resources, preferably from the public sector), (ii) availability of road space to accommodate a dedicated busway, (iii) availability of alternative routes to accommodate diverted general traffic, and (iv) coordination among related agencies, including the police agency and public/private bus operators.

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5

HAMAMATSU: REVITALIZING BUS TRANSIT

A. CITY BACKGROUND

5.1 Hamamatsu, located in Shizuoka Prefecture (between Tokyo and Osaka), is a mid-scale city with a population of about 590,000 as of May 2000. Since the completion of the Tokaido Shinkansen (Bullet Train) passing through the area in 1964, the city has played an increasingly important role as the center of the Hamamatsu Metropolitan Area, which now has a population of about one million; in particular, significant urban development activity has been concentrated in areas near Hamamatsu (Central) Station. The city has developed as an industrial center with textiles, musical instruments, and automotive industries.

5.2 The city's highway network consists of ten radial and six ring roads.¹ The number of registered vehicles totaled about 463,000 in 1998. Railways have been developed radially from the station—JR Tokaido Line runs in an east-west direction, and Enshu Railway runs north-south. The service level of these railways is relatively low (15-20 minute headways during the peak hours), but they carry 20 percent of Hamamatsu's commuting trips. There were 793 buses operating on about 40 routes carrying 43 million passengers in 1998. Although buses have been used extensively for commuting as well as for other purposes, bus ridership has been decreasing due to continued motorization, increasing traffic congestion (leading to poor on-time performance for buses), and a decline in economic activities in the urban core. In addition, automobile traffic accidents have been increasing.

B. MAJOR URBAN TRANSPORT SYSTEM DEVELOPMENTS

5.3 **Overview.** Under the circumstances explained above, the city of Hamamatsu has implemented a series of traffic management and public transport promotion measures over the past two decades. One recent development has been the implementation of an "omnibus town" project supported jointly by the Ministry of Transport, the Ministry of Construction, and the National Police Agency²—this project is intended to solve various problems caused by the increased use of autos through creation of a safe and pleasant bus-oriented urban society.

5.4 **Traffic Management.** The city of Hamamatsu introduced a *Traffic Zone System* in 1985 in order to minimize through traffic and create a pedestrian-friendly environment in the central business district. Elements of the Traffic Zone System include:

- improvement of the pedestrian environment;
- introduction of one-way streets;
- improvement of peripheral streets;

¹ Some of these links are still under construction.

² Five cities have been designated for implementation under this project as of May 2000. The first so designated was the city of Hamamatsu in 1997, with Kanazawa, Matsue, Morioka, and Kamakura designated later.

- strategic location of car parks to maintain access; and
- strategic location of bicycle parks.

5.5 *Bus Priority Signals.* Three types of bus priority signals were installed along the major bus routes. The first type of signal system gives priority to buses by extending green time or shortening red time for the approaching buses. The second type of signal has a special phase for buses that allows them to leave intersections earlier than other traffic. The third type of signal is installed near bus stops and assists departing buses in merging smoothly into general traffic. When general traffic enters bus priority lanes, a detector is activated and displays a warning message to the violating vehicles on a variable electronic signboard. Similar equipment has also been installed near bus stops to prevent illegal parking and standing vehicles.

5.6 *Street Widening and Introduction of Bus Lanes.* Road widening, improvement of intersections, and grade separation at rail crossings have reduced traffic congestion and improved the on-time performance of buses. Hamamatsu has also introduced and extended exclusive and priority bus lanes with the installation of new traffic control systems; these measures are often referred to as “public transport priority systems” or PTPS.

5.7 **Omnibus Town Project.** The bus system in the project area is operated by a private company, Enshu Tetsudo³ (Enshu Railway: abbreviated Entetsu), which also operates a suburban railway radiating from Hamamatsu Station as well as undertaking real estate operations. The omnibus town project has been implemented with cooperation among Entetsu, the city, and other agencies concerned. The project, mainly comprising improvements to the bus system, includes the following components:⁴

- user-friendly buses;
- bus route reorganization;
- improved bus stops with shelters and bicycle parks;
- improved user information system; and
- fare reduction.

Each is described below.

5.8 *User-Friendly Buses.* Hamamatsu is introducing a low-floor, non-step bus fleet to facilitate travel by the elderly and handicapped. These buses are not only user but also environmentally friendly. In order to reduce harmful exhaust, the bus engine automatically stops when idling longer than one minute. It is reported that total NOx emissions from this type of bus be 10 percent lower than those from ordinary buses. By the end of 2001, the total fleet of this type of bus will be 85, at a total purchase cost of 1.97 billion yen. About half of this cost is to be subsidized by a combination of the national, prefectural, and city governments.

5.9 *Bus Route Reorganization.* Bus routes have been reorganized, primarily by increasing routes that directly connect areas where a large number of trips are generated and attracted.

³ The company is part of the Entetsu Group, which is diversified into various enterprises including retailing, tourism development, travel agencies, hotel management, taxi, and insurance operations.

⁴ The total cost of 2.5 billion yen is to be spent by public (48% of the total cost) and private (52%) sectors between 1997 and 2001.

Before this system was introduced, transfers with additional fares were often required at the central terminal (located at Hamamatsu Station) where most of the routes were consolidated. Various kinds of demand-responsive services have also been introduced, including: (i) direct transport services from residential areas to high schools (morning only); (ii) transport services for commuting on a contract basis; and (iii) provision of additional buses in case of rain.

5.10 Improved Bus Stops with Bicycle Parks. This program has provided bus stops with a bus location system, protection against the wind, as well as bicycle parking lots to promote “cycle and bus ride.”

5.11 User Information System. The user-friendly buses are equipped with a video monitor panel with which a variety of information is provided to bus users including news, information from the local government, as well as the name of bus stops and fares. These information panels are also available at the sheltered bus stops, on which the location of buses for which passengers are waiting is displayed.

5.12 Fare Reduction. Fare reduction has been achieved through a reduction in the base fare, an increase in the discount rate for season tickets, and the setting of a fare ceiling for long-distance rides.

5.13 Impact of Omnibus Town Project. The Omnibus Town Project has generally been successful, as indicated by the following findings of an impact assessment prepared by the Hamamatsu city government:

- Year-on-year bus ridership has increased by 10% along routes on which 100% of the bus fleet has been modernized.
- Progress has been made towards providing a public transport system for the disadvantaged; for example, wheelchair riders are now regular bus users and may purchase a special discount season ticket.
- A questionnaire survey found that bus users are generally satisfied with the new bus fleet and improved bus stops with shelters and bicycle parks.⁵
- Bus running speeds have improved particularly on routes where bus priority measures have been introduced.
- In sections where bus fares have been reduced by one third from 150 yen to 100 yen, ridership has increased by about half. A 10% increase in passengers has been observed in sections where the fare for the new buses remained at 150 yen.

5.14 Transit Mall Experiment. As a public transport promotion measure and an effort to revitalize the city center, a 270 m transit mall was implemented on an experimental basis for two weeks in March 1999 in downtown Hamamatsu. The municipality spent 14 months to prepare the experiment, by consulting shop owners, bus operators, taxi companies, car park owners, and others. The traffic police were involved from the beginning of the project. During the experimental period, more road space in the city center was made open to pedestrians

⁵ The bicycle parks are fully utilized. The municipal government would like to construct more bicycle parks adjacent to bus stops but is facing difficulty in securing land.

through a reduction in the number of traffic lanes in order to provide much wider sidewalk space with the remaining lanes used exclusively for buses.⁶

5.15 Other relevant measures implemented at the same time included:

- various traffic control measures along and in the vicinity of the mall section;
- securing of car parking spaces in the area;
- provision of rent-free power-assisted bicycles around the mall section; and
- introduction of bus priority signal setting.

5.16 Despite careful preparation and effort, the experiment was not a complete success. A questionnaire survey conducted by the municipality found that the majority of those who appreciated the scheme were visitors although not necessarily residents or shop owners, some of whom complained that traffic congestion was particularly serious in the mall area. On balance, however, the experiment was considered worthwhile and the municipality considers the experiment an important step towards the permanent introduction of a similar system in the future.

C. ISSUES AND LESSONS

5.17 **Important Role of Buses in a Medium-Size City.** Hamamatsu, with a population of about 590,000, cannot support extensive urban rail systems; however, buses can play an important role in the urban passenger transport system of such a medium-size city. Indeed, the promotion of bus use is required to prevent increased traffic congestion and accidents, tendencies generally observed in cities where the use of private cars is increasing.

5.18 **Coordination of the Public and Private Sector To Promote Bus Services.** Entetsu, a private bus operator, operates about 800 buses on about 40 routes in Hamamatsu; it carried over 43 million passengers in 1998, but ridership has decreased substantially since 1994, when Entetsu carried 52 million passengers. The Omnibus Town Project aimed at improving bus services has been made possible through coordination among the national, prefectural, and municipal governments. Joint subsidies by the public sector have been provided for a number of bus improvement measures including: (i) fleet modernization to increase user convenience and comfort; (ii) improvement in user information systems; (iii) construction of bus stops with shelters and information panels; and (iv) provision of bicycle-bus-ride facilities.

5.19 **Necessity of Associated Street Improvements for Introducing Transit Malls.** After careful preparation, the city of Hamamatsu implemented a two-week transit mall experiment along a 270 m downtown section. Although visitors generally appreciated the mall experiment, many residents and shop owners in the mall area were not satisfied. Increased traffic congestion in the area, and a less-than-expected number of visitors were main reasons for their complaints. In future projects of this sort, associated street improvements may have to be made prior to implementation, and the experiment may have to be implemented for a period of longer than two weeks.

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6

BANGKOK: SLOW PROGRESS IN CONSTRUCTING RAIL MASS TRANSIT

A. CITY BACKGROUND

6.1 The Bangkok Metropolitan Area (BMA), the capital city of the Kingdom of Thailand, accommodates a population of about 6 million and about 10 million residents within the Bangkok Metropolitan Region (BMR) combining the BMA and the five nearby provinces. The BMA produces about 40% of the country's GDP with about 10% of the total population of the Kingdom.

6.2 Bangkok's growth over the past decades has generally reflected a relentless process of accelerating urbanization. With rapid economic growth over the two decades up until 1997 and accompanying motorization, Bangkok has long suffered extreme road traffic congestion. One estimate indicates that the vehicle speed during peak hours averages only about 8 km per hour. Daily transport demand in the BMA (in 1995) has been estimated at about 16 million person trips (intra-BMA trips) and 21 million for the BMR.¹

6.3 The traffic in Bangkok (intra-BMA trips) has been largely dependent on public transport, which carries 42% of all trips (and historically these have all been on road-based modes). With rapid motorization, autos have been increasingly used, accounting for 27% of the trips, followed by motorcycles (18%), with the rest by walking. In December 1999, the first urban rail transit system began operation after nearly two decades of rail planning in Bangkok; it will soon be followed by other transit systems including subways currently under construction.

6.4 Environmental quality in Bangkok has been especially bad, to a large extent because of the traffic problem. Key indicators of the problem are: (i) high dust concentrations, both in the forms of total suspended particulates (TSP) and particulate matter smaller than 10 microns (PM₁₀), which result in 9-51 million restricted activity days per year and 300-1,400 deaths;² (ii) high noise levels, with 24-hour equivalent noise levels (L_{eq}) in the range of 64-84 decibels on the main arterial roads;³ and (iii) high levels of road traffic accidents (e.g., over 1,500 in 1996, although the level varies considerably by year). Levels of carbon dioxide and nitrogen oxides are also high by international standards, although these are reported to be within the applicable standards. The environment is also poor in qualitative terms, as indicated by the general ugliness of the traffic scene and the little segregation of traffic and people (with, e.g., the driving of motorcycles on footpaths). While the economic downturn of the late 1990s

¹ The numbers of trips and modal share data were taken from Pacific Consultants International, and Suuri-Keikaku Co. Ltd., *The Study on Urban Environmental Improvement Program in Bangkok Metropolitan Area*, prepared for Japan International Cooperation Agency and Bangkok Metropolitan Administration (BMA) of the Government of the Kingdom of Thailand, Volume 2, Chapter 5, February 1997.

² Major generators of particulate matter in Bangkok include light diesel trucks (38%), heavy diesel trucks (24%), motorcycles (22 percent), and diesel buses (11%).

³ Major noise generators are motorcycles, tuk-tuks, and poorly maintained diesel vehicles.

provided some relief from Bangkok's environmental problems by reducing traffic and increasing average vehicle speeds, as have government actions (e.g., strengthening of roadside inspection of vehicle emissions), this relief is likely to be reversed with full economic recovery.⁴

B. MAJOR URBAN TRANSPORT SYSTEM DEVELOPMENTS

6.5 **Overview.** Bangkok's transport system, once dominated by canals, has been relying on a poorly planned road network. Roads are significantly undersupplied relative to the city's size and density, with the system particularly lacking in well developed distributors and collectors, forcing most of the traffic to pass major arteries that are still insufficient. Existing access roads or *sois* are generally unplanned and narrow with poor connections to the road hierarchy. With these road conditions, Bangkok has established a worldwide reputation for congestion.⁵

6.6 As streetcars that formerly served much of the traffic were disappearing by 1960, buses became dominant on a limited number of arteries while several kinds of paratransit and non-motorized vehicles also emerged to serve other major as well as smaller roads.

6.7 Major government efforts to improve Bangkok's public transport services began in 1959 with planning to merge a number of existing bus companies into a single enterprise. However, due to lengthy coordination, it was only in the mid-1970s that the attempt materialized, creating a state-owned bus operator. Following this development, various measures were taken to provide improved bus services, including exclusive bus lanes, reverse lanes, differentiated bus services (e.g., air-conditioned, express buses with higher fares), and the granting of franchises to private companies to operate minibuses. These measures generated positive results, but became increasingly ineffective with worsening traffic congestion. BMTA chronically incurred losses, putting a severe burden on government finances. In addition, the use of an old fleet as well as a lack of adequate maintenance caused serious air pollution. Meanwhile, the use of motorcycles grew rapidly in the 1980s as an informal public transport mode to fill the gap in Bangkok's public transport system. Initially, they mostly served feeder road (*soi*) traffic, but later provided service on major roads as well, creating serious safety concerns. The low quality of bus services that resulted from a lack of

⁴ See, e.g., The World Bank, Transport Sector Unit, East Asia and Pacific Region, Thailand, *Bangkok Urban Transport: Options for Sustaining Mobility*, pp. 10-11, June 10, 1999 [Draft]; Pacific Consultants International, and Suuri-Keikaku Co. Ltd., *The Study on Urban Environmental Improvement Program in Bangkok Metropolitan Area*, prepared for Japan International Cooperation Agency and Bangkok Metropolitan Administration (BMA) of the Government of the Kingdom of Thailand, Volume 3 Chapters 3 and 10, February 1997; and Halcrow Fox and Associates, Pak Poy & Kneebone Pty Ltd, and Asian Engineering Consultants Corp., Ltd., *SPURT—Seventh Plan Urban and Regional Transport, Final Report*, funded by the United Nations Development Programme and executed by the World Bank, March 1991, Chapter 14.

⁵ Since the late 1980s, endeavors have been made to build privately funded urban expressways in Bangkok, including the Second Stage Expressway (SES), an elevated toll highway linking with the First Stage Expressway to form a loop road around the central city, and the Don Muang Tollway that links central Bangkok and the (current) Bangkok International Airport, and will ultimately connect the airport to the SES. For detailed information on toll road development in Bangkok, see PADECO Co. Ltd., at al., *Asian Toll Road Development Program: Review of Recent Toll Road Experience in Selected Countries and Preliminary Tool Kit for Toll Road Development, Final Report*, prepared for the World Bank and the Ministry of Construction of Japan, July 1999.

adequate policies coupled with increased household incomes encouraged a shift toward the use of automobiles.

6.8 In the mid-1970s, a transport plan for the Bangkok metropolitan region recommended developing urban rail systems in the city. Subsequently, an attempt was made in the 1980s to build rail systems with the use of private funds, but resulted in failure. In the late 1980s, two elevated rail projects were proposed by private concerns and proceeded toward implementation. One of them, however, was stalled due to various problems, while the other eventually led to the opening of the first urban rail system in Thailand. Meanwhile, subway systems were planned and their construction is currently underway, expected to add to the Bangkok's public transport systems in the near future.

6.9 **Urban Development in Bangkok.** The development pattern in Greater Bangkok is largely characterized by road-oriented dispersal of population and commercial activities. An absolute lack of road space even in the core area has caused extreme congestion, which tends to promote a flight of development forces toward outer areas, leaving a large volume of unused or low-density land in the central area. Development activities have taken place largely along arterial roads, forcing dependency on road traffic. Suburban development has been disorderly, sprawling toward the east, north, and south, while the western part of Bangkok has long been slow to develop due to severance by Chao Phraya River as well as squatter settlements. However, with the construction of additional bridges, urbanization has accelerated in the west as well.

6.10 Bangkok's urban sprawl and lack of sufficient road space are partly due to a lack of effective urban planning. Bangkok's city planning began with the Greater Bangkok Plan 1990, prepared by United States consultants in 1960, the first attempt to provide land use plans for the metropolitan area, followed by the Greater Bangkok Plan 2000, prepared by the city of Bangkok, although these plans were not considered "official," and effective actions were not taken to implement them. It was not until 1992 that the Government issued the first statutory land use plan, the Bangkok Metropolitan General Plan. However, the plan has been generally ineffective as indicated by: (i) a lack of coordination between transport infrastructure development and land use; (ii) extensive subdivision of rural and agricultural land for residential development; (iii) commercial development in medium to high density residential areas; (iv) continued "ribbon-like" commercial development along major arteries; and (v) high-density development as well as industrial development in low-density residential areas.⁶

6.11 The lack of development controls is considered partly responsible for these development patterns. Zoning regulations permit a fair extent of mixed land use. Allowable density is also very generous, with a floor-to-area ratio (FAR) of 1,000% permitted across the country; prior to 1992, there was no limit on FAR. The accompanying access requirements tend to encourage construction along wide roads, thereby promoting arterial-oriented development toward outer areas. Moreover, building codes relate more to the suitability of a building for its purpose than for its location and land use. At the same time, large tracts of land remain undeveloped between and behind the arterials; this use of land is inefficient as well as highly uneconomic in the use of transport, since it needlessly generates large volumes

⁶ The 1992 Bangkok Metropolitan General Plan lacks authority because it is not linked to short-term, fiscally constrained plans and programs. The World Bank, Transport Sector Unit, East Asia and Pacific Region, Thailand, *Bangkok Urban Transport: Options for Sustaining Mobility*, June 10, 1999, p. 16 [Draft].

of traffic and simultaneously obstructs the arterials, which in turn produces deplorable living and working conditions along these roads.⁷ As in the case of Manila, such a “pro-development” regulatory environment is considered among one of the major factors contributing to Bangkok’s extensive urban sprawl.

6.12 Urban Poor in Bangkok’s Development. In the 1950s a large number of poor people immigrated to Bangkok from rural areas and established slum or squatter areas on vacant land in the city. During the 1960s, old wooden detached houses that had been purpose built in the suburbs and inhabited by the rich were gradually replaced by low-income people, with overcrowding and environmental decline resulting from the proximity of these dwellings to factories, urban facilities, and trunk roads. High-grade accommodation deteriorated as the new residents could not afford to maintain the housing. In addition, low-income persons built their own houses or hired carpenters to build them on vacant or leased land. Meanwhile, developers sought to create dense housing areas avoiding governmental control by incrementally building estates.

6.13 Typically the more wealthy moved to developments that were car-dependent and therefore “protected” from the poor. In the inner city areas, townhouse or condominium developments also gained popularity with high-income households. Many or most lower-income households in Bangkok live relatively close to their workplaces,⁸ with transport not a major constraint. Furthermore, the abundance of shophouses along trunk roads combining work with accommodation has helped to limit the need to travel and may in part account for the high proportion of the city’s lower-income workers who are self-employed or employed within the service sector.

6.14 The dense building of low-grade housing along trunk roads and the parallel downshift of resident status in such locations in Bangkok has been witnessed in many other cities. In this respect, the environmental problems of housing inhabited by the poor are of clear concern while observable problems of inadequate accessibility are less clear.

6.15 Road-Based Public Transport. In 1975, a total of 24 franchised bus companies (two of which were public enterprises) were amalgamated into one parastatal company, called the Metropolitan Transport Company (MTC).⁹ Due to a huge loss incurred in the first year of its operation, MTC was taken over by the state-owned Bangkok Mass Transit Authority (BMTA) created by Royal Decree on October 1, 1976.

6.16 Recognizing the importance of tackling Bangkok’s extreme congestion problem, the Government took various measures to improve bus services. Exclusive bus lanes, first

⁷ See, e.g., Halcrow Fox and Associates, Pak Poy & Kneebone Pty Ltd, and Asian Engineering Consultants Corp., Ltd., *SPURT—Seventh Plan Urban and Regional Transport, Final Report*, funded by the United Nations Development Programme and executed by the World Bank, p. 3-12, March 1991.

⁸ See Tsukasa Iwata and Sadao Watanabe, “Study of the Urbanization Process in the Urban Fringe of Bangkok through the Analysis of Housing Typology,” Figure 24 (Workplace Distance), p.55 and p. 40, paper published in Department of Engineering, Faculty of Engineering, University of Tokyo, *Survey on the Local Housing System of Non-Planned Human Settlements in the Rapid Growth Urban Sprawl Area*, July 1987.

⁹ A number of the least profitable previous operators exited the industry. See Dorsch Consult, Louis Berger International, Epsilon, TESCO, MVA Asia, and Sofretu, *A Review of the Public Transport Organization and Operation in the BMR*, Working Paper 2.3, prepared for the Office of the Commission for the Management of Road Traffic, February 1996, p. 6.

employed on an experimental basis in 1982, were later extended substantially. Reverse lanes were also introduced to deal with peak-hour traffic more effectively. These decisive measures proved very effective, resulting in a considerable increase in average bus speeds and a reduction in travel times of 38%.¹⁰ This induced modal shifts from autos, although the effectiveness faded with worsening traffic congestion. In 1990, BMTA moved to meet growing travel demand by granting franchises to private companies to operate buses; the BMTA could not meet this demand itself given its high costs. These private companies have operated more cheaply than BMTA (e.g., because they use second-hand buses purchased from BMTA, have lower maintenance standards, and lower overhead costs), although it has been suggested that the operation of old buses by these operators has adversely affected air quality and passenger comfort.¹¹

6.17 The BMTA system is among the world's largest with a fleet of about 5,000 buses operated over about 4,000 km of route length generally with very high load factors, but it has chronically incurred losses for several reasons, including low fare levels, inefficient operation, overstaffing, and high bus purchase prices when BMTA initially took over the parastatal bus operator. The debt-ridden bus services have become a major issue in Bangkok's public transport system, and the Bangkok Metropolitan Administration (BMA) may take over BMTA now that the Ministry of Finance has reportedly agreed to take the BMTA's debt onto the state account.¹² However, the transfer of BMTA to BMA may have little or no impact unless some other action is taken to change the organization and efficiency of service supply.¹³

6.18 **Planning of Urban Rail Mass Transit Systems.** Bangkok's railway system had long been limited to services operated by the State Railway of Thailand (SRT), with routes radiating from the central station mainly serving intercity transportation, not adequate for urban transport. Meanwhile, road traffic congestion reached a serious state by the 1970s, pushing the Thai Government to take remedial actions. A transport plan for the Bangkok metropolitan region prepared in 1975¹⁴ included, among other elements, the development of a rail mass transit system, based on which the Expressway and Rapid Transit Authority of Thailand (generally abbreviated in English as ETA) under the Ministry of Interior prepared a plan in 1980 to build elevated rail systems. This project was to be undertaken with private funding under the supervision of ETA. However, the project did not materialize due to the failure of contract negotiations with an international consortium led by a Canadian company, the winning bidder.

¹⁰ The World Bank, *Urban Transport: A World Bank Policy Study*, 1986. P.16, Box 5.

¹¹ See source in previous footnote, p. 16.

¹² E.g., "Takeover of Debt-Ridden Bus Service," *The Nation*, January 29, 2000; and "Council to Take Decision on BMTA," *The Nation*, April 11, 2000.

¹³ It has been argued that the privatization of BMTA is necessary, because its escalating debt is an unsustainably large burden on the government budget and because the maintenance of a deficit-financed public sector inhibits the development of a competitive private supply. Alternative structures for privatizing BMTA include: (i) separating the operations and assets into a few independent units, each to be sold by competitive tender; (ii) transferring the assets and operations to existing management and employees, either as one unit or as a few smaller, more manageable units; or (iii) dissolving the company and selling assets by auction to private bidders. The World Bank, Transport Sector Unit, East Asia and Pacific Region, Thailand, *Bangkok Urban Transport: Options for Sustaining Mobility*, June 10, 1999, pp. 38-41 [Draft].

¹⁴ Ministry of Interior, *Bangkok Transport Plan*, 1975. This plan was prepared with technical assistance from the (West) German Government.

6.19 Despite this experience, the Thai Government continued to pursue its policy of using private funds to build and operate urban rail systems in Bangkok. Two elevated rail projects were proposed by private concerns in the late 1980s (the Hopewell and Tanayong projects, described below), which were later approved by the Government although they were not in line with the previous plan.¹⁵ Construction on these projects finally began in 1990s, about 20 years after the 1975 plan.

6.20 The main reasons for such slow progress include: (i) ETA, the executing agency responsible for building both expressways and urban railways, put more emphasis on expressway network development; and (ii) coordination among the government agencies concerned and private stakeholders, which is crucial for developing urban rail in built-up areas, did not succeed given the existing political and administrative systems.

6.21 In order to streamline the project plans that were not mutually integrated, the Thai Government undertook a study in 1992, called the Bangkok Advice on Rationalization of Rapid Transit Systems (BARRTS), thereby attempting to rearrange responsibilities for urban transport planning that overlapped across agencies and promote effective urban rail network development. As a result, the Cabinet approved the Initial System Project (ISP) in 1994, composed of a government-led subway network and the two private-led elevated rail projects (the Hopewell and Tanayong projects). BARRTS also proposed separating responsibility for rail development from ETA, which led to the establishment of the Metropolitan Rapid Transit Authority (MRTA) in August 1992, a state-owned corporation under the Office of the Prime Minister, as a government body to undertake urban rail development.¹⁶ The plan (based on BARRTS) approved in 1994 by the Office of the Commission for the Management of Road Traffic (OCMRT)¹⁷ under the Office of the Prime Minister included future extension as well as the ISP, totaling 238 km of route length, and was considered a master plan for Bangkok's urban rail development.

6.22 **Hopewell/Bangkok Elevated Road and Train System (BERTS) Project.** In 1990, the State Railway of Thailand (SRT) and the Ministry of Transport and Communications (MOTC) granted a Thai subsidiary of Hopewell Holdings, a Hong Kong private developer, a 30-year concession to build and operate the Bangkok Elevated Road and Track System (BERTS). The proposed 60-km “triple deck” facility was to follow existing SRT rights-of-way to the north and east of central Bangkok (and ultimately to the west and south as well). A toll roadway was to be built on the top level of the facility, a privately operated express commuter railway and new tracks for SRT were to occupy the middle level, and space for commercial establishments was to be made available at ground level. The concession contract included the right to develop vast tracts of land held by SRT, enabling Hopewell to recoup its investment cost through real estate development as well as rail operations.

¹⁵ The eventual network is at least arguably likely to be less efficient due to the reliance on opportunistic private financing arrangements.

¹⁶ Even after the establishment of MRTA, ETA is still legally empowered to undertake urban rail development.

¹⁷ This was later changed to the Office of the Commission for the Management of Land Traffic (OCMLT) due to the inclusion of responsibility for rail transport. OCMLT is responsible for overseeing the integration of various mass transit systems in the Bangkok area.

6.23 Hopewell was to contribute US\$500 million in equity to the project.¹⁸ The planned construction period was eight years, but after many delays and much acrimony between Hopewell and SRT, only 12% of the project was completed by the time construction was suspended in January 1998.¹⁹ Hopewell has pointed to: (i) delays in the approval of the construction design; (ii) delays in the handing over of construction sites and in addressing physical interface coordination issues with other mass transit projects; (iii) environmental issues; (iv) personnel changes in MOTC; and (v) frequent threats by Thai officials to terminate the project, which eventually discouraged the firm's creditors and undermined Hopewell's efforts to secure full project financing.²⁰ In response, the Thai Government has questioned whether Hopewell tried to meet the agreed schedule, considering, e.g., that (i) Hopewell did not submit a clear project implementation schedule until three years into the project; (ii) Hopewell did not commence the design work within an appropriate time, and the first designs submitted were not in accordance with agreed specifications; (iii) Hopewell did not provide equipment, accessories, and systems pertaining to the construction within an appropriate time; and (iv) Hopewell did not propose a detailed financial plan to convince the Government that it had sufficient capital to complete the project in accordance with the agreement. The Thai Government has also noted that Hopewell may have lacked commitment to complete construction, especially in recent years, due to the depreciation of the baht, which led to increased construction costs, and the decline in property prices, which would have led to less than expected revenues from associated real estate development. Accordingly, MOTC terminated the concession agreement in January 1998.²¹

6.24 In October 1998, the Thai Cabinet ordered MOTC to cancel the toll roads component of the BERTS project and to proceed with the urban rail component. As of 1999, a few investment consortia expressed interest in reviving the stalled project, although their prospects are unclear.

6.25 **Tanayong/BMA Elevated Rail System Project.** On December 5, 1999, the first urban rail transit system began operations in Bangkok. This system, known as the Tanayong project or Skytrain, runs along two heavily traveled routes extending from the city center, one to the north and the east and the other to the south, totaling 23.5 km of route length. The Bangkok Metropolitan Administration (BMA) granted a concession to Bangkok Mass Transit System Co. Ltd. (BTSC), a subsidiary of Tanayong Group, to build the system and operate it for 30 years before transferring it to BMA. The system was originally proposed as a light rail network²² but is now a heavier system, elevated 12 meters above street level with 23 stations.

¹⁸ No land acquisition costs were to be incurred due to receipt of the land from SRT.

¹⁹ A formal notice of termination was provided in a letter from MOTC/SRT to Hopewell dated January 27, 1998 and further explained in a letter dated February 25, 1998.

²⁰ As reported in the *Bangkok Post* throughout 1994-98, and documents in Hopewell (Thailand) Ltd.'s own 1998 publication, *The Thailand Experience 1990-1998*.

²¹ SRT presents the Government position in *Justification for the Termination of Concession Contract for the Bangkok Elevate [sic] Train and Road System and Benefits for Usage of SRT's Land*, posted at <http://www.srt.motc.go.th/httpEng/projectOfHopewellEng.html>.

²² A question may be raised why a light rail project was preferred originally while the huge transport needs of Bangkok would seem to have justified a heavier system. Perhaps affordability was a concern pushing the authorities to select what was arguably not the optimal solution. See, e.g., Professor Hitoshi Ieda, *Mass Rapid Transit: Why Neither in Bangkok Nor in Manila*, in *A Symposium on Asian Urban Transportation ... Bangkok Perspective*, 27-28 July 1994, p. 130 ["It is considerably required to introduce the system having a suitable and enough transport capacity for the future, once it is decided to construct something. We should not be tricked by

6.26 The total project cost of nearly US\$2 billion was funded through a combination of equity, local commercial loans, and foreign loans from the International Finance Corporation (IFC) of the World Bank Group and from an international bank syndicate led by Kreditanstalt für Wiederaufbau (KfW), a German government financing institution. The investment and operating costs are to be recouped from fare revenues.²³

6.27 As of February 2000, the Skytrain had attracted far fewer passengers than anticipated,²⁴ putting pressure on debt payments, which caused a delay in the initial public offering of BTSC due to a new listing regulation of the Thai stock exchange stipulating that applicants must operate commercially. The lower-than-anticipated ridership can be attributed mainly to the high fares in relation to that of buses on parallel routes;²⁵ bus fares are about a third the level of rail fares (which have set at current levels with the aim of providing sufficient income for investors) and crowded buses can often be observed while overhead trains are virtually empty. The daily patronage pattern of Skytrain has been unusual in that morning patronage is low with only seated passengers observed during the morning peak; ridership increases from midday and remains at a steady level before falling at mid evening. In December 1999, the total ridership for the month amounted to 4.63m with a weekday average of 156,000. In March 2000, the total was 4.48m at a weekday average of 151,500.

6.28 In February 2000, the Thai Cabinet approved three extensions that will add 20 km to the existing system, with BTSC expected to receive the right to negotiate first with BMA on the extensions.²⁶ Meanwhile, the government was studying (as of March 2000) the feasibility of linking BTSC's system with the suspended Hopewell/BERTS project, both having the same rail width, expecting to provide improved services if the stalled project is restarted.

6.29 **MRTA Initial System Project (Blue Line).** This initial system project undertaken by the Metropolitan Rapid Transit Administration (MRTA) includes two interlinked sections (both called the Blue Line), one running east-west in the southern part of central Bangkok, and the other going from south to north and then proceeding westward, totaling 20 km of route length with 18 stations. Originally, the system was to be elevated, but was changed to underground due to its passing the city center. The total construction cost (infrastructure portion) is about 390 billion yen, of which 250 billion yen is to be funded by the Thai Government (e.g., through the issuance of government-guaranteed bonds), with the rest to be financed with soft loans from the Japan Bank for International Cooperation.²⁷

the short demand expected in the early stage. Marginal increase of construction cost due to the raise of the transport capacity of the system is not so much...."]

²³ The debt to equity ratio is about 6 to 4.

²⁴ As of February 2000, the number of daily users was only 150,000 on weekdays and nearly 200,000 on weekends while the operator needs 600,000 riders per day (or daily revenue of 20 million baht to break even in the 15th year of its 30-year concession. BTSC earned about 5 million baht a day from 150,000 riders, but spent 8 million baht a day. (Source: "Skytrain Discounts Begin this Week," *The Nation*, February 2, 2000; and "Skytrain Operator Will Proceed with IPO in Second Quarter" and "Skytrain Vision On Track Despite Slow Start, says BTSC," *The Nation*, February 3, 2000.)

²⁵ An exodus of population from Bangkok and employment levels lagging forecasts by as much as 10 years in the wake of the economic crisis commencing in 1997 have also been factors.

²⁶ Based on "Cabinet Approves Extending Skytrain," *The Nation*, March 1, 2000.

²⁷ Japan Bank for International Cooperation was created in October 1999 as a result of a merger between the Overseas Economic Cooperation Fund of Japan and the Export-Import Bank of Japan.

6.30 An important feature of the project is the separation between ownership and operation of the system. Currently, construction is under the supervision of MRTA, which is responsible for building infrastructure including tunnels, track, depots, and stations. Rail operation is to be undertaken by the private sector under a 25-year concession contract that includes procurement of rolling stock and other related equipment in addition to the operation and maintenance of the system. The initial investment is to be recouped out of fare revenues.

6.31 In 1995, the Thai Cabinet approved the Blue Line extension toward the northwest and southwest to be undertaken with the same scheme as the initial system project; it remains to be seen if and when the extension will be built. The northwest extension is estimated to cost about 64 billion yen and the southwest extension about 136 billion yen. There are also plans to build other MRTA subway lines (e.g., Orange and Purple Lines).

C. ISSUES AND LESSONS

6.32 **Overlapping Responsibilities among Public Agencies.** A central issue emerging from the Thai experience is the problem of redundancies and overlapping responsibilities among the various agencies responsible for urban rail transit development. This problem was among the major causes for slow progress in urban rail development in Thailand. The three mass rapid transit projects implemented in the 1990s are under control of different agencies, i.e., MOTC and SRT for Hopewell/BERTS project, BMA for the Tanayong project, and MRTA for subway development. In addition, ETA still can undertake rail mass transit projects although it has historically put more emphasis on expressway development, another cause for delays in urban rail development.²⁸ The elevated rail project that was planned and eventually failed in 1980s was under the responsibility of ETA. In addition to the slow progress of rail development, these overlapping responsibilities tended to result in a lack of (i) consideration of network development and (ii) coordination between and among different systems.

6.33 One attempt to address some of these issues came in the form of the Royal Act on Private Partnership in State Affairs (1992), which applies to transport as well as other sectors. This legislation intended to establish a uniform procedure within the Thai Government for the concession or grant of rights to private sector or public-private entities. Prior to this law, the review authority for such decisions was defined as a single person or agency, and ultimately the relevant minister. The previous arrangement did not define review criteria, methods of compliance and concession enforcement, nor the rule of Government ministries aside from the one directly involved in initiating the project. While an improvement over the previous conditions (under which troubled projects such as Hopewell's BERTS were originally proposed), the 1992 Private Participation Act is predominantly concerned with assuring that the interests of various ministries and agencies are represented when private sector projects are implemented.²⁹ The needs of the private sector for successful project implementation, particularly with respect to required inputs and prompt and decisive action from the public

²⁸ At least 27 agencies have responsibilities related to urban transport. The World Bank, Transport Sector Unit, East Asia and Pacific Region, Thailand, *Bangkok Urban Transport: Options for Sustaining Mobility*, June 10, 1999, p. 12 [Draft].

²⁹ Such ministries and agencies include the Ministry of Finance, Judicial Council, Supreme Prosecutor's Office, Office of the National Economic and Social Development Board, and Budget Bureau.

agencies, are not addressed in the Act. One consequence of this oversight has been continuing problems with delays in project implementation—not only in the urban rail sector, but also with private sector road, water, and power proposals.

6.34 Another attempt to address this issue has been the adding of responsibility for rail transport to the Commission for the Management of Land Transport (CMLT) and its supporting office OCMLT, which is now responsible for overseeing the integration of various mass transit systems in the Bangkok area including road- and rail-based public transport. However, OCMLT's effectiveness has been severely limited by institutional constraints, particularly the lack of a relationship between planning and financial coordination; since the coordination of plans through OCMLT is not associated with any parallel budgetary process, there is no effective fiscal constraint on the activities of implementing agencies.³⁰

6.35 **Need for Better Project Preparation.** Another important issue closely related to the overlapping responsibilities among public agencies responsible for urban rail development is the ineffective system of project preparation. Public policies have generally been reactive and sometimes even preemptive. This was clearly illustrated in the case of the Hopewell/BERTS project, which was approved without adequate advance master planning or other analysis to ensure that the project would be in the public interest, take account of all costs, and be effectively integrated into the transport network. Ultimately, implementation delays killed investor confidence in BERTS.

6.36 The quick (and superficial) planning process meant that project implementation started right away, but ended up taking too long, financing was never fully secured, and the whole endeavor was ultimately unsuccessful. Perhaps, a more deliberate (but detailed) planning and preparation process may have taken longer, but ultimately would have led to a more rapid and successful financing and implementation stage. In general, consequences of inadequate project preparation have included: (i) parallel, competing projects; (ii) few bids, resulting in little competition; (iii) poorly structured concession agreements, neither based on sound risk allocation principles nor on an underlying detailed financial analysis; and (iv) diminished confidence in the private sector about the Government's willingness to follow through on signed concession agreements.

6.37 **Integrated Mass Transit and Land Development and Use of Existing Rail Assets.** The BERTS project, although long stalled, incorporated two important strategies as ways to improve the financial viability of urban rail projects. First, the proposed "triple deck" facility was to follow the existing SRT right-of-way, thereby saving costs and the time required for land acquisition. Second, in addition to a tollway and rail tracks, the facility was to provide space for commercial establishments at ground level, allowing for the generation of revenues from real estate.

6.38 **Insufficient Road Development.** Bangkok's transport system relies on a poorly planned road network, which is in great part responsible for the city's notorious traffic congestion. Roads are significantly undersupplied relative to Bangkok's city size and

³⁰ The World Bank, Transport Sector Unit, East Asia and Pacific Region, Thailand, *Bangkok Urban Transport: Options for Sustaining Mobility*, June 10, 1999, p. 13 [Draft].

density,³¹ and they are particularly lacking in well-developed distributors and collectors, forcing most of the traffic to pass major arteries that are also insufficient.³² Existing access roads or *sois* are generally unplanned and narrow with poor connections to the road hierarchy.

6.39 In addition to a lack of sufficient road development, the poor state of access roads is partly due to a lack of controls over private developers, who have little incentive to plan efficient street systems.

6.40 **Lack of Land Use Planning and Development Controls.** Effective land use planning at an early stage will reduce the possibility of project delays due to difficult land acquisition. The first land use planning exercise for Greater Bangkok came in 1960, followed by revisions, but with little effort made to take actions to implement the plans. It was not until 1992 that the Government issued the first statutory land use plan. The lack of effective land use planning was partly responsible for the insufficient pace of road development, particularly of distributors and collectors linking to major roads, which has resulted in a large volume of unused or low density land in the central area.

6.41 Development patterns in Greater Bangkok have largely been characterized by road-oriented dispersal of population and commercial activities, which has resulted in the sprawling of city toward the east, north, and south, and recently toward the west as well. Such disorderly urban sprawl resulted partly from a lack of appropriate development controls. Zoning regulations permit a fair extent of mixed land use, and allowable densities are also very generous, with floor-to-area ratios (FARs) of 1,000% permitted across the country; prior to 1992, there was no FAR limit whatsoever. Moreover, building codes provide rules that encourage construction along wider roads, thereby promoting arterial-oriented development toward outer areas.

6.42 These problems are partly responsible for the limited effectiveness of the 1992 land use plan, which resulted in (i) a lack of coordination between transport infrastructure development and land use; (ii) extensive subdivision of rural and agricultural land for residential development; (iii) commercial development in medium to high density residential areas; (iv) continued “ribbon-like” commercial development along major arteries; and (v) high density development as well as industrial development in low density residential areas.

6.43 To better address land use/transport issues in the future, a 1996 study sponsored by a unit under the former Overseas Economic Cooperation Fund of Japan (a predecessor of the Japan Bank for International Cooperation) recommended that Thailand and Bangkok (i)

³¹ Roads occupy only about 11% of the area within Bangkok’s Middle Ring Road; the comparable figures for London, Paris, and New York are in the range of 20-25%, while the figure for Los Angeles is even higher. Of course, to the extent that there is substantial latent demand for travel, increasing the supply of road space may also increase travel demand, thereby mitigating the benefits to existing travelers. PADECO Co., Ltd., *The Survey of Urban Transport Costs and Fares in the SEATAC Region, Phase I (RL-12/I), Final Report*, prepared for the Southeast Asian Agency for Regional Transport and Development (SEATAC), September 1990, p. 3-44.

³² One quantitative analysis found that introducing a simple distribution network within blocks in Bangkok would result in reductions of : (i) 8% in total traffic volume, (ii) 18% in arterial traffic volume, (iii) 15% in arterial junction movements, and (iv) over 50% in turning movements at arterial road junctions. Halcrow Fox and Associates, Pak Poy & Kneebone Pty Ltd, and Asian Engineering Consultants Corp., Ltd., *SPURT—Seventh Plan Urban and Regional Transport, Final Report*, funded by the United Nations Development Programme and executed by the World Bank, March 1991, p. 6-25.

incorporate intensity controls into the overall scheme of development regulation;³³ (ii) introduce a system of development promotion including elements of the Japanese land readjustment approach and/or the enterprise zone concept in the United Kingdom, the zone d'aménagement concerté (ZAC) in France, or incentive zoning in the United States; (iii) introduce provisions for the capture of the “profit” accruing from development; and (iv) the preparation of effective plans.³⁴ Along these lines, a 1997 study sponsored by the Japan International Cooperation Agency recommended a series of measures (linked to “policy zones”), including: (i) incentives offered by public infrastructure providers, e.g., construction of facilities on land provided by private developers; and (ii) public regulations, e.g., regulations requiring the provision of public space by private developers, designation of urban planning project areas in which the public sector has priority to negotiate land transactions, land readjustment).³⁵

6.44 The Hopewell/BERTS Project—What Went Wrong. The Hopewell Project has suffered from a lack of synergy, planning communication, and political and financial problems. The issues leading to the project’s escalating problems are discussed here and represent the views of observers that would no doubt be contended by the concerned parties.

6.45 The allegations against Hopewell were that they did not:

- prepare and submit a clear project implementation schedule for the government’s approval until three years into the project;
- commence the design work within an appropriate time, and the early submitted designs were not in accordance with the Agreement specifications;
- provide equipment, accessories, and systems pertaining to the construction within an appropriate;
- cooperate with the government in resolving the various problems as they developed;
- propose a detailed financial plan and sources of finance to convince the government that Hopewell had sufficient capital for the project;
- propose a construction schedule and technical details to the government to ensure progress according to the Agreement; and
- proceed with construction continuously according to the Agreement by having construction take place on numerous sites.

6.46 Other issues cited as undermining of the Hopewell Project are that:

- the project was approved without a prior feasibility study;
- construction commenced before land ownership had been secured;

³³ For a more recent development, see “Urban Development: Healthy City Concept Supported by Experts,” *Bangkok Post*, Internet Edition, June 1, 2000 [support for increasing required floor area ratios].

³⁴ Research Institute of Development Assistance (RIDA) of the Overseas Economic Cooperation Fund, *Measures for Promoting Urban Improvement in Bangkok, Focusing on Institutional Aspects*, October 1996, Chapter 4.3.

³⁵ Pacific Consultants International, and Suuri-Keikaku Co. Ltd., *The Study on Urban Environmental Improvement Program in Bangkok Metropolitan Area, Final Report*, prepared for Japan International Cooperation Agency and Bangkok Metropolitan Administration (BMA) of the Government of the Kingdom of Thailand, February 1997, Volume 2, Chapter 12.

- the project inevitably suffered from government instability including a military coup and various leadership changes;
- the estimated construction cost escalated due to the floating exchange rate;³⁶ and
- a separate concession was granted to a different company for the construction of a toll road to Don Muang Airport, which runs alongside the Hopewell route and features flyovers that provide physical obstructions making it difficult for the Hopewell project to proceed.³⁷

6.47 Hopewell continually had problems in delivering a financially viable scheme. The timing of income from property and retail developments combined with difficulties in SRT land acquisition posed constant threats. Ultimately, the project's bankers lost faith and decided the project was not viable. Consequences of the non-completion of the Hopewell project have included continued traffic problems, undeveloped real estate, damage to Thailand's economy, and lost benefits to SRT.

6.48 The Hopewell Project is perhaps indicative of the inherent difficulties in undertaking a complex private-public venture and will no doubt cause some rethinking of the financial viability and risk analysis of such megaprojects. The relative imbalance between capital costs and ridership revenue requires supplementary development, which involves increased risk and complexities. A key lesson is the need for transparency and close coordination and partnership between the public and private parties in such transactions.

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7

METRO MANILA: TACKLING TRAFFIC CONGESTION WITH ELEVATED LIGHT RAIL

A. CITY BACKGROUND

7.1 Metro Manila, the capital region of the Republic of the Philippines, accommodates a population of about 9.5 million (1996 data) within its land area of 636 square kilometers; it produces almost one-third of the nation's GDP with 13% of the total population of the Republic.

7.2 The combination of rapid population increase and income growth has placed increasing demands on urban services, resulting in an overburdened transport system. Urban transport demand in Metro Manila was estimated at 11 million person trips in 1980 and approaching 18 million in recent years (1996 data). As is typical in a large metropolis in a developing country, Metro Manila suffers worsening traffic congestion as well as serious environmental degradation.

7.3 The traffic in Metro Manila has been heavily dependent on public transport modes, which carry about 70%¹ of all trips. Jeepney² along with similar small-vehicle public transport³ has been a dominant mode, accounting for 39% of the trips, followed by private cars (19%), buses (15%), and tricycles (13%). Road-based modes dominate at present. The Light Rail Transit (LRT) system that began operation in 1984 carries only a small percentage (2.3%) of the trips in Metro Manila. In the 1990s, the Philippine Government began a program to use private sector forces for provision of infrastructure including urban rail. Currently, LRT development has been undertaken with the active participation of the private sector, and the LRT's role is expected to grow in the future.

B. MAJOR URBAN TRANSPORT SYSTEM DEVELOPMENTS

7.4 **Overview.** Following the end of World War II, various efforts were undertaken to tackle transport problems in Metro Manila, commencing with the planning of an arterial road network, known as the Major Thoroughfares Plan, prepared by the Planning Commission in 1945. This plan called for a radial-circumferential network that eventually led to the one existing today with ten major radial and six circumferential roads.⁴ Such a hierarchical network, influenced by the approach taken in the United States, significantly contrasts with those in other

¹ All of these modal shares are 1996 figures taken from Japan International Cooperation Agency, *[Draft] Final Report on Metro Manila Urban Transportation Integration Study*, December 1998.

² Jeepney is a shared taxi based on an extended United States Army jeep chassis with a rear entrance/exit and lengthwise benches seating 14 passengers.

³ E.g., high occupancy vehicle shared taxi services known as FXs; the reference is to the Toyota Tamaraw FXs typically used for such services.

⁴ As of 1999, three circumferential roads had been completed. Among them, Epifanio de los Santos Avenue, EDSA, is the most heavily traveled route, crossing 10 radial roads.

developing country cities in Asia, including Bangkok and Jakarta. By the 1960s, considerable road investment had been made, including the building of these major arterial roads, but transport problems continued to worsen much faster than they could be addressed by these remedial measures.⁵ Traffic congestion became very serious and the provision of public transport services, particularly buses and jeepneys, was far too insufficient to meet commuting demand, leading to further deterioration in service levels.

7.5 In the 1970s with assistance from both bilateral and multilateral donors, urban transport master plans were formulated, identifying large-scale projects including completion of the circumferential and radial road network, mass transit rail lines, and construction of exclusive bus lanes. In this period, major road construction and road transport improvements were undertaken, including the introduction of a modern traffic signal system for Metro Manila.

7.6 In the 1980s, the emphasis was placed more on traffic management measures to pursue more optimal use of limited road space and on improving public transport service levels. The most significant move by the government was the introduction of the Light Rail Transit (LRT) System, the first attempt to provide rail services for the central area. Meanwhile, the combination of rapid urbanization and motorization in Metro Manila worsened traffic congestion as well as environmental conditions. From 1980 to 1995, the population of Metro Manila increased by more than 60% and vehicle ownership climbed 130%, while total road length increased by only 18%. It became increasingly costly to expand road space in Metro Manila partly due to difficulty with land acquisition. Recognizing the urgent need for improving the public transport system, coupled with generally favorable results of the first LRT project, the government planned a large-scale LRT expansion program at the end of 1980s, to be undertaken with extensive involvement of the private sector.

7.7 **Urban Development in Metro Manila.** Manila's metropolitan growth has largely come from rapid suburbanization, generally occurring in a dispersed fashion, a typical pattern of urban sprawl, as well as a significant concentration of business, commerce, and housing in the core area (within Epifanio de los Santos Avenue, EDSA, the most heavily traveled circumferential arterial). Disorderly development with highly mixed land use prevails along major roads and in the suburbs, with squatter settlements in many parts of the region. At the same time, rapid suburbanization has been accompanied by increased (and lengthened) trips between suburbs and the city center, which has severely strained the urban transport system.

7.8 Disorderly urban development in Metro Manila has been partly due to a lack of adequate development controls. On the positive side, a form of modern development control was initiated relatively early in the country, and government efforts in this area continued after World War II, commencing with the establishment of the National Urban Planning Commission in 1946, which undertook master planning, revision of zoning ordinances, and preparation of subdivision control measures.⁶ These regulations, in updated form, are still in

⁵ During the 1960s, strategic plans identified the need for an integral network of public transport routes with rail and bus feeder links and tighter controls on private vehicles and jeepneys. However, the strategy was not implemented due to political reasons and limited financial resources.

⁶ In 1950, the National Planning Commission was created merging the National Urban Planning Commission and other organizations to extend these activities to local governments across the country.

effect today. Planning based on subdivision control⁷ contributed to the development of certain areas, notably Makati, a core area for business, commerce, and quality housing, where development based on a 50-year plan was undertaken (privately) in the postwar period. However, zoning regulations have generally been ineffective, with a lack of clear land use policies and guiding principles. They also do not impose controls on permitted densities for each district with measures such as the floor-to-area ratio. This “pro-development” regulatory environment is considered partly responsible for Manila’s disorderly development.

7.9 Road-Based Public Transport. As noted, about 70% of all trips in Metro Manila are carried by public transport, with jeepney the predominant mode. Manila’s 60,000 jeepneys⁸ are the mainstay of the city’s transport system, carrying nearly one-half of all peak-period passenger trips. Jeepneys are privately owned and operated, with the fleet mostly owned by individual operators who lease them to drivers. In addition, the vehicles are assembled locally by a thriving industry. The dominance of jeepneys (rather than buses)⁹ may have resulted partly from generally dispersed travel demand patterns in Metro Manila. The hierarchical road network created a multiple of sub-centers at major intersections as well as commercial activities along several radial roads. These land use patterns tended to generate travel demand that is relatively dispersed or not dense enough to make large buses an adequate public transport mode.¹⁰

7.10 A group known as the Piston Organization is a registered alliance of some 120,000 nationwide jeepney drivers and operators. Research has shown that operation of Manila’s jeepneys costs 16% less per seat km than does operation of standard buses, while jeepneys generally provide a higher level of service (e.g., greater reliability, shorter wait times) at lower fares than do buses.¹¹ In particular, jeepneys take less time to load and unload, they stop less frequently, and run on shorter headways than do buses, which are larger. Manila’s jeepney owner-operators ply their trade along corridors where short, multi-destinational trips are made, the very trips that are most costly for public transit to serve. Jeepney operators, moreover, have historically been the last to petition for fare increases. Unlike public transit authorities, almost all jeepney operators turn a profit.

⁷ Subdivision regulations govern the development of raw land for residential or other purposes, prescribing standards for lot sizes and layout, street improvements, procedures for dedicating private land to public purposes, and other requirements in far more detail than those for zoning plans. They also include procedures for filing maps and for receiving the approval of the public body that grants permission. The main objective is to ensure that developments take account of the community’s need for various kinds of public infrastructure and services, as well as to clearly identify land ownership through detailed surveys following designated procedures.

⁸ This is an unofficial estimate as many are unlicensed.

⁹ Buses are mostly operated privately. Metro Manila Transit, which is government owned, is the largest single bus operator in Metro Manila, but accommodates only a small portion of road-based passengers with a fleet of only about 100 vehicles. About 5,500 private buses, ranging from minibuses to full-size single deck buses, are included in Manila’s total fleet and are operated by small groups or larger companies.

¹⁰ Other factors leading to the dominance of jeepneys may include: abundant low-cost labor, which contributes to low operating costs; the self-management system of the industry (including the support of jeepney associations); the availability of local technology for vehicle supply; and fare levels about equal to those for buses the service level of which is generally lower than that provided jeepneys.

¹¹ For further discussion on jeepneys and commercial transit, see Robert Cervero, *Fostering Commercial Transit: Alternatives in Greater Los Angeles*, available at Reason Public Policy Institute (RPPI), Publications No.146, September 1992, <http://www.rppi.org/transportation/ps146.html>.

7.11 There are various issues regarding jeepneys (and paratransit in general), including: their self-support mechanism through the associations they form;¹² their strong political influence, which tends to make it difficult for the government to intervene in the market (e.g., for route rearrangement); providing employment opportunities for low- (to mid-) income persons as drivers, operators,¹³ vehicle assemblers, and maintenance mechanics; and safety and environmental concerns resulting from the use of inadequate equipment and parts for the vehicles.

7.12 Manila's road-based public transport system suffers from a serious lack of service facilities such as stop and drop locations, terminal and transfer facilities, and waiting areas. Thus, chaotic traffic conditions prevail along major corridors particularly around road junctions, severely affecting the overall traffic flow and causing delays. The neglect in developing terminal facilities is partly due to the lack of well-established institutional arrangements.

7.13 Recognizing the importance of addressing this issue, a project has been formulated with the assistance of the World Bank to improve transfers between and among buses, jeepneys, and LRT lines, and to manage traffic congestion. Known as the Metro Manila Urban Transport Integration Project (MMURTRIP), it is aimed at demonstrating the effectiveness of traffic management measures as a cost-effective means of reducing congestion along major travel corridors. This project is to enhance public transport use, improve the effectiveness of the committed large-scale transit projects (described below), and increase road access to outer areas particularly outside of EDSA. The project targets public transport users, the majority being poor "captive" users.

7.14 **Non-Motorized Transport (NMT) Pilot Project in Low-Income Areas.** In order to connect low-income communities with employment centers and LRT stations, the Department of Public Works and Highways (DPWH) plans to develop a pedestrian and bicycle path pilot project in the Marikina Valley. Statistics show that 20% of total trips in the project area are made by pedestrians. Furthermore, on average, there are more trips on foot and by tricycle in this area than throughout Metro Manila, with 22% made on foot and 30% by tricycle compared with 20% and 14%, respectively, metropolitan wide (tricycles are banned in many major corridors in Metro Manila).

7.15 **Air Pollution.** Manila is known for its poor air quality inevitably produced by its high motorization. Annual particulate matter production (in 1991, the most recent year for which data is available in the published sources) was about 12,000 tons per year; of this total, 41% was generated by trucks and buses and 24% by jeepneys and taxis. High particulate matter emissions are promoted by the slow and stop-go traffic conditions prevalent especially in the city's core area where streets are narrow and intersection traffic densities are high. For lead, 39% of all emissions were from cars and 58% came from private utility vehicles (that use gasoline). Even though trucks, buses, and jeepneys make up only 18% of the metropolitan

¹² Jeepney operators form an association that provide its members with various services, including application for route franchises and their extension, negotiation with the regulatory body on operating problems, and enrollment in the national social security system and assistance in receiving low-interest loans and medical services provided by the social security system.

¹³ Small-scale operators receive certain benefits from the government through the cooperatives they form, including exemptions from income taxes and the common carrier tax over the initial years of operation, financial assistance for upfront capital requirements, and handling of licensing and other procedures, although the extent of support is very limited largely due to financial constraints experienced by the government.

vehicle population, they account for about 60% of the particulate matter, which is the most serious air pollutant (as in Bangkok).

7.16 The risk that air pollution presents to public health has become an increasing cause for concern, particularly for high-risk population groups such as public transportation operators, street vendors, the commuting public, and children. For instance, working as a jeepney driver in Manila exposes one to an increased risk of abnormal pulmonary function by about 50%, and a more than double risk of chronic obstructive pulmonary disease. High blood lead levels have been noted in neighborhoods near the inner city areas where traffic flows are greatest. The range of lead exposure found in children and young street vendors is an important public health concern, because of lead's known toxic effects on the developing brain of young individuals.

7.17 Notably, Manila is beginning to tackle its severe air pollution problem. For example, with assistance from the Asian Development Bank, the Department of Environment and Natural Resources is implementing a Sector Development Program to promote policy reforms to improve air quality through the combination of (i) a policy loan of US\$200 million to implement policy reforms; (ii) an investment loan of US\$25 million to establish an air pollution control facility for assisting industry, commercial establishments, and the transport sector to make investments necessary for the monitoring and reduction of air emissions; (iii) an investment loan of US\$71 million to finance part necessary public sector investments; and (iv) a US\$1.5 million technical assistance grant to develop air emission policies and enhance public awareness to support the abatement of pollution.¹⁴

7.18 **Development of Light Rail Transit (LRT) System.** An LRT plan originated from an urban transport master plan prepared in early 1970s with technical assistance from the Overseas Technical Cooperation Agency (the predecessor of the Japan International Cooperation Agency, JICA), which recommended a rail rapid transit network.¹⁵ Following this master plan JICA sponsored a feasibility study, which recommended building an underground rail system. A World Bank assisted urban transport study prepared in the mid-1970s, known as MMETROPLAN, also concluded that exclusive bus lanes would not sufficiently meet growing traffic demand along major corridors radiating from the city center; however, it was also skeptical of the viability of an underground system, and instead recommended a surface system. In the late 1970s, the plan was changed to an elevated system largely as a result of a political decision.¹⁶ In 1980, the Light Rail Transit Authority (LRTA) was established as a project implementing body. For political reasons, however, the responsibility for the development of stations and terminals was separated from the LRTA, which resulted in insufficient consideration of integrated urban development along the corridors as well as an inability to exploit value capture opportunities. After the collapse of the Marcos administration, the operation of stations and terminals was taken over by the LRTA.

¹⁴ Asian Development Bank, *Report and Recommendation of the President to the Board of Directors on Proposed Loans and a Technical Assistance Grant to the Republic of the Philippines and the Land Bank of the Philippines for the Metro Manila Air Quality Improvement Sector Development Program*, November 1998.

¹⁵ This study was called the Urban Transport Study for Metropolitan Manila Area (UTSMMA).

¹⁶ The LRT project resulted largely from a political decision of the Marcos administration. A study of the system was undertaken, but it was not at an appropriate technical level and did not establish the system's economic feasibility.

7.19 Insufficient project preparation also limited financing options. Due to generally unsuccessful negotiations on foreign aid assistance, the Government of the Philippines relied on foreign loans with an average interest rate of 8.2% for about 62% of the construction cost of the first line, with the remainder funded by the government's equity and the issuance of domestic bonds with interest rates averaging about 10%. While these rates are comparatively low for loans from the private market, there could have been advantages of obtaining low-interest ("soft") loans from donor agencies, especially if these loans were untied as to the nationality of the firms undertaking the project construction (as, for example, are the loans of the World Bank, or of the Overseas Economic Cooperation Fund of Japan and its successor, at least in principle). Perhaps another consequence of the insufficient project preparation were costs overruns of about 15% in the LRT construction work; coupled with currency depreciation, the debt service burden mounted, with the debt to equity ratio increasing over time.

7.20 **LRT1.** The first LRT line was built along a north-south corridor with the second heaviest traffic flow in Metro Manila and was partially opened in 1984. The entire 15 km route (all elevated above the road) became fully operational by 1985.¹⁷ The main reason for implementing this line first rather than the one along the most heavily traveled route (the third line described below) was that the residents along the line are predominantly low- to middle-income. Despite various problems in the early years, the system has been operated fairly well, with operations considered comparable to those of the best urban rail systems in the developing world. Average daily ridership increased from 191,400 in 1985 to 377,500 in 1995, an equivalent average annual increase of 7%. The operating performance has been relatively good,¹⁸ partly due to a separation between the ownership of infrastructure and rail operation. A private company, Metro, was established to operate the LRT with the equity provided by Meralco, a private concern that formerly operated tramways. Although Meralco later sold its equity holdings in response to criticism that Metro's earnings were "excessive," engineers and other staff of Metro continued in their jobs under the management of the LRTA.

7.21 Modal shifts occurred from other public transport modes to the LRT, which carries about 60% of total corridor traffic. Buses suffered most partly because routes were not adequately rearranged, which forced them to compete directly with the LRT.¹⁹ Although there was a plan to rearrange bus and jeepney routes, it was not properly implemented after the opening of the LRT largely due to opposition from the jeepney industry and institutional fragmentation.²⁰ No notable change in land use occurred, although new commercial activities around stations have been increasing in recent years.

¹⁷ The system has the capacity to transport 18,000 riders/direction per hour, with three terminals and 15 other stations at an average station spacing of 825 m. Trains run at an average speed of 30 kph, with a capacity of 750 passengers per train. In the late 1990s, a capacity expansion program for LRT1 was undertaken with financial assistance from the Overseas Economic Cooperation Fund of Japan, a predecessor of the Japan Bank for International Cooperation.

¹⁸ The farebox ratio (gross revenues divided by direct operating expenses) has been around 1.5 since its opening.

¹⁹ Although ridership on the LRT system has steadily increased to high levels, the restructuring of bus routes to achieve integration with rail facilities is important in maximizing investment from the outset of a project. While competing bus services on rail routes can be an advantage where additional line haul is necessary, feeder bus services can increase overall network efficiency, improve rider service, and avoid loss of employment.

²⁰ Disagreements between and among concerned agencies are not uncommon, e.g., between the public transport planning division of the Department of Transport and Communications (DOTC) and the Land Transportation Franchising Regulatory Board (LTFRB), also under DOTC. See Halcrow Fox in association with Almec Corporation, *Metro Manila Urban Transport Improvement Project, Final Report*, prepared for the Government of the Philippines and the World Bank, July 1998, p. 2-27.

7.22 In 1989, the Government of the Philippines decided to build six LRT lines (including the first line) so that LRT would become a major public transport mode in Metro Manila. Selected lines were to be built by the private sector according to the government policy to use private sector forces for the development of infrastructure. In 1990, the Philippine Government enacted the Private Financing Act (known as the BOT Law), which established formal rules for private sector participation in public infrastructure projects through Build-Operate-Transfer (BOT) mechanisms.²¹

7.23 **LRT2.** The second line (13.8 km, largely elevated), to run along an east-west corridor, is to be built with financial assistance from the Japan Bank for International Cooperation (JBIC), the successor of the Overseas Economic Cooperation Fund (OECF) of Japan. Originally, the project was to be undertaken with BOT (build-operate-transfer) financing, but it failed. The project was delayed following allegations that the bidding process had been rigged and the project overpriced; discrepancies were observed between the bid price and the actual price of the venture that was awarded the project.

7.24 **MRT3.** The third project²² (16.9 km in Phase 1, about half elevated) follows the EDSA route; most stations are located mid-block, often far from the cross streets for which they are named, resulting in long walks for transferring bus and jeepney passengers. This US\$655 million project (Phase 1)²³ was awarded to the private sector on a 25-year build, lease, and transfer (BLT) arrangement. Originally the project was to be financed by commercial borrowing from foreign capital markets, similar to the financing of LRT1. However, the Departments of Transport and Communications (DOTC) and Finance (DOF) assisted the private consortium in negotiating lower lending charges by guaranteeing the lease payments of DOTC to the lenders with confirmation from DOF that the obligations carry the full faith and credit of the Republic of Philippines; with this undertaking, the interest rate was reduced from 20 per cent to 15 per cent. The project was also made commercially attractive to the private sector because operating revenue was supplemented with commercial development revenue. This approach was made possible by awarding the commercial development rights in the depot and stations to a private consortium in return for payment of a lease charge to the government.

7.25 The Metro Rail Transit Corporation (MRTC), a 100% subsidiary of MRTC Hong Kong established by a Philippine consortium, was responsible for construction and facilities including rolling stock. However, the government is responsible for train operation. The system is currently underused²⁴ largely due to high fares and difficult access arrangements. For example, there are steep stairs that are unpopular with pedestrians and construction of escalators has now become a priority.²⁵ The high fares, more than double initial projections,

²¹ In 1993, the Act was amended and expanded to include a wider variety of private sector participation strategies.

²² The third line will be operated with peak-hour headways of 2.5 minutes, having a capacity of 23,600 passengers/direction per hour. The system will have an initial capacity of 540,000 riders per day, with an assumed ultimate capacity of 1 million passengers per day.

²³ The 5 km of Phase 2 has been approved, with the contract expected to be signed in July 2000 (US\$270 million) and the section to be opened three years later.

²⁴ Ridership was only about 60,000 per day as of May 2000 on the existing 10-station line, in comparison to an estimated 400,000 for the 13-station line (to be completed by July 2000). The original demand estimate may have been unrealistic.

²⁵ Similarly, a failure to provide escalators from the street to elevated stations occurred in Bangkok and there has been some speculation that such inconvenience can influence ridership.

have reflected high construction costs, partly caused by delays arising from a lawsuit and partly due to the Asian economic crisis, which led to a significant depreciation in the value of the Philippine currency and accordingly made the dollar portions of the construction cost much larger than expected. Such high fares have consequently minimized the effect of the project on buses, which charge about half the rail fare. The government is further obligated to cover some US\$60 million in guaranteed loans to the MRTC consortium.

7.26 MRT4. The fourth line (15 km, all elevated) is planned to be built with a combination of a BT (build-transfer) scheme for infrastructure development and a BOO (build-own-operate) scheme for operation with procurement of rolling stock²⁶ making it more attractive to local and foreign contractors. Under the BT scheme, the fixed infrastructure will be built by the private proponent and will then be transferred to the government (DOTC), which will make repayments through track fees in pesos and not in dollars, thereby eliminating the foreign exchange risk. The private sector will operate and maintain the trains and will pay the government track fees. The government will cover any financial deficit incurred by the proponent in the first five years of its operations to enable it to pay its creditors. However, this guarantee will be provided at a cost by imposing interest charges based on the higher of either the prevailing bill rate or commercial market rate. The scheme has already been affected by the depreciation of the Philippine currency, which has fallen sharply since 1997, thereby increasing the cost of building the first phase of the line by 40 per cent.

7.27 Philippine National Railways. In addition to intercity transport services, the state-owned Philippine National Railways (PNR) began providing commuter services in and around Metro Manila in the early 1970s, although operating results have been disappointing, with ridership only about 10,000 passengers per day in the 1990s. This low ridership may be attributable to several factors, including competition from road-based transport, the total lack of integration with land development along rail corridors, the low level of service (e.g., low train frequency, poor on-time performance), inefficient operation and management, outdated equipment and facilities, and the lack of adequate policies. These problems are fairly common for state-owned railways in the developing world. In the case of PNR, encroachment of squatters into the rail right-of-way has exacerbated the problem. However, it is encouraging that PNR has a large number of land holdings along its rail corridors, and these may be used for real estate development. In the 1990s, the PNR increased its real estate business operations, which contributed to some improvement of its weak financial performance.

7.28 There have been some developments toward improving commuter services along the PNR corridor. In 1996, Ayala Land Inc. submitted to the Government and PNR a proposal to develop commuter rail services, with a newly constructed railway system between Metro Manila and Calabarzon using BOT.

C. ISSUES AND LESSONS

7.29 Viability of Rail Mass Transit in Large Metropolises of Developing Countries. In Metro Manila, further LRT development is ongoing, partly with private sector participation, although the results remain to be seen. The third project, located along the most heavily traveled

²⁶ The planned route will run from east to northeast, providing capacity of 400,000 passengers per day, which is expected to be expanded ultimately to 650,000.

corridor in Metro Manila, undertaken on a BLT (build-lease-transfer) basis, had been partly opened as of June 2000. The project includes development of commercial activities by the rail operator, which will allow it to internalize the development benefits as well as attract more riders. However, the fare is substantially higher than that for buses,²⁷ suggesting (although preliminarily) that an urban rail undertaking might require far higher fares than those for road-based public transport in order to achieve financial viability, the relatively favorable conditions for rail mass transit in Metro Manila notwithstanding.²⁸ This finding supports the proposition that the financial viability of an urban rail system can only be achieved with additional and lucrative sources of revenue, perhaps through value capture.

7.30 In order to provide an additional source of revenue to subsidize urban rail projects and/or improve the competitiveness of rail, road-based transport should be fully accountable for the cost of the infrastructure that it uses. However, as road construction costs are likely to have long since been paid, the introduction of road pricing mechanisms may be subject to opposition. If such pricing mechanisms are developed at an early stage and as a pre-requisite to mass transit construction, financial burdens could be reduced and perhaps public acceptance increased. Yet the case is always a difficult one to make to the general public, as evidenced by the recent public outcry in the Philippines over government proposals to increase vehicle registration taxes.

7.31 **Importance of Adequate Preparation of Rail Mass Transit Projects.** The decision to proceed with the LRT1 project was taken despite insufficient project preparation, which resulted in various problems, including the limiting of financing options, particularly with respect to the possibility of receiving “soft loans,” which could have been beneficial particularly if the loans were untied as to the nationality of the firms undertaking the project construction (as, for example, would have been the loans of the World Bank or of the Overseas Economic Cooperation Fund of Japan). Adequate project preparation is essential if a project requires a large amount of capital, as do all rail projects. With soft loans from donor institutions, the debt burden suffered by the LRTA might have lowered substantially.

7.32 **Importance of Integrated Rail and Urban Development.** It is important to explore the possibilities for integrating urban development with mass transit projects. The LRT 1 project neglected this point; even the operation of its terminals and stations was separated from the transit operation for political reasons. Integration with urban and commercial development would have provided value capture opportunities to cross-subsidize the rail construction, the cost of which cannot generally be recouped from fare revenues. The lack of integrated development led to a loss of revenues (and profits) that could have been earned from real estate and commercial development; in addition potential ridership has been lost due to the slow progress of development along the corridor.²⁹ The project also did not take account of the need for intermodal transfer facilities, which led to road traffic disruption at transfer points.

7.33 **Private Sector Participation in Urban Rail.** Private sector participation focuses on the most lucrative routes, leaving less attractive ones to the public sector, which tends to lead to a “piece-by-piece” approach. Although private provision of rail services is desirable in

²⁷ The fare for the operated section is set at 40 pesos, compared with 7 pesos for buses along this section.

²⁸ The project’s economic viability, as opposed to its financial viability, is likely to be more favorable, indicating that urban rail still is good policy for Metro Manila.

²⁹ In recent years, centers of commerce and trade have been redeveloped along the LRT corridor, leading to the commercialization of areas around the stations.

appropriate cases, given the governmental financial constraints, the piece-by-piece approach may result in inconsistency or a lack of coordination across modes and systems, both technical and institutional (e.g., in terms of operational integration, interline transfer, and fare coordination).

7.34 Use of Government Guarantees. The Philippine government has used government guarantees to motivate private sector lending by mitigating risks that the private sector either cannot evaluate or will not bear. These guarantees have been an integral feature of private sector participation and, in helping to solve the country's power crisis, has been extended to transport projects. The government must of course be adequately prepared to meet contingent liabilities should they arise. Some observers have argued that such guarantees are too onerous for the government and effectively transfer the risk from the private sector back to the public sector. It may also consign the government to redeeming ill-conceived projects. Moreover, in creating an attractive environment for private participation in ventures that require high capital costs, the principles of private sector risk can be eroded. When costs rise unexpectedly and ridership levels are disappointing, exacerbated further by fare increases, the government, which was keen to involve private capital, can in this way become liable for debt repayments. The private sector may realize returns on its investment but the government may be left with an expensive scheme that does not adequately serve its citizens.

7.35 Equity in Mass Rail Transit. The requirement to offset construction and operating costs of rail transit often leading to high fares has an impact on low-income earners who are unable to afford to use new systems. Northern Metro Manila has a high concentration of squatter families and is not served by rail transit; this area also has the lowest density of bus service. It can be presumed that rail and bus would not be financially viable at the affordability of these potential riders. While the mobilization of private capital, in particular, has helped realize many infrastructure projects that might otherwise have been long delayed, the targeting of lucrative routes raises equity issues that need to be addressed. Coordination by the government, including regulation and methods of cross-subsidy, is essential to ensure equity and inter-modality while avoiding the need to later retrofit individually developed projects into an overall transport system that can be used by everyone.

7.36 Busway versus Light Rail. During the planning stages of LRT3 (EDSA line), consideration was given to developing a segregated busway that could later be converted to light rail. This approach would have been an intermediate and economic step toward a longer-term solution as passenger demand was estimated to lie awkwardly between over-demand for the existing situation and under-demand for mass transit. A busway has a lower capacity and is cheaper to both construct and operate than a railway. It can allow passengers to travel without modal interchange, which may attract more passengers than light rail in the short term. However, light rail is more desirable in terms of travel speed, on-time performance, comfort, and pollution. The decision not to proceed with a busway was based largely on its expected short lifetime before conversion would have become necessary and also on the qualities that light rail offers in terms of attracting riders from other modes. Ground-level systems were examined but were rejected due to anticipated conflicts at intersections.

7.37 Timing of Urban Rail Investments. The implementation of the MRT3 project in particular raises the issue of whether it is preferable to proceed with heavy rail investments at relatively early stages of economic development or wait until the economy develops so that

such investments would yield higher rates of return, considering the risk that they may not then be built at all because land cannot be acquired or the city has become more automobile oriented.³⁰

7.38 Poor ridership, as witnessed in some projects, may be considered a result of unsuccessful planning and raises questions about the value of a well-meaning project if the public is not using it. Project timing is an important and complex consideration involving issues such as available finance, modal competition, incomes and employment, and land acquisition in addition to general market and economic fluctuations. Some Asian projects have suffered due to the unforeseen economic crisis resulting in currency devaluation and job losses, which reduce commuter travel. Such an event can obscure the suitability and timing of the approach adopted although a reactive approach, responding to pressure to build in a deteriorating situation, can cause essential factors for a project's viability to be overlooked.

7.39 While urban rail development at a relatively early stage of economic development allows cities to become more transit oriented, investment in such systems is not generally affordable, nor the best use of scarce capital funds. However, the adoption of private vehicle restraint and promotion of bus priority are policy choices that can make mass transit more viable at an earlier date than otherwise. If a city has been following a road-based development strategy, a delay in urban rail construction can compound the size and complexity of problems.

7.40 **Paratransit Issues.** There are both strengths and weaknesses of paratransit services. The beneficial characteristics of jeepneys (and other small-vehicle public transport), the most preferred public transport mode in Manila, may include the following: (i) they provide extensive coverage, have high frequency, and are generally affordable; (ii) they are privately operated, with essentially no government subsidy; (iii) they can provide convenient complementary or feeder services to the LRT system and buses; and (iv) the industry provides employment opportunities for low- (to mid-) income persons such as drivers, (small-scale) operators, vehicle assemblers, and maintenance mechanics.

7.41 There are also unfavorable aspects of jeepneys. They compete directly with buses, which suffer severely, and have contributed to traffic congestion both directly and indirectly (e.g., as a result of excessive lane changing and poor acceleration from stationary positions). There are also serious safety and environmental concerns resulting from the use of inadequate equipment and vehicle parts. However, the government appears to lack any clear policies on the role jeepneys are to play in urban transport (e.g., relative to buses), and it tends to be reluctant to increase controls over them partly because of the organized political power of the industry.

7.42 The issue of congestion and pollution caused by the informal paratransit sector weighed against the convenience and employment opportunities offered by the mode is difficult to assess. Bus patronage certainly suffers due to the prevalence of jeepneys, and while it could be argued that, in the absence of jeepney competition, bus operations could be adjusted to serve all demand, the jeepney mode is already established and tends to suit the dispersed travel patterns found in Metro Manila. Bus services also contribute to pollution. Convenience and relatively cheap fares are the main attraction of jeepneys; their ubiquity, and consequent short headways, is also noteworthy. With respect to the importance of jeepneys in providing employment, an

³⁰ This issue was raised in comments by the World Bank on the consultants' Draft Final Report.

estimated 60,000 are currently in circulation with many more personnel employed in jeepney factories and other support services. For comparison, in the formal transport sector some 5,500 private buses operate and the public sector employs about 5,000 bus and rail staff including the staff of the Philippine National Railway. On balance, the jeepney sector is a significant source of employment for Metro Manila's 4 million labor force, which currently has an unemployment rate of 16%.³¹ The political strength of the jeepney sector appears to have restricted government intervention, although it may be in the interests of all parties if some controls are in place to promote efficiency and reduce pollution. The effectiveness of jeepneys is clearly apparent although generally the limitations of this type of mode become apparent as passenger volumes rise above a threshold, at which point the economic advantages diminish. Nevertheless, the supportive role of jeepneys in Manila's transport network can be considered of great value at present.

7.43 Importance of Modal Integration. Given the limited financial resources available, it is crucially important to increase the capacity of the existing transport network. One promising approach is to improve the extent of integration across (and within) modes. In Manila, modal interchange and within-mode transfer have long been serious bottlenecks with a serious lack of adequate measures. Their significance will grow as the LRT network extends. In countries with extensive rail networks, including Japan, modal integration is crucial to maximizing the effect of investment with such measures as provision of effective intermodal transfer facilities and interlined (through-train) operations. Due to the importance of addressing this issue, a project has been formulated with the assistance of the World Bank to improve interchanges between and among buses, jeepneys, LRT lines and manage traffic congestion.

7.44 Lack of Development Controls. Manila's metropolitan growth has largely come from rapid suburbanization, generally occurring in a dispersed fashion, as well as from a significant concentration of business, commerce, and housing in the core area. Disorderly development with highly mixed land use prevails along major roads and in the suburbs, with squatter settlements among the major concerns in many parts of Metro Manila. In addition, the hierarchical road network has created multiple sub-centers at major intersections. These developments have created dispersed travel patterns that can be suitably met by highly competitive and flexible paratransit services, which, coupled with rapid motorization, lead to an extremely congested road transport.

7.45 It is recognized that disorderly urban development in Metro Manila is partly due to the lack of adequate development controls. Zoning regulations are generally ineffective, with a lack of clear land use policies and guiding principles. They also do not impose controls on allowable densities for each district with such measures as the floor-to-area ratio. Such a "pro-development" regulatory environment is partly responsible for Manila's disorderly development.

7.46 Use of Existing Assets for Rail Development. In addition to long-distance services, the Philippine National Railways (PNR) provides commuter rail services in Metro Manila, although on a very limited scale. Due to various problems faced by PNR (e.g., of a financial, technical, and social nature), it has been difficult to improve the system and achieve operational efficiency. This issue is fairly common for state-owned railways in the developing world.

³¹ Philippine National Statistics Office.

However, PNR owns its vast assets including a large volume of land holdings as well as rail infrastructure, part of which could be used more effectively and at lower cost if managed better. As in the case of the road network (i.e., modal integration to improve the capacity of the existing network), it could be beneficial to take appropriate measures to use existing rail and related resources for providing improved urban transport services. Recently, there has been a movement toward development of commuter rail services by the private sector partly utilizing the existing assets.

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8

SEOUL: CONGESTION PRICING AND TAXATION TO RESTRAIN CAR USE

A. CITY BACKGROUND

8.1 Seoul is one of the most densely populated cities in the Republic of Korea, a mountainous country in which two-thirds of the land is virtually uninhabitable. Seoul has a population of 10.2 million in the central city and 13.5 million including satellite cities. Notably, the central city population is larger than that of (the five boroughs of) New York City although the land area is only one third as large. The population of Seoul peaked in 1995, after which it has been decreasing as a result of a policy of moving population into newly developed satellite cities. The Han River traverses Seoul's central business district, effectively dividing the city into two parts. Most of the recent growth in Seoul has been in the city's southern suburbs since a mountain chain blocks expansion to the north.

8.2 Seoul's infrastructure was largely destroyed during the Korean War in the early 1950s and its road and rail systems were badly damaged. During the following 20 years the government concentrated on constructing a major road network. During this period, the Seoul Metropolitan Government accelerated the construction of bridges and tunnels along the Han River that created traffic bottlenecks. A generally rising population and increasing incomes has resulted in a 20 percent annual increase in private car ownership since 1980, but expanding the road network was viewed as expensive due to severe topographical constraints and the fact that land was restricted due to an aggressive greenbelt policy.

B. MAJOR URBAN TRANSPORT SYSTEM DEVELOPMENTS

8.3 **Overview.** Increased car ownership and traffic from satellite cities created serious traffic congestion along the corridors radiating from the Seoul CBD, with serious congestion evident by the end of the 1980s when the morning and evening peaks became an all-day peak. Until the early 1990s, government policy emphasized the expansion of transport capacity, for example through the construction of highways and the expansion of subway systems. The city also adopted some minor traffic engineering schemes at this time to improve the capacity of the existing streets. For example, several one-way streets were implemented and some left-turns were banned. In an attempt to reduce congestion, left-turns are prohibited at critical signalized intersections. Also, one-way streets were implemented, some exclusive bus lanes were introduced for morning peak-hour operation, a small pedestrian zone was created, and heavy trucking was banned in the central business district during daytime.

8.4 Since 1993, however, the government started experimenting with traffic demand management (TDM) techniques by restraining car use through various taxation measures and congestion pricing. An additional noteworthy measure is known as the "Green

Transportation” policy by which the government has encouraged walking and the use of bicycles.

8.5 Modal Split. Seoul traditionally had been heavily dependent on buses, which carried 66 percent of daily trips in 1980. However, the modal share of bus steadily decreased due to increased car use and the development of the subway system; in 1997, buses carried only about 30 percent of all daily trips. The percentage of daily trips carried by the subway system, on the other hand, has steadily increased during the past two decades, reaching almost 31 percent in 1997, the largest share among other modes (Table 8-1).

Table 8-1 Percent of Daily Trips by Travel Modes in Seoul, 1980-97

	1980	1985	1990	1995	1997
Bus	66.0	58.0	43.3	36.7	29.5
Subway	7.0	14.0	18.8	29.8	30.8
Taxi	19.0	16.5	12.8	10.7	10.1
Other	8.0	12.5	25.1	22.8	29.7
(pass.veh)	(NA)	(NA)	(14.0)	(14.5)	(20.6)
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Other vehicles include passenger cars, rental vehicles, and two-wheeled vehicles.

Source: Seoul Metropolitan Government, 1998

8.6 Subway System. Seoul’s first subway opened in 1974 and was expanded to four lines totaling 132 km with 114 stations by 1997. Construction was undertaken by the Seoul Metropolitan Government and operation by the Seoul Metropolitan Subway Corporation (SMSC). In addition to its subway system, Seoul has 83.5 km of Metro Rail operated by Seoul Metropolitan Rapid Transit Corporation (SMRTC), and 57.3 km of railways constructed and operated by Korean National Railway Company. The subway lines were built in the city’s heaviest traveled corridors where road expansion was not feasible. Increasing congestion led to a new metro Master Plan in 1988, which was later revised in 1993. The construction of four new rapid transit lines has been in progress since 1990 with priority accorded completion of routes that will double the size of the network and subsequently accommodate 50% of daily public transport journeys. About 10% of subway construction costs have been financed by proceeds from US\$1,000 bonds for vehicle purchases. However, revenues from subway fares have been sufficient only to cover operating costs (but not capital costs).

8.7 Bus System. Buses in Seoul are run by both private and public operators. A total of 90 private groups or companies operate a fleet of 8,500 buses over 347 routes. Although the private buses have been owned and operated without government subsidy, routes and fares have been strictly controlled by the Seoul Metropolitan Government. The issuance of bus operation licenses requires no monetary payment and the allocation of a route following multiple applications is based on discussions with the final decision taken by the licensing authority. The municipal bus company operates 232 routes and 1,260 buses. Until 1996, bus was the predominant mode of travel in Seoul. As noted, bus accounted for 66% of daily trips in 1980, but the modal share of bus fell to 30% by 1997 due to the subway, and the share of bus trips is expected to decline further.

8.8 The combination of high vehicle taxes and insurance rates helped restrict car

ownership; more recently, however, rising incomes have reduced this effect. With regard to public transport, subway ridership and financial performance were not as high as initially hoped, and in 1986 were only half projected levels. Despite these initial failures, some marginal bus operators have suffered due to the expansion of the subway system. It appears that many of the new subway riders were former bus riders rather than motorists. Generally, however, buses continue to be overcrowded and some streets have up to four lanes completely occupied by buses. There is pressure on the government to increase fares while some operators have made route and service alterations. Cooperatives and friendly takeovers have also arisen to maintain profitable operations although the complexity of the network makes this “solution” difficult to apply more broadly. Continued pressure on the Seoul Metropolitan Government to maximize the return on its subway investment will force issues relating to buses and integration of the network higher on the agenda.

8.9 The Metropolitan Government Transportation Bureau has the objective of maintaining balanced and stable bus operations, and recently the government has been considering revised bus routes and services to feed the subway as well as dedicated bus infrastructure, particularly on corridors without subways. In 1998, the government expanded exclusive bus lanes from 154 km to 270 km. As part of the bus improvement measures, bus companies have also been experimenting with “smart card” systems (e.g., Smart Card and IC Card) since 1996, and the Government is considering the introduction of a bus location system for bus users. The smart card includes microchips that can identify each operator for revenue distribution; no problems have been encountered in dividing the revenues appropriately among companies. The IC card system is to be integrated into a through ticketing system in which users can use the same IC card to pay for buses and subways. The 1999 Budget of the Seoul Metropolitan Government included the introduction of a public bidding system for the acquisition of three bus routes with the aim of improving services.

8.10 **Namsan Tunnel Congestion Pricing.**¹ Seoul has been known for its severe traffic congestion, but the transport policies adopted by the Seoul Metropolitan Government had been mainly focused on the construction of new urban freeway and subway lines until the early 1990s. However, since 1993, the SMG has approached congestion problems by adopting transport demand management (TDM) techniques. Congestion pricing has been one of the newly introduced measures. In 1996, the Seoul Metropolitan Government commenced charging 2,000 won (US\$2.20) for the Namsan #1 and #3 Tunnels, two corridors linking downtown Seoul to the southern part of the city.² These two corridors had high private vehicle use, with such vehicles comprising 90% of total traffic—the highest of all corridors linked to the central business district. Congestion charging was thus introduced to reduce the number of low-occupancy vehicles gaining access to the central business district, as well as a means of raising revenue for transport-related projects and assessing the effectiveness of the technique for possible application to other major congested links.

8.11 Charges were set for one- and two-occupant private vehicles (including driver), and collected in both directions per entry/exit from 7:00 to 21:00 during weekdays and from 7:00

¹ A major source of information on this topic is Kee Yeon Hwang, Bongsoo Son and Jin Ki Eom, “Effect of Congestion Pricing at the Namsan Tunnels in Seoul,” *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 3, No. 4, September 1999.

² Tollbooth facilities have long been present in these tunnels, where a 100-won toll was collected for 20 years until 1996 to recover construction costs.

to 15:00 on Saturdays. No charge was assessed on Sundays and national holidays. The violation penalty amounts to 10,000 won (five times the congestion fee). The vehicles exempted from charges are: private cars with three or more passengers, taxis, as well as all kinds of buses, vans, and trucks.³

8.12 In the two years since commencement of the congestion pricing scheme for the Namsan #1 and #2 tunnels, significant improvement in the traffic situation has been recorded in both corridors. During peak periods, there was a 34% reduction in passenger vehicle volumes, the average travel speed increased by 10 kph, and the number of toll-free category vehicles increased substantially (see Table 8-2). On the alternative routes, traffic volumes increased by up to 15% but average speeds also increased—this impact is a network effect caused by improved flows at signalized intersections linked to the Namsan corridors. Also, increased enforcement of illegal on-street parking on the alternative routes reduced obstructions.

Table 8-2 Traffic Volume and Speed Changes on Namsan Tunnel Corridors

Measurement	Before Pricing	12/1996	11/1997	11/1998
Traffic Volume (vehicles)	90,404	67,912 (-24.9%)	78,078 (-13.6%)	80,784 (-10.6%)
Speed (km/h)	21.6	33.6 (+55.6%)	29.8 (+38.0%)	31.9 (+47.7%)

Source: Kee Yeon Hwang, Bongsoo Son and Jin Ki Eom, "Effect of Congestion Pricing at the Namsan Tunnels in Seoul," *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 3, No. 4, September 1999

8.13 The annual revenue from the two tunnels is about 14.1 billion won.⁴ The entire amount of this revenue is invested in a special account for transportation and is spent exclusively for transport projects including Transport Systems Management (TSM) and Transport Demand Management (TDM) measures. However, the amounts spent are not necessarily related to the toll sites.

8.14 **TDM through Reduction of "Traffic Tax."** Another interesting TDM measure implemented in Seoul has been the use of a "traffic tax" reduction for business owners. This measure was introduced in 1995, and enables the Seoul Metropolitan Government to reduce the amount of "traffic tax" payable by business owners according to the type of TDM measures they implement. If a business owner, for example, agrees to implement measures such as employee carpooling, staggered work hours, company commuter buses, and/or provision of subsidies for public transport, the owner will benefit from a reduced "traffic tax" based on a predetermined schedule.

8.15 **Vehicular Taxes.** The government of the Republic of Korea imposed a number of car ownership and user taxes partly to alleviate congestion but also to conform to national policies aimed at encouraging saving and restricting luxury items. While the items subject to tax have remained largely the same, the applicable tax rates have changed and in more recent years have been reduced. The current ownership and operation taxes for motor vehicles are summarized in Table 8-3.

³ Diplomatic vehicles, government vehicles, and ceremony vehicles are also exempted from paying tolls.

⁴ US\$1=1,130 won as of June 2000.

Table 8-3 Vehicle Ownership Taxes (1999)

Stage	Type of Tax	Tax Bracket	Tax Base	Tax Rate	N or L [*]
Purchase	Special Excise Tax (SET) on vehicle	Four-Wheel Jeep	Vehicle Price	14%	N
		Autos <1500cc	Vehicle Price	7%	
		Autos 1500-2000cc	Vehicle Price	10.5%	
		Autos > 2000cc	Vehicle Price	14%	
	Education Surcharge (ET)	All vehicles	SET on Vehicle	30%	N
	Value-Added Tax (VAT)	All Goods and Services domestically produced and imported from abroad	Vehicle Price + SET + ES	10%	N
Registration	Registration Tax	New Record and Transfer Other Records (such as creation mortgage)	Vehicle Price	2-5%	L
	Acquisition Tax	New and Used Vehicles	Vehicle Price	2%	L
	Railway Bond	All vehicles	Vehicle Price	4-20%	L
Possession	Vehicle Tax	Private:			L
		Auto	Scale	80-220/cc	
		Bus	Year	65,000-115,000/yr	
		Truck	Year	28,500-157,500/yr	
		Commercial:			
		Auto	Scale	18-24/cc	
Operation	Transportation Tax	Bus	Year	25,000-100,000/yr	N
		Truck	Year	6,600-45,000/yr	
		All vehicles	SET on Vehicle Tax	30%	
		License Fee	Scale, Region	3,000-45,000/yr	
		Gasoline	Fuel quantity used	630Won/l	
		LPG		40Won/Kg	
Operation	Education Surcharge (ES)	Diesel		155Won/l	N
			SET on Transportation Tax	15%	
			Oil Price + Transportation Tax + ES	10%	

* N: National Tax, L: Local Tax.

Source: Korea Transport Institute (National Research Institute on Transportation).

8.16 The Special Excise Tax (SET) rates have been reduced since the mid 1980s. For example, in 1985, the SET for autos in the range 1500-2000 cc was 20% and for autos over 2000 cc was 40%.⁵ In addition, all vehicle purchasers were required to pay a no-interest, US\$1,000 bond, repayable after five years. This is now a local tax based on the vehicle price.

⁵ Sung-Soo Kim, *Seoul's Transportation Dilemma*, based on paper by Sung-Soo Kim, rewritten by Leslie Oringer, Harvard University, 1991, Exhibit 7.

Other former constraints on car ownership included a lack of credit availability and high insurance rates in part due to high accident levels.

8.17 For a representative motor vehicle (Sonata 2.0), the taxes and equivalent costs are shown in Table 8-4.

**Table 8-4 Vehicle Price and Ownership Taxes
on a Representative Car (Sonata 2.0), 1999**

Stage	Type of Tax	Price (won)	Percent (of veh.price)
Vehicle Price (without tax)		13,000,000	100.0
Vehicle Price (with tax)		22,641,564	174.2
Purchase	SET	1,365,000	10.5
	ES	409,500	3.1
	VAT	1,477,450	11.4
	Sub Total	3,251,950	25.0
Registration	Registration Tax	812,600	6.2
	ES on Registration Tax	162,520	1.2
	Acquisition Tax	325,039	2.5
	Bond: Subway	1,772,940	13.6
	Others	1,181,960	9.1
	Sub Total	4,255,059	32.6
Possession	Vehicle Tax	519,480	4.0
	ES on Vehicle Tax	155,840	1.2
	License Fee	36,000	0.3
	Sub Total	711,320	5.5
Operation	Transportation Tax	1,085,217	8.3
	ES on Transportation Tax	162,875	1.3
	Value Added Tax	175,143	1.3
	Sub Total	1,423,235	10.9
Tax Total		9,641,564	74.2

Notes: 1. Figures for calculation are assumed as follows; gas mileage: 12.0km/l, vehicle scale: 1,998cc, vehicle mileage per year: 20,000 km 2. License Fee is based on the region with the population over 0.5 million
Source: Hyundai Motor Company, *Automobile Industry*, 2000 (in Korean); and Ministry of Finance and Economy, *Korean Taxation* (in Korean), 2000.

8.18 In the 1980s, the Special Excise Tax (SET), at a rate of 100% for gasoline, and the VAT on fuel, combined to create high gasoline prices. Table 8-5 presents a comparison of prices for gasoline in major cities around the world. This shows the relatively high cost of gasoline in Seoul during 1983 but, while many other countries have increased prices in recent years, the price in Seoul has remained steady.

Table 8-5 World Comparison of the Market Value of Gasoline

City	Market Price of Regular Gas / Liter (1983 US\$) ^c	Market Price of Unleaded Petrol / Liter (1998 US\$) ^b	GNP per Capita ^a
London	0.70	1.33	23,405
Hong Kong	0.56	1.28	23,510
Paris	0.54	1.07	24,335
Seoul	0.85	0.84	8,580
Tokyo	0.59	0.81	34,720
Singapore	0.70	0.72	22,710
Bangkok	0.48	0.32	1,850
New York	0.33	0.32	33,790
Manila	0.49	0.29	1,050

a: Latest available figure from national and multilateral sources as published in Asiaweek, June 9,2000.

b: Consumer Council, A study of Motor Gasoline, Diesel and LPG Markets in Hong Kong.

c: World Bank, Urban Transport, A World Bank Policy study, 1986, Appendix Table, p.47.

8.19 Rationing of Automobile Use (Sippujae). The ‘Sippujae’ program prohibits the use of vehicles when the last digit of the license plate matches the last digit of the date. For example, if the last digit is 5 and the date is the 15th, the vehicle cannot be used in Seoul. This method was utilized during the 1988 Seoul Summer Olympics and again in 1995 between February and June. The times of restriction were Monday-Friday 06:00-22:00 and Saturday 06:00-15:00 (except the 31st day and National Holidays). The penalty for non-compliance was 50,000 Won.

8.20 An evaluation to determine the effectiveness of the system revealed a 7% reduction in total traffic and an increase in average vehicle speed of 14%. The vehicle speed in the CBD increased significantly by 37%.

8.21 Congestion Pricing Scheme. While the success of Singapore’s area license scheme (ALS) was evident to observers, it was argued that a similar scheme may not work in Seoul because the city has no ring road around the downtown that motorists could use to avoid the fees. Also, the Seoul subway and bus systems do not have the capacity to carry motorists diverted by the introduction of the scheme. A plan to expand congestion pricing in Seoul has since been developed but it is not based on the cordon pricing system of Singapore; instead, tests on tolling just a few sites are being carried out, with the objective of achieving a system that provides improved equilibrium conditions. This approach raises issues on equity in the selecting or exempting of sites. However, to date, the congestion pricing expansion plan has not been implemented due to political risks perceived by the new mayor. There are also plans to increase parking charges in the central business district either by taxing off-street parking spaces or restricting the number of on-street spaces. The existing parking policy tends to increase the supply of private parking space regardless of location including sites near rail stations.

C. ISSUES AND LESSONS

8.22 Strategies for Car Restraint Measures. A successful strategy depends on conformity and consistency; any conflicts in policy that arise can have undesirable effects. In Seoul,

constraints on car ownership rates became less in recent years as the average household income has increased almost threefold (between 1985 and 1995). In accommodating the consumer desires of the Republic of Korea's growing middle class while providing a stable domestic market for the country's developing automobile car industry, the government has reduced previous constraints. In particular, recent policy shifts have attempted to provide the middle class with moderate housing and lower-priced passenger cars. For example, the government has reduced special excise and registration taxes on automobiles and also reduced pollution standards for minicars, both of which will exacerbate urban congestion and road safety problems. Also, the fuel price (1,200 won per liter) is being held stable while the international market price increases.

8.23 Seoul's congestion pricing strategy differs from that of Singapore in that sites are selected for pricing rather than an entire cordon. While cordon pricing is generally considered to have greater effects on the overall transport network, Seoul's site-based strategy is being tested and has already proved successful in improving both the priced routes and the local network without causing the simple migration of congestion problems that may be expected. For example, the tolls charged at the two Namsan tunnel sites unexpectedly resulted in improved traffic speeds on alternative non-tolled routes.

8.24 The 'Sippujae' system of rationing automobile use was successful in achieving traffic reduction and improving traffic speeds. Since it applied to all drivers, with some exemptions, it was easy to enforce although enforcement and administration costs were generated. Furthermore, the system raised equity issues as the poor tend to use cars by necessity in work travel and less for leisure or convenience.

8.25 **Highway Planning and Traffic Management: The Need for Policy Integration.** While increasing the area devoted to road space cannot necessarily solve a city's transport problems in the long run, there will still be an optimum requirement within an integrated plan. Seoul is a case where insufficient space is devoted to the mobility of people and goods and the rapidly growing vehicle fleet outstrips road capacity. In addition, the pattern of major routes in Seoul is unorganized and incomplete with too much traffic focused on the central area; street capacity in the principal corridors is uneven resulting in random points of congestion.

8.26 A successful transport system depends on the assignment of vehicles to appropriate roads based on their trip purposes. Over half of all traffic approaching the central business district in Seoul is simply traveling across the city with no local purpose. Traffic controls are largely ineffective and cause greater time delays, higher vehicle volumes on particular routes, and greater congestion. Proposals have been offered to address this issue in Seoul through redesigning intersections as well as introducing one-way streets and bus lanes. The supply of parking facilities is currently inadequate to serve demand at reasonable prices and could be increased with appropriate restrictions to ensure that new traffic is not generated.

8.27 **Need for Changing the Role(s) of the Bus System To Achieve Effective Subway Development.** It is important to integrate services so that they complement each other within a transport strategy. For example, buses can act as feeders with no or low cost transfers to subway lines and avoid unproductive competition. However, many of Seoul's transport improvements have taken place in a relatively piecemeal manner and without an integrated

plan. While the coverage of bus services is comprehensive, it is also inefficient. The large number of buses combined with relatively little road and loading space creates congestion. The disappointing ridership and deficits of the Seoul subway at the outset can be explained by competition from bus services. Subway fares are higher than bus fares and the government has not implemented a plan to integrate and coordinate both modes. Through such integration and combined fare systems, the problem of increasing private vehicle use can be addressed more effectively.

8.28 The government did not proceed with a plan to integrate bus and subway services for a number of reasons. While the Seoul Subway Corporation supported such a plan to maximize revenue and recover huge losses, bus companies were opposed. They were concerned that a feeder network structure would not be profitable and viewed government intervention as an infringement on the operations of individual bus companies. The government was unable to determine the effect of an integrated plan on the small vulnerable bus companies and found conflicting objectives between preserving the privately operated bus system and the efficiency gains of integration. There were also concerns that integration could cause increased travel time and lead to higher costs due to transfers.

8.29 While free entry of bus services led to financial problems for the operators, unreliable services and an increased accident rate, the system of licensing bus routes indefinitely provides difficulty in route restructuring. Awarding licenses for a period of time may overcome this constraint.

8.30 **Application of Land Use Policy for Minimizing Travel Demand.** Land development should combine residential areas with employment opportunities. Growth of residential areas in Seoul has mainly occurred in separation from business areas, with the Han River serving as a divide. The resulting traffic volume that crosses the river, increasing by 10% each year, causes congestion and creates demand for new bridges.

8.31 Aspects within the new town policy in Seoul can also be viewed as exacerbating traffic congestion. Such new towns are located 50 km outside of the boundary of Seoul, but are linked to the city mainly via roads instead of high-speed urban rail. The rail service that is provided to the city consists only of extensions to existing subway lines within the boundaries of Seoul. As the distance between stations tends to be short, these lines do not constitute direct, efficient links. Thus, few new town residents use the rail system, preferring to use cars instead. The explanation for this low rail use may lie in the lack of an association of local governments that can coordinate competing interests among them. Also, the central government has its own railway company called The Korail, while the city of Seoul has two own subway companies. In many cases, these companies cannot agree with each other because they represent different administrative bodies.

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9

SINGAPORE: INTEGRATED TRANSPORT AND DECENTRALIZED DEVELOPMENT¹

A. CITY BACKGROUND

9.1 When Singapore achieved internal self-government in 1959, it suffered from overcrowding, poor sanitary conditions, and extreme poverty. The housing shortage was addressed during the 1960s with concentrated construction programs that ran in parallel with industrial expansion and social improvements. Policies to attract multinational companies serving global markets were introduced and Singapore soon benefited from the prosperous regional and global economic environment. By 1970, manufacturing had become the leading sector of the economy and poverty steadily declined.²

9.2 The Government's concerns turned to a potential shortage of commercial space and the inadequacy of the transport system. As incomes increased and housing programs moved people away from their workplaces, private transport increased dramatically, a situation that was exacerbated by slow and unreliable public transport, which had largely been neglected. The Government reacted by embarking on a number of measures to provide a transport system consistent with its ambitious priority of attracting multinational companies to Singapore.

9.3 Present-day Singapore boasts an internationally acclaimed transport system and is at the forefront of managing traffic at socially acceptable levels. Auto-restraint “sticks” have been complemented by pro-transit “carrots” and its long-term “constellation” development plan is designed to increase transit modal splits to among the highest in the world. In January 1996, Singapore's Parliament endorsed a vision for a “World Class Land Transport System.”

B. MAJOR URBAN TRANSPORT SYSTEM DEVELOPMENTS

9.4 **Overview.** In 1958 Singapore produced a Master Plan for physical development that prescribed concentric expansion of the city, limited by a green belt. Dominant radial roads to the West, North, and East, cut by semi-circular roads at increasing distances from the city core, would lead to new towns for population overflow and industrial estates.

9.5 During the 1960s ambitious targets for housing construction were set and a Housing and Development Board (HDB) was created. Funding was supplied by borrowings from a Central Provident Fund (CPF), a self-financing pension scheme.³ To accommodate anticipated demand, a large area (6,000 hectares) was set aside for industry. During the 1960s, there was

¹ This paper draws most extensively from Christopher Willoughby, *Motorization in Singapore*, Draft, 2000.

² Extreme poverty fell from 20% in the mid-1950s to under 10% in the early 1970s.

³ The CPF was established in 1955 by the colonial government and was funded by equal contributions from employees and employers in a fixed ratio to the wage paid.

a dramatic increase in private vehicles and the number of cars doubled and motorcycles tripled.

9.6 In 1970, the Government addressed a problem of uncoordinated bus services by amalgamating small Chinese-owned bus companies into three groups and required that they expand their fleets. At the same time, pirate taxis were banned. In 1971, a Concept Plan for physical development was formulated updating and modifying the original Master Plan; this Ring Plan contained a vision of satellite towns interconnected by mass rapid transit (MRT) around the urban core. The Plan recommended a more dynamic and activist role for the Government and emphasized the need to prepare for a much larger population over the long term. Settlements were to be connected by both expressways and rail mass transit lines, particularly to serve journey-to-work travel.

9.7 In 1972, the Government attempted to restrain vehicle growth by increasing import duties, the annual road tax for larger cars, and the Additional Registration Fee (ARF). In 1973, the bus groups merged into a single national company, Singapore Bus Service, and one year later the Government increased ARF and the annual road tax again. An Inter-Ministerial Road Transport Action Committee then recommended restraints on the use of cars in the Central Area. Following this recommendation, an Area License Scheme (ALS) that restricted access to the central city area was introduced

9.8 In 1981, increasing concern over a shortage of commercial space prompted an end to public housing construction and urban renewal programs. In 1982, the Government decided to build a Mass Rapid Transit System, which was finally completed in 1990. In 1983, Trans-Island Bus Services was created to serve the northern new towns. At the end of the 1980s, the Government expanded the ALS to impose further restrictions on time periods and exempted vehicles.

9.9 The 1990s were notable for developments in road pricing. In 1995, a pilot Road Pricing Scheme was introduced on the East Coast Parkway and later extended to other expressways near downtown Singapore. In 1998, automatic Electronic Road Pricing was introduced and replaced the Area License Scheme.

9.10 The revised 1991 Concept Plan is structured in three stages up to 50–70 years in the future. Most notably, it replaces the ring concept with a constellation scheme featuring an expanded central business area with inner city housing, with orbital regional centers, in turn surrounded by smaller centers with self-sufficient communities, all interconnected by MRT.

9.11 **New Town Development.** Centralized planning enabled the relocation of residents from overpopulated slum housing to modern, high-rise housing units. The 1971 Ring Plan established the basis for new towns containing high-density housing, industrial sites, and urban centers in a ring around the urban core and interconnected by an efficient MRT network. This plan was largely enabled by the Land Acquisition Act of 1966, which empowered the state to take land for public purposes and subsequently increased state holdings from 31 per cent in 1949 to 76 per cent in 1985.

9.12 Singapore's 20 new towns were planned to accommodate the later arrival of mass transit. Tampines is an example of a rail-served new town consisting of eight neighborhoods,

which surround the town center; these neighborhoods contain around 5,000 mid- and high-rise apartments, located within a ten-minute walk of central facilities. Housing planners provided inexpensive, standardized apartments of all sizes catering for all social strata and by 1995 had accommodated 87 per cent of the population in apartments within the island's new towns, from which most residents commute via public transit.⁴

9.13 Multi-Centered Development. Rail and various land uses have been integrated to facilitate transport objectives and gain real estate profits. High-rise developments are located above or adjacent to stations as retailers seek to capitalize on the public housing population. Decentralized employment has been facilitated through planned industrial estates, which have further contributed to the pattern of multi-centered settlement.

9.14 Innovative Car Restraint Measures. The most notable measures designed to restrain the use of private motor vehicles in Singapore have been the Area License Scheme (ALS), the Vehicle Quota System (VQS), and Electronic Road Pricing (ERP). Each is described below.

9.15 The Area License Scheme (ALS). This scheme required all cars entering a designated restricted zone, covering most of the Central Area, to display a license in peak morning hours unless they were carrying three passengers (including the driver). The system was paper-based and enforced manually by observers stationed at zone entrance points. Charges were incurred both for licenses⁵ and parking, with such charges structured to deter long-term parking. ALS was later extended to cover the whole day, and other aspects, such as vehicle exemptions, were fine-tuned. It has been credited with moving travelers onto trains and buses. The business community also reacted favorably to the ALS scheme as there was a perception that employees enjoyed easier access and goods movements became easier. While retail sales were already not growing substantially, the scheme was not blamed for any adverse impacts on sales.

9.16 While ALS appeared to meet its objectives,⁶ it did receive some criticism. Some argued that the price of an ALS license was set so high that it caused unnecessary inconvenience and did not allow for optimum use of road space. Congestion shifted to just before and after the restricted hours and also moved to the peripheral ring roads. Despite improved traffic speeds at peak hours, there were indications that work journey times were longer than they were before the scheme. Evidence in 1990 again indicated substantial under-utilization of road space during the morning peak and estimates were that the price of a license was 50% too high. The Government, however, appeared to place greater priority on long-term car restraint than optimization in the short term.

9.17 The Vehicle Quota System. The aim of this system is to constrain vehicle growth to an acceptable rate. The Government decides an acceptable rate of growth for the vehicle fleet and then auctions a corresponding number of additional licenses. Under the system, prospective purchasers of new vehicles are required to secure a ten-year license known as the Certificate of Entitlement (CoE), which can be purchased through a bidding process at quarterly auctions. The CoEs are made available at the price offered by the lowest bidder

⁴ In 1990, 72.3% of high-rise public housing residents commuted by public transit.

⁵ The initial license price was S\$3 per day (S\$60 per month) while the monthly core parking price was S\$70.

⁶ Traffic volumes during morning peak hours fell by 45% (70% for cars) and average speeds increased from 18 to 35 kph.

whose acceptance, with that of all those who bid higher, would exhaust the predetermined supply. Companies are required to pay twice this price (quota premium) due to corporate tax deductions. Vehicles acquired before the system was introduced required a CoE only when they reached ten years of age. In order to protect less wealthy consumers and to make the market more flexible, various vehicle sub-categories were introduced. However, these created complexities and distortions and, since May 1999, the number of sub-categories for cars has been reduced to two.

9.18 As of January 1995 and 1996, the CoE prices were as follows:

Table 9-1 CoE Prices (Fees for Vehicle Ownership License)

Category	CoE Prices (1995)	CoE Prices (1996)
1,000 cc & below	S\$22,200	S\$19,000
1,001-1,600 cc	S\$40,001	S\$43,100
1,601-2,000 cc	S\$61,500	S\$30,008
2,001-& above	S\$65,000	S\$50,003
Goods vehicles and buses	S\$31,996	S\$23,888
Motorcycles	S\$2,002	S\$3,208
Open Category	S\$69,000	S\$55,002

Source: Singapore Land Transport Authority, Homepage [<http://www.lta.gov.sg/index.htm>]

9.19 The CoE prices rise to balance supply and demand and have halved vehicle population growth from 6% to 3% per year since the system began in 1990; this achievement is considerable when viewed in the context of the rapid rise in per capita incomes in Singapore. However, the administrative costs for the system are extremely high as there are as many as 15,000 bids each month. Also, it is difficult to determine the optimal quota since the demand and cost for CoEs are not known perfectly. For this reason, prices of CoEs are sometimes over- or under-estimated. At times of low CoE supply, prices can rise dramatically, or at least remain high. The public has subsequently put pressure on the Government to modify the existing system in order to depress significantly high prices.⁷

9.20 *Electronic Road Pricing.* Singapore's ERP system has been fully operational since September 1998. It works on principles similar to ALS, which it replaced, with the extension to approach and bypass roads. Vehicles are required to have an electronic in-vehicle unit (IU) that accepts credit in the form of a smartcard. Tolls are automatically paid when the vehicle passes under a gantry and a liquid crystal display indicates the current credit balance. Tolls do not fluctuate in relation to actual traffic volumes but are adjusted quarterly to ensure optimum traffic speeds. The system cost S\$200million to implement, half of which was for the free fitting of IUs.

⁷ The CoE price for mid-sized cars (1,001-1,600 cc) was as high as S\$43,100 in February 1996 and its peak price was S\$56,600. In 1971 a basic car cost 3.6 times the per capita GNP and gradually became more affordable to 2.7 times per capita GNP in 1986. Following VQS, a basic car rose to 4.5 times GNP/capita in 1994. In June 2000, the Land Transport Authority (LTA) received a total of 17,546 applications for the July 2000 Certificate of Entitlement (CoE). Of these, 9,122 were successful. The CoE price for category A (cars 1600 cc and below) was set at S\$38,499 and for Category B (cars 1601 cc and above) S\$35,880.

9.21 The ERP system was not implemented to generate more revenue for the Government. In fact, the Government's revenue from ERP is about 40 per cent less than the revenue previously collected from the Area Licensing Scheme. Instead, the ERP system enables greater responsiveness in setting charges that are just sufficient to keep the roads free of congestion. In general, ERP charges are less than the corresponding ALS and RPS license fees. For example, a car driver entering the restricted zone during the off-peak periods pays S\$1.00 in ERP charges instead of S\$2.00 paid previously for a part-day ALS license. Nevertheless, because of the ERP system's per-pass charging principle, some motorists who use the priced roads more often now pay more. This system is considered fairer as under the previous license scheme motorists who made single passes were actually "subsidizing" heavy road users who made multiple passes on their licenses.

9.22 After new traffic patterns stabilized, measurements showed that week-day traffic volume entering the restricted zone had dropped from 271,000 vehicles per day to between 206,000 and 216,000, some 20 to 24 per cent less. With lower traffic volume, average traffic speeds in the zone increased from 30-35 kph to 40-45 kph. Improvements are less clear on the three expressways in the ERP scheme, but the Land Transport Authority is reviewing ERP charges to further optimize traffic flow.

9.23 **Generation of Revenue from Motor Vehicles.** The taxes and charges relating to vehicle ownership and usage in Singapore generated sufficient revenue to cover the initial construction phase of a mass rapid transport system. Table 9-2 shows such revenue sources from 1985.

Table 9-2 Revenue Sources from Motor Vehicle Related Taxes, Fees and Charges
(Million S\$)

Fiscal Year	Vehicular Ownership Taxes & Charges				Vehicular Use Taxes & Charges			Total Owner -ship	Total Usage Taxes / Fees	TOTAL
	Import Taxes	Regist-ration Fees	Road Tax	Vehicle Quota System	Area Licence Fee	Oil Duties & Tax	Traffic Fines			
85/86	56	166	391	-	14	444	na	613	458	1071
86/87	59	143	410	-	15	399	na	613	413	1026
87/88	139	350	417	-	14	351	na	907	364	1271
88/89	275	849	486	-	16	375	25	1610	416	2025
89/90	286	916	553	-	30	544	35	1755	608	2364
90/91	218	668	572	186	35	550	40	1645	625	2270
91/92	269	733	600	506	35	628	45	2108	708	2816
92/93	310	873	631	888	39	645	34	2701	717	3418
93/94	418	1214	693	1574	47	694	45	3900	785	4685
94/95	376	1219	744	1989	80	662	57	4328	799	5126
95/96	350	1253	800	1752	87	683	52	4154	821	4975
96/97	315	1122	845	1893	na	710	42	4175	751	4926
97/98	281	877	836	2478	na	723	38	4471	761	5232
98/99	270	465	645	1507	na	640	38	2887	678	3565

Sources: Accountant General, Financial Statements 1986-97; The Budget 1988-99; Annual Report of the Inland Revenue Department 1986-98; Yearbook of Statistics 1990, 1999.

9.24 Mass Rapid Transit. Singapore's MRT took the form of a full metro system operating with 500 cars of rolling stock in six-car sets over 80 km and 48 stations. Revenue is controlled by self-service ticket machines and automatic entry/exit barriers all controlled by central computer. Although patronage of the mass rapid transport system fell substantially short of first-year projections, it grew steadily, particularly with new additions to the network that created a complete loop. Daily ridership increased from 370,000 in 1990 to 676,000 in 1992 and about 1 million in 1997. In Asia, only Hong Kong, which is three times as dense as Singapore, has as much transit use per capita. Major expansions are planned including light rail local feeders and improvements to make stations the hub of transport activity creating seamless journeys.

9.25 Complementing the MRT are privately owned bus services under license to the Government of Singapore, which provide feeder services to the MRT stations as well as cross-town links. All of Singapore's bus services generate substantial profits and carry more than 3 million passengers a day, three times as many as the MRT.

9.26 Modal Share. The following Table 9-3 shows the modal split for Singapore for each category of transport over three different years. It table highlights a steady increase in rail transit use; while bus commutation has decreased, it still remains a significant mode of travel⁸ and an important feeder service to MRT. In most new towns, buses accommodate about one third of the trips to MRT stations while the remainder mainly walk. The table also shows that excessive growth in private car use has been avoided.

Table 9-3 Modal Share in Singapore (%)

Vehicle Class	1980	1990	1995
Automobiles	13.6	16.1	20.2
Bus Only	51.2	36.3	29.2
Van Only	4.8	11.2	9.5
MRT Only	0.0	5.0	6.8
MRT + Bus	0.0	5.4	7.7
Motorcycles	5.4	4.9	4.9
Walk	17.3	12.8	12.8
Other Modes	7.7	8.3	8.9

Source: A.T.H. Chin, "Transport Policy in Singapore - Bound for the World-Class-System," *Transport and Economics*, Vol. 59, No. 2 (in Japanese), 1999

C. ISSUES AND LESSONS

9.27 Rationing Road Space to Control Congestion. Where road space is scarce, it can be treated as a valuable commodity rather than a physical constraint. Rationing, such as that introduced through Singapore's road pricing, can be used to control congestion. The overall shortage of space in Singapore was considered to largely rule out any significant increase in road area in the city. A very restrictive approach therefore became necessary and the

⁸ Singapore's buses carry over three times more passengers each day than MRT and a bus stop is within a five-minute walk of nearly all new town residents.

inelasticity of car demand was effectively utilized in the policies adopted. Alternative methods of rationing can be administrative or involve traffic calming based on the reallocation of road space.

9.28 Effects of Car Restraint Methods. Singapore largely adopted the principle that aggregate taxation on motor vehicles and their operation should at least cover the costs of the externalities they cause and of the infrastructure networks they use. Furthermore, it is generally accepted that car restraint addressing car use rather than car ownership is preferable and should be sought at the earliest opportunity. While the balance of Singapore's car taxation was based on ownership, it slowly shifted to use, providing a fairer system.⁹ The initial dependence on car ownership taxes exhibited a bias in favor of those who could afford to pay and therefore led to feelings of unfairness, which were compounded since the high taxes encouraged owners to make full use of their vehicles. Singapore subsequently exhibited high average car utilization. Similarly, VQS tended to promote the purchase of larger, more expensive cars as the premiums were proportionally less.

9.29 A paper-based area licensing system can be an effective early traffic management tool and Singapore has shown that in the long run it can be smoothly replaced by electronic methods, thereby providing a more flexible, less labor-intensive system, and achieving optimum use of available road space. It is most suitable when the number of toll points is small and enforcement is efficient. Experimentation in the application of pricing for urban traffic management is worthwhile even if mistakes arise. Even with overcharging, the main objectives are met. Ultimately, electronic road pricing can be expensive to implement but has lower administrative costs. Although the potential benefits of road pricing are broadly recognized by experts, it can be difficult for the public to accept, as seen in Hong Kong's rejection of ERP in the 1980s. It also has some social effects; for example, it may change people's shopping behavior and affect business in the restricted area.

9.30 Use of Available Funding Sources. Methods to resolve the financial problems inherent in transport improvement need to be addressed at the earliest stage to "jump-start" a reinvestment process leading to a successful transport system. The Government of Singapore adopted an ambitious approach of attracting foreign investors and subsequently increasing the value of its limited land resource. In order to achieve this objective, an attractive environment became an early priority and attention quickly focused on the problem of funding its creation. Financial problems were solved mainly by using Central Provident Fund resources and land value gains against a background of rising motor vehicle taxation. The road transport sector gradually became a large fund generator and allowed investment in many aspects of the economy including beneficial tax incentives as well as mass rapid transit.

9.31 Integration of Transport Modes. Singapore has helped to show that maintaining and developing coordinated public transport, particularly alongside car restraint measures, is integral to the success of transport in a city and is best realized when fares offset costs. Buses provide feeder services to MRT and fares and timetables for rail and bus services are integrated. Singapore boasts the world's first stored-value fare card that can be used

⁹ The distributional effects of a vehicle quota system are greater than those of a system more directly regulating vehicle use in that a vehicle quota system totally denies car ownership to some segments of the population; in June 2000, only 52 percent of the applications for Certificates of Entitlement were successful, given the constrained supply.

interchangeably for bus and rail travel. Officials have also recognized that the MRT system needs to be expanded and are seeking to upgrade feeder connections and add tertiary systems such as “travelators” and grade-separated sidewalk networks.

9.32 While Singapore has demonstrated success in achieving a balanced public transport system, a cohesive transport plan requires all modes of transport to be addressed. In this respect, facilities to encourage bicycle use could have been explored more fully. Despite Singapore’s relatively flat topography and short trip distances, only about 2% of journeys to work are undertaken by bicycle.

9.33 **Land Use Planning to Reduce Trips.** The location of concentrated housing areas clearly has an impact on trip distribution—if more people had been retained in or near the Central Area,¹⁰ this would have affected the required level of long-distance passenger transport and reduced congestion on major arteries. However, the Government is seeking to address these issues through its latest constellation plan, which will take commerce and industry to the already decentralized workforce.

9.34 The location of workplaces will affect trip demand and length. The main new industrial estates in Singapore were relatively isolated from residential areas resulting in transport problems for employees that could have been avoided by providing neighboring housing. Labor pools in areas of the new towns could have been employed locally by attracting private developers to make some investment in these less expensive areas.

9.35 **The Importance of Efficient Planning Procedures.** A lack of planning and neglect underlie the transport problems of cities. The Government of Singapore recognized that most major cities in the region were experiencing the effects of an increasing population without appropriate transport infrastructure or management. It therefore sought to avoid widespread vehicular congestion, avoiding the harmful effects of pollution, while attracting and establishing international business. The strategy that Singapore adopted to address transport problems was to ration scarce physical space by the price mechanism and promote innovative techniques for transport management.

9.36 Although earlier treatment of the problems with bus companies could have averted reliance on private transport and relieved some of the increasing pressure on the authorities, the Government reacted with carefully planned decisions and strategies. Singapore has also benefited from being a small island state; without multiple levels of government, it has demonstrated an efficient and uninterrupted approach to public sector decision-making to which the public complies and respects. A further reason for Singapore’s success in planning is its Government’s approach to human resource management; some of the best university graduates become civil servants with salaries comparable to those of the best-paying private sector jobs.

9.37 **Centralized Planning.** Singapore’s single-party rule allows sufficient political unity and stability for highly centralized planning, which allows for uninterrupted, top-down decision-making, which in turn facilitates efficient plan implementation. In particular, nearly all development and redevelopment projects are planned and executed by the Urban Renewal

¹⁰ Between 1970 and 1980, there was a large transfer of population out of Singapore’s Central Area to areas some 7-11 km away.

Authority (URA), which prepares conceptual and master plans and is therefore in a good position for coordinating development.

9.38 Effective Land Use Planning. Singapore efficiently links transport and residential settlement patterns with land use effectively guiding transport investments. The Land Acquisition Act was notable in reducing the cost of building transport infrastructure for the new towns, which could otherwise have proven to be a major financial obstacle. The strategy of decentralization to minimize an overcrowded core and concentrating development in mixed-use nodes was successfully employed in Singapore. The proposed Constellation Plan will further continue the decentralized approach by creating more self-sufficient communities, thereby limiting commuting demand.

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10

TAIPEI: INTEGRATING TRANSPORT WITH URBAN REDEVELOPMENT

A. CITY BACKGROUND

10.1 If Taiwan were a country, it would be the second most densely populated in the world, after Bangladesh, with some 28% concentrated in the city of Taipei. The population within the city was 2.6 million and 6 million within the metropolitan area in 1997. Taipei, with a history of about 120 years, has been transformed in its modern era into a focal point for Taiwan's industries. The city's economic growth, mainly through secondary and tertiary industries, has resulted in accelerated urbanization and an overloading of public services.¹

10.2 Taipei's transport infrastructure has not kept pace with the overall growth of the economy and the accompanying rise in living standards. Roads are generally narrow, even in the high-density western districts. Due to increased auto ownership, the city's once extensive bus system is facing substantial decreases in service levels and patronage. Although some bus priority measures have been successfully implemented, and part of a Mass Rapid Transit (MRT) system is in operation, early completion of an urban rail network has become one of Taipei's most important policy objectives.

B. MAJOR URBAN TRANSPORT SYSTEM DEVELOPMENTS

10.3 **Overview.** In 1968, the city government drafted the Taipei Urban Planning Outline with plans for urban development to accommodate 2.5 million residents. In 1970, the Ministry of Transportation and Communications established the Transportation Planning Board, which took responsibility for setting priorities and investment in transport. The first Taipei City Comprehensive Development Plan was produced in 1979 for long-term development based on a total population of 3.5 million. The previously established Transportation Planning Board was a provisional organization and soon lacked sufficient resources to address the city's increasingly complex transport problems. Therefore, the Institute of Transportation was created in 1985 by merging the Transportation Planning Board with the former Institute of Traffic Research. The institute has the mandate to conduct traffic research and is a formal branch of the government.

10.4 In common with most other fast-growing Asian cities, Taipei has experienced a substantial increase in auto ownership, with registrations increasing from 533,000 in 1980 to 1.53 million in 1997, an annual average increase of 6.5 percent. During the same period, the number of passenger cars increased 10 percent per annum and motorcycles 5.5 percent. Table 10-1 shows private motor vehicle growth in the city of Taipei and illustrates the high

¹ About 99 percent of the total labor force works in secondary (35%) and tertiary (64%) industries.

use of motorcycles. It also shows rapid growth in the registration of cars between 1985 and 1990 paralleled by a small increase in motorcycle registration.

Table 10-1 Vehicle Registration in Taipei City

Vehicle	1980	1985	1990	1995	1997
Cars	105,000	192,000 (+13%)	389,000 (+15%)	512,000 (+6%)	550,000 (+4%)
Motorcycles	351,000	586,000 (+11%)	598,000 (+0.4%)	735,000 (+4%)	872,000 (+3%)

Note: Figure in brackets show annual average increases.

Source: Department of Transportation, Taipei City Government, 1998

10.5 Decrease in Bus Ridership. The long absence of an MRT system caused substantial growth in bus services in past years. However, the increase in auto ownership exacerbated traffic congestion, and this, in turn, led to a decrease in bus service levels. Also, the bus route network was inefficient including many overly circuitous routes. The quality of public transport deteriorated leading to a decline in ridership. Table 9-2 shows the change of modal split in Taipei in 1980, 1990, and 1996. Noteworthy points are that:

- The share of bus transport decreased from about 62% in 1980 to just 22% in 1996.
- The share of urban rail remained largely unchanged.
- Trips made by car increased substantially from about 3% in 1980 to over 33% in 1996.

Table 10-2 Modal Split in Taipei, 1980, 1990, and 1996

Mode	1980	1990	1996
Bus	61.8	26.4	22.4
Commuter Rail	1.5	0.4	1.2
MRT	-	-	0.2
Taxi	3.8	11.0	10.2
Car	3.4	17.9	33.8
Motorcycle	15.2	32.2	32.2
Other	14.3	12.1	-
TOTAL	100.0%	100.0%	100.0%

Source: Feng Shen Minh, "Urban Transport System in Taipei (Taihoku no Toshi Koutsu)," *Transportation and Economy (Unyu to Keizai)*, March 1999 (in Japanese)

10.6 Bus operators have suffered more recently due to the MRT. For example, one bus company witnessed reductions of 50% in daily revenue following the opening of the Tamshui Line. In light of this experience, the company reorganized its bus routes to provide short-route feeder services rather than directly competing with the new Hsinchung Line.

10.7 Bus Priority Measures. In recent years, dedicated bus lanes have been implemented to improve operations on eight major corridors with the lanes extending 47 km and covering 114 bus stops.² These lanes have increased ridership and the 334 bus lines now carry 1.8 million passengers per day.

² Taipei spent US\$9 million on this project.

10.8 Mass Rapid Transit (MRT) System. Although the city's high population had indicated a need for MRT for sometime, its introduction was delayed because the compact urban areas were deemed sufficiently served by well-developed trunk roads and buses. However, subsequent growth in population, the economy, and vehicle ownership finally provided sufficient pressure for the construction of an MRT system. The existing metro lines largely relieve pressure on the highways by offering commuters an alternative within the transport corridor.

10.9 The decision to build a metro in Taipei was approved in 1986 and construction began in 1988, the target being to have the entire initial network by 1998, and the first line open by the end of 1992. This target was not achieved—it was only in 1996 that the first rapid transit line, the medium-capacity Mucha Line (10.9 km), commenced service, five years later than scheduled. In 1997, the first heavy-capacity transit line, the Tamshui Line (22.8 km), began service. The Hsinchung Line (5.4 km) was opened in 1999 and a total of 39.1 km of MRT system is now in operation. The first line is elevated along its entire length and has 12 stations. The Tamshui Line was the first of the heavy metro routes and is partly elevated to avoid level crossings and also has underground sections. Besides these lines, two others are under construction and are to be in operation by the end of 2000. When the last line is completed in 2007, the Taipei metro will cover some 88 km with 80 stations and 450 cars of rolling stock. A further six lines totaling 108 km and including an orbital route are being evaluated. The feasibility of LRT feeder systems is also under investigation.

10.10 Mucha MRT Construction Problems. The Mucha Line suffered many problems during its construction leading to delay. Shortly after work had commenced on the project, Taiwan's political, economic, and social environment entered a period of change that affected the timetable and added unexpected problems. There was resistance from the public over land acquisition, a labor shortage following the expansion of Taiwan's "bubble economy," and problems in the unprecedented coordination of over 40 departments and organizations by the newly established and inexperienced city government's Department of Rapid Transport Systems (DORTS).

10.11 The public also became disillusioned at the inconvenience and environmental impact of the construction works resulting in a gradual loss of public support. The lifting of martial law also effectively permitted political opposition parties to publicly condemn the government's undertakings in the project and to expose any failings. Technical problems arose in the structure of the system as cracks were observed in beams supporting the trackbed. The rolling stock of driverless railcars, provided by French supplier Matra, encountered problems at the test stage due to the unexpected complexities of working with four-car trains rather than the two-car system that the company had previously developed. Some test failures occurred thus increasing concerns over safety and exacerbating general dissatisfaction. The confidence and morale within DORTS began to collapse and the project was jeopardized. Ultimately, an independent inspection was carried out to assess whether the project could be salvaged resulting in over 100 improvements largely including reinforcement works. Following these improvements, the line was initially opened for two hours per day; three weeks later it began running at full capacity.

10.12 The construction problems subsequently caused conflict between DORTS and the state-run Taipei Rapid Transit Corporation (TRTC, which manages network operations) on whether the line was safe to operate. Matra Transport, the French company contracted to build the line, also had a series of disputes with DORTS and TRTC, and the company was eventually awarded NT\$1.13 billion in damages for delays and cost overruns.

10.13 **Mass Transit Patronage.** Ridership on the Mucha and Tamshui Lines increased from 20 million in 1996 to 80 million in 1998. When the Tamshui Line was opened, it carried 40,000 passengers per day and that increased to 160,000 per day by the end of 1998. The most significant improvements have been in the suburbs and satellite townships served by the metro lines, which are being revived due to the removal of congestion on routes to the city center. The introduction of metro services has caused a corresponding increase in the use of buses. Annual patronage rose from 1.8 million in 1996 to over 2 million in 1998;³ in 1999, fares on the Mucha and Chungho Lines were reduced to increase patronage. TRTC also offered to subsidize taxi and bus operations in view of the effect of reduced MRT fares. The subsidy would be used to establish 50 shuttle bus lines and to set up taxi stations near MRT stations.

10.14 **Integrated Ticketing.** TRTC is proposing to introduce an integrated circuit (IC) card designed to integrate the bus and MRT stored-value cards that currently operate independently. The card will keep a comprehensive record of each transaction allowing easy and accurate financial calculations. Bus tickets in Taipei have evolved from paper vouchers in 1981, to tickets and later tokens collected by bus drivers in 1986, coins in 1989, and finally the plastic stored-value cards used since 1995.

10.15 **Central City Redevelopment.** The redevelopment of central city areas is taking place as districts can no longer support demand for urban facilities. This redevelopment not only alleviates urban concentration and improves the quality of the environment, but it also provides the opportunity for incorporating hubs of transport activity. For example, the underground mall complex planned for the city's central district will provide a network of walkways, increase parking space, and aid the transfer and dispersal of MRT passengers. The Hsinyi urban subcenter, 5 km east of the old central district, is being developed as a high-quality urban environment and includes a hierarchical road system of primary, secondary, and service roads. The primary roads are arranged in a swastika-like pattern to discourage through traffic and MRT lines and stations are constructed within the district.

10.16 **Economic Effects of Mass Rail Transit.** MRT not only produces direct effects in improved journey times, but can also create invisible benefits such as increased productivity and consumer spending. TRTC has estimated that the Hsinchung Line will generate NT\$1.98 billion worth of economic benefits excluding ticket revenue. The tourism sector in Taipei has particularly benefited; for example, the Mucha Line was responsible for significantly increasing the number of Taipei Zoo visitors due to the location of the zoo at the end of the line. Other recreational areas have increased customers and more leisure-based businesses have been established in locations close to the rail lines.

³ However, despite the improvements in public transport, private vehicle use, particularly use of motorcycles, continues to increase.

10.17 MRT has had a positive effect on land prices—while real estate values have generally been decreasing, residential and commercial land values in the Tamshui area have increased. However, the relatively high land prices can reduce the returns from retail outlets and for this reason high expectations from retailers have not been realized.

C. ISSUES AND LESSONS

10.18 Importance of Bus Priority Measures. Taipei experienced a sharp decline in bus patronage during the last two decades. In the Taipei Metropolitan Region between 1980 and 1996, bus transport's modal share decreased by 40%, a decline caused mainly by increased auto ownership, traffic congestion, and decreased bus speeds and reliability. The city reacted by constructing exclusive bus lanes totaling 47 km, which resulted in a 35 percent increase in bus speeds, and a 4 percent increase in ridership. A public opinion survey conducted in 1996 showed that more than 70 percent of Taipei residents supported the construction of bus lanes.

10.19 Relation between Auto Dependence and Environmental Degradation. Taipei is a city developed in a basin prone to air pollution. With an increasing number of cars and motorcycles, 90 percent of the pollutants in Taipei are now emitted by these mobile sources. The Taipei experience demonstrates the serious consequences of developing auto dependency in a pollution-prone, basin city.

10.20 Urban Rail Construction—Better Late than Never. With its population of over 6 million, Taipei is now realizing the limitations of road-based public transport, and is therefore accelerating the construction of MRT. Once all the planned lines are constructed, the city will have a total of five lines and 88 route-km. National, provincial, and municipal governments are all contributing to the construction cost, and the introduction of private funds is also under consideration. However, construction of the Mucha Line highlighted the problems that MRT projects may experience due to their size and complexity. While public acceptance of urban rail projects in developed countries usually reflects a history of constructing such projects, the citizenry of less developed countries have not yet adapted to such technology and are uncertain of it. The lack of public confidence when problems are encountered tends to place considerable pressure on engineering staff, who are constantly forced to defend themselves.

10.21 The decision to construct several lines at similar times has been cited as one reason for Taipei's problems in implementing MRT. This decision did not allow for the accumulation of experience and knowledge to be applied to new projects or for lessons to be gained from mistakes. The benefits of a combined budget application to the central government and the commitment toward improving transport have been highlighted as reasons for this approach. The recently opened Hsinchung Line was opened ahead of schedule and no doubt benefited from lessons learned during the previous projects.

10.22 The construction difficulties in Taipei are further attributed to the approach of dividing the project into many bid packages. The government considered the entire project too large for local prime contractors and therefore sought multiple contractors. However, this contracting approach led to difficulties in coordination and the assignment of responsibilities, which resulted in a chain of accusations when unexpected problems arose. Such experience influenced the national government to adopt the BOT approach for the Taiwan High Speed

Rail Project, but this was then viewed by small construction companies, who were unable to compete, as favoring large corporations. This reaction in turn may have influenced the government to maintain responsibility for construction of one line of the Kaohsiung Mass Transit Project though sub-contracted packages and to use BOT for the other.

10.23 Need for Better Coordination in Planning. The Taipei Metropolitan Area encompasses the city of Taipei and surrounding areas in the county of Taipei. However, there are notable differences between the city and the surrounding county areas in terms of revenues and expenses, levels of public service, and the quality of life of residents. Furthermore, there is little coordination between the city and the surrounding areas in the formulation of comprehensive development plans or in the administration to implement them. It is important that an appropriate administrative structure be established to find an integrated solution to the problems of the greater metropolitan area, either by expanding the jurisdiction of the city or by achieving closer coordination between the city and county governments.

10.24 Importance of Integrating Urban Transport and Redevelopment. In the past decade, the government has reacted to the deteriorating environment by investing in appropriate infrastructure. It has identified a number of humanitarian, economic, international, and cultural objectives and, in transportation, the city will strive to create a quality system of comfortable public transport with a comprehensive network of roads, parking space, and pedestrian walkways. The basis for these objectives is not only investment in transport facilities, but also a framework of redeveloped city sub-centers with multifunctional urban space, which will also seek to preserve traditional culture.

10.25 Restraints Caused by Land Costs. While redevelopment can be helpful in improving outdated infrastructure, land costs can prohibit this course of action. In Taipei, land and housing prices have risen sharply making it difficult for authorities to acquire land for public use⁴. Furthermore, the floor area ratio within Taipei's old city district already exceeds that of the present development standard, which limits urban development prospects. This problem can be overcome by permitting a higher floor area ratio although the acceptability of increased densities within a particular city is another issue.⁵

10.26 Planning and Redevelopment. Construction projects can become outdated as society changes. Taipei has engaged in a number of large-scale projects in the past 50 years, most recently in response to altered or neglected social needs. It is important that systems be formulated so that as the city develops and society continues to change, appropriate responses can be made. A rationalized governmental administration system is important, as is close cooperation between the public and private sectors.

⁴ Land acquisition approaches utilized in other cities include expropriation supported by government legislation, land readjustment, and safeguarding of rights of way.

⁵ The Hsinyi Urban Subcenter Project was designed in accordance with the floor area ratio of 560% for the district, excluding residential zones. In comparison, Bangkok permits generous FARs of 1,000% across the country. In Japan, the maximum permissible FAR is 1,000% but this is limited to only a few zones in central Tokyo; the limit is usually 600% for urban districts and in the range of 100-200% for residential districts.

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11

FINANCING URBAN TRANSPORT

A. OVERVIEW

11.1 The capital costs of large transport projects, particularly of urban rail, are high and difficult to finance as most governments are under increasing financial pressures. Even Japan has suffered severe financial difficulties in funding urban rail investments due to the high initial costs. It is therefore important to secure financial resources and allocate responsibilities effectively. For the financing of urban rail projects, a number of fundamental issues need to be considered. For example, the construction and operation of urban rail can be separated and carried out by either the public or private sector. The public sector itself can involve direct government control or take the form of a public corporation.

11.2 Since urban transport schemes mainly produce local benefits, it follows that local as opposed to national government should maintain an active administrative role. Construction costs can be offset directly through fare revenue and indirectly through the capture of land development profits. In this way, central government assistance or dependency can be avoided. Increasingly, the private sector is engaged in the procurement of transport projects, with the objective to transfer financial risk thereby relieving the burden on governmental budgets.

B. PUBLIC FINANCE FOR THE CONSTRUCTION OF TRANSPORT INFRASTRUCTURE

11.3 There are a number of alternative public financial approaches available to governments for the construction of transport infrastructure such as capital contributions, bonds, loans, subsidies, value capture, business revenue, and government property tax revenues. Capital contributions, for example, involve direct capital investment by central or local governments but are not usually sufficient to cover the entire cost of a project. Municipal revenue bonds are issued on the security of revenue generated by operating income or taxes.

11.4 **Domestic Government Loans.** The governments of some countries provide low-rate loans or interest compensation for project construction. For example, the Development Bank of Japan provides low-rate domestic loans for railway construction relating to safety features (up to 50% of project costs) and service improvements (up to 30% of project costs) such as line extensions. In Seoul, low-interest loans are obtained from the national government's Treasury Investment and Loan Fund and from the municipal government's Treasury Investment and Loan System. In Manila, through the "Net Lending Strategy," the Philippine Treasury Bureau provides funds for public corporations to help pay overseas loan debts; this approach effectively provides more time for operating revenues to be collected and the new debt to the Treasury is then paid according to an agreed schedule. In the event that a corporation is unable to pay repay this debt, it may request the government to convert the loan into governmental equity investment in the corporation itself.

11.5 Loans from International Organizations or Foreign Governments. Foreign countries or international organizations such as the World Bank provide loans that usually have more favorable conditions than those of private banks in terms of interest rates, repayment and grace periods, and maximum amounts. However, there are exchange rate risks associated with foreign loans and repayment can increase if the local currency loses value. Some international organizations also impose conditions on their loans such as mandatory institutional reform, while foreign governments may require tied procurement.

11.6 Subsidies from General Tax Revenues. Construction expenses can be funded from the general tax revenues of central and/or local governments. Singapore provides the most notable example of this method with the entire construction costs for its mass rapid transit system met by governmental subsidies. In Seoul, 10-20% of subway construction costs were financed by central government subsidies.

11.7 In Thailand, a national tax is imposed on gasoline and other oil products, the revenue of which is allocated to regions in proportion to population. Motor vehicle registration tax is another source of revenue in Thailand and although it is a local tax, it is collected by central government and allocated accordingly.

11.8 Within Bangkok, there are various views on the increased collection and use of tax revenue for rail construction. The Fiscal Policy Office, one arm of the Ministry of Finance, is hesitant to recommend new or increased taxes in view of the difficulty of receiving Cabinet approval for such policy changes. Also, the Office is of the view that urban construction costs can eventually be met by increased tax revenues arising from economic expansion. Emphasis is therefore put on the priority of maintaining the competitiveness of Thai industry and simply improving existing tax collection. An alternative view, held by the Mass Rapid Transit Authority (MRTA), holds that the most acceptable course of action is to raise the gasoline and motor vehicle registration tax, particularly as other methods such as an area licensing system and congestion tax proved politically unacceptable in the past. In a variant of this view, the Office of the Commission for the Management of Land Traffic (OCMLT) considers that it is preferable to raise the gasoline tax for repayment purposes after construction finance has been acquired.

11.9 In Japan, there are a number of central government subsidy methods utilizing the government's general account and granted through the Railway Development Fund. In the case of new town rail construction, approximately 36% of construction costs may be subsidized. An interest payment assistance program is available whereby private railways purchase rail lines from the Japan Railway Construction Public Corporation and pay off the capital and interest in 25 equal annual installments (15 years for new town lines). Central and local governments also provide a subsidy by reimbursing interest payments above 5% per annum. The construction subsidy and interest payment programs were introduced in 1972 by agreement among the Ministries of Transport, Construction, and Finance.

11.10 Subsidies from Earmarked Taxes. Revenue from certain taxes are sometimes specifically allocated for transport investment; usually it is the tax on petroleum products that is earmarked for such purpose. For example, the Republic of Korea introduced taxes on volatile and light oil in 1995 to help fund railway projects in Seoul. In this case, a Traffic Facilities Improvement Special Account provides subsidies and loans for all "traffic facility"

construction; it has been enacted for a temporary period of ten years. Gasoline taxes account for 42% of the account proceeds while general taxes contribute the remainder.

11.11 In Japan, the Ministry of Construction subsidizes the construction of monorail and automated guideway systems from the national road improvement special account with contributions from general road taxes. The subsidy is set at 55% of the cost of substructure, which is equivalent to the subsidy granted to local governments for the construction or improvement of ordinary urban roads. Since the substructure comprises about half the total cost of such systems, the subsidy effectively covers about 25% of total cost, which is the same as the government subsidy of subway projects. This national subsidy program also applies to the construction of bus guideway systems, as seen in Nagoya (see Chapter 4). In the construction of station plazas, which are transport nodes characteristic of Japanese cities, three-quarters of the costs are financed by this national subsidy program (through the municipalities) and the remainder by rail operators.

11.12 **Value Capture.** To meet the substantial costs required for initial investment,¹ value capture methods can be adopted to benefit from the increase in land values around rail nodes. This approach has been utilized widely in Tokyo with rail companies acquiring low-priced agricultural land prior to rail construction; subsequent land value increases have been appreciable in Japan, and additional benefits to the rail companies have been the ridership generated by the new development. Integrated land development is undertaken along rail corridors (often with the use of land readjustment), thereby creating higher-valued land as well as achieving efficient movement of road traffic. Manila's LRT1 project is considered to have missed value capture opportunities that could have significantly reduced both its debt burden and risk in ridership revenue.

11.13 In order to accomplish value capture, a basic facilitating framework is necessary, which requires the following steps:

- Establish legal framework related to rail businesses.
- Establish legal framework related to urban development.
- Identify the real beneficiaries.
- Establish a real estate tax system so that profits from rail-induced development are captured and appropriate tax is collected.

11.14 **Business Revenues.** Private rail company groups can engage in diverse business operations including real estate development, recreation, retail stores, restaurants, and hotels. These operations tend to be associated with the company's rail stations and can greatly assist in increasing ridership and fare revenue. Major private railway companies that operate suburban rail services in Greater Tokyo branched out over time into businesses closely related to the railway industry, including real estate development, retailing, and bus operations. Japan's Tokyu Corporation has been particularly successful in owning and operating extensive suburban rail services. Tokyu successfully utilized a land readjustment process and subsequently promoted the area's development by land sales, housing construction, and shopping center development, thereby increasing population and rail ridership.

¹ An implication of the need for substantial initial investment for urban rail investments is that only large and well-capitalized companies can be successfully involved in such endeavors.

11.15 Manila's MRTC has been granted commercial development rights permitting the collection of commercial revenues from real estate development within its land rights area, including for example the airspace over rail stations. Calculations by Bangkok's MRTA show that the revenue from non-rail operations can account for 5-10% of the rail operation revenue. The Republic of Korea's Urban Railway Law, however, prohibits rail operators from engaging in non-railway business operations and therefore from generating revenue from station-related development.

11.16 The State Railway of Thailand (SRT), which has been accumulating debts due to declining passenger traffic, is looking toward its vast land holdings to generate income from commercial development. Some plots have already been leased to the private sector and SRT will consider all types of development proposals in preference to raising its fares. Additionally, SRT's land in relation to the Bangkok Elevated Road and Train System (BERTS) or Hopewell project is being offered for commercial development.²

11.17 **Government Property Tax Revenues.** These taxes are related to commercial properties that are near stations or have an impact on transport. In Seoul, the municipal government levies a traffic tax on the owners of commercial buildings that generate excessive traffic. As part of Kobe City Rapid Transit, the municipal government of Kobe requested the developers of land in station areas to bear part of rail construction costs and to allocate land for rail use. In Tokyo, property owners share the costs for walkways connecting stations to nearby buildings.

11.18 **Legislation Relating to Finance.** In Japan in 1991, a law was enacted to promote the efficient integration of housing development and railway construction; it established procedures for determining basic plans and subsidy measures such as local bonds and intensive land exchange and readjustment systems. The law (Special Measures for Promotion of Housing and Railway Development in Urban Areas) also decrees the key role that local municipalities should play in project implementation.

C. PUBLIC FINANCE FOR TRANSPORT OPERATIONS

11.19 Fare revenues should cover operating costs and ideally also offset construction costs or provide for reinvestment in expansion of the rail network or other projects. However, revenue can be insufficient, particularly in the early stages of a new project or when fares are held low for political reasons. In such cases subsidies from central and local governments can reduce the financial burden of operators.

11.20 **Subsidies.** In the case of Manila's LRT3 project, the Department of Transportation and Communications (DOTC) guarantees the return on the investment by the operating company through three types of government subsidy. These include compensation for fare revenue shortfall, a grant for maintaining service levels, and a dividend guarantee.

11.21 The DOTC contract with the operator stipulates that fares and service levels should be maintained at predetermined levels for the first six years. After the sixth year, the government

² Of course, it may be argued that SRT should not use its vast land holdings to cross subsidize its declining urban passenger traffic.

and operator share the profit equally. The Department of Budget Management (DBM) prefers to provide incentives for efficient operation than direct financial subsidy.

11.22 In regard to bus operations in Japan, operators are generally expected to sustain their services without public subsidy. However, some subsidies and grants are provided on a limited scale to facilitate the introduction of new and improved services with increased competition and patronage. The annual total of such subsidies and grants amounts to about 2.5 billion yen.

11.23 Favorable Treatment in Taxation. Favorable tax and finance systems can be introduced for public transport operators. The Government of Singapore provided Singapore Mass Rapid Transit (SMRT) with low facility leasing fees and an exemption from corporate taxes. Bus operators in Japan receive tax exemptions and reductions in consideration of their status as public service providers.

11.24 Enactment of Related Laws. The smooth operation of a rail system and reduction of business risk can be facilitated through the legislation of project contents and conditions. Bangkok's Mass Transit Authority (MRTA) Establishment Act of 1992 prescribes the purposes and authority of the MRTA and stipulates the possibility for private sector involvement. The revision of the Act in 1997 facilitates easier promotion of non-retail businesses by granting the same authority on land acquisition as other public agencies and rights to construct underground without impinging on land ownership.

11.25 Earmarking of National and Local Taxes for Urban Transport. Some authorities involved in the construction of urban rail projects in Bangkok believe an earmarked tax and special account system should be established. However, the Fiscal Policy Office of the Ministry of Finance has disapproved on the grounds that it fixes expenditure and reduces financial flexibility³. The central government of Manila also pursues a policy of not earmarking financial resources and creating special accounts and while several bills for new taxes and tax increases have been prepared, they do not involve earmarking. However, DOTC reports that transport-related tax revenues exceed transport expenditures and it, in association with the Light Rail Transit Authority (LRTA), accordingly argue for creating a special fund.

11.26 Without an earmarked tax and special account system, funds for rail projects are drawn from a general account with greater uncertainty of available resources and the requirement for approved annual project budgets. A further advantage of earmarking when applied to local taxes is that it increases awareness of the principle that beneficiaries of public transport improvements should pay for the benefits they receive. For example, new or increased taxes collected from land and property owners considered to have benefited from rail development can be earmarked for repayment purposes or for future transport projects.

11.27 Discretionary Powers of Tax Setting by Local Authorities. In the case of Thailand, the imposition and collection of taxes by local governments is limited. The local tax rate is low and fixed across the country to the extent that the cumulative total of local government public expenditure, including that of the Bangkok Metropolitan Administration (BMA), in the

³ Research Institute of Development Assistance (RIDA), Overseas Economic Cooperation Fund (OECF), OECF Research Papers No.25, Urban Railway Projects in Bangkok – Measures for Securing Financial Resources, August 1998.

past 20 years has not reached 20% of the central government's budget. BMA itself is inefficient in collecting real estate tax from corporations and only collects 20% of its budgeted revenue while the city of Bangkok, where key industries are located, produces about 80% of the national tax revenue. The situation is exacerbated in that while the house and building tax is imposed by BMA on estate rental value, rental real estate operators tend to set low rents resulting in low tax revenues compared to developed floor area. It follows that local government expenditure on local public facilities in Bangkok is low. Since it is not possible to construct urban railways in Bangkok using local fiscal revenues, there is financial reliance on the central government. In response, the Ministry of Finance is considering a bill to enable local government to adopt its own house and building tax. In contrast, Seoul's metropolitan budget is funded exclusively from local financial resources, which include 90% from local taxes, such as residence and property taxes, and the remainder from non-tax revenues such as license fees.

D. PRIVATE SECTOR ROLE IN FINANCING PUBLIC TRANSPORT

11.28 Private Sector Initiatives. Private sector involvement in rail projects can be pursued to reduce the financial burden on the public sector and to introduce private management and innovation skills thus maximizing value for money. Urban rail projects require significant capital costs that are rarely recovered and many governments cannot bear the entire cost. Involving the private sector is a way of reducing government deficits. Incorporating the private sector also places risks where they are best managed and increases the incentive for efficiency. Furthermore, if a project is viewed as service provision based on output specification, rather than an asset, the private sector can bring new ideas and innovation and potentially reduce the need for future subsidies. Japan, in particular, has developed its urban rail network through private railway companies that construct and operate rail services.

11.29 The category of private sector involvement depends on the degree of involvement, as set out below. Table 11-1 also identifies the use of private sector within the Asian case study cities and provides a general summary of financial aspects.

11.30 Build Own and Transfer (BOT). Large urban rail projects are characterized by high initial costs and such projects can fail due to a shortage of capital unless the necessary financial planning has taken place. Under the BOT method, private developers undertake to design, finance, construct, and operate projects. At the end of the franchise period, the project is handed back to the government. The profit gained is in proportion to the risks encountered during the lengthy planning and construction stages, and to a lesser degree during operation.

11.31 BOT in the Philippines. The Philippine Department of Transportation and Communications (DOTC) encourages private sector participation, such as BOT, in urban rail construction. It therefore sought to improve the regulatory and administrative framework for implementing infrastructure projects in this way. The Law to Approve Investment, Building, Operation and Maintenance by Private Sectors for Infrastructure Projects (The BOT Law) was passed by the Philippine Congress in 1990.

11.32 The objectives of the Philippine BOT Law are to:

- minimize the burden of infrastructure projects on the national government budget,
- minimize external borrowing for infrastructure projects, and
- use the efficiency of the private sector in delivering a public good.

11.33 A BOT Center was subsequently established with the aim of promoting BOT projects. Its functions include preparing governmental policies, providing technical support, and holding training meetings for BOT-related organizations.

The Philippine BOT Law was revised in 1994 to incorporate the following:

- Approval of ROT (Rehabilitate, Operate, Transfer) and BLT (Build, Lease, Transfer);
- Approval of commercial development (Develop, Own, Transfer);
- Provision of favorable tax conditions and profit protection for BOT projects; and
- Financial support from central government to improve private investment incentives.

11.34 The Philippine BOT Law was critical in clarifying objectives and delineating private-public sector responsibilities. It is notable that the Philippine government has been active in providing governmental guarantees to encourage lending to private participants and therefore provide greater attraction to private investment. However, such guarantees can be considered as a means of removing private sector risk and undermining financial accountability. While the use of BOT in various infrastructure sectors in the Philippines has generally reduced public sector deficits, it has also created large contingent liabilities that are not accounted within cash-based budgets.⁴ Therefore, the sharing and transfer of risks is essential in implementing projects.

11.35 *BOT in Bangkok.* Bangkok's BTS Skytrain was realized through the granting of a concession by Bangkok Metropolitan Administration (BMA) to Bangkok Mass Transit System Co. Ltd. (BTSC) to build the system and operate it for 30 years before transferring it to BMA. BTSC was established as a subsidiary of the Thai real estate company, Tanayong Group, and land for construction was provided by BMA. However, the project is experiencing low levels of ridership and revenues are less than forecast.

11.36 **Build Lease and Transfer (BLT).** Manila's LRT3 Line was developed as a Build, Lease, and Transfer project. The railway was built by a private company and is being leased to the government for 25 years, after which it will be transferred. Metro Rail Transit Corporation (MRTC), a 100% subsidiary of MRTC Hong Kong, which was established by a Philippine consortium, is responsible for construction and facilities including rolling stock. The cost of the project is met partly by investment from the consortium and partly by loans from both the Export-Import Bank of Japan and private financial institutions. While government subsidies will not be provided for finance, the stable revenue in government leasing enables low-interest loan rates.

11.37 **Separation of Infrastructure Facilities from Operating Facilities.** Bangkok's Blue Line Subway separates construction and operation. MRTA is responsible for building infrastructure including tunnels, track, depots, and stations. Rail operation is to be undertaken by the private sector under a 25-year concession contract that includes procurement of rolling

⁴ See the discussion on the Potential of Private Sector Participation in Urban Rail under Part C of Chapter 7 on Metro Manila.

stock and other related equipment in addition to the operation and maintenance of the system. The initial investment is to be recouped out of fare revenues and the operation rights and facilities will be transferred to MRTA at the end of the concession contract.

11.38 In Japan, the Government instituted a project in 1972 to support the construction of urban private railways by a state-owned entity (Japan Railway Construction Public Corporation); after construction, the railways are turned over to private operators, with the construction cost to be repaid over the long term. Interest payments were subsidized by the national and local governments and in some cases were also shared by public-private property developers. Financial risk is reduced through value capture and in this respect, the involvement of public housing entities has assisted in building private sector confidence.

11.39 In Kobe, separation between ownership of infrastructure and rail operation was formally introduced in 1988 allowing a “third sector” company to own rail infrastructure. This initiative was adopted elsewhere in Japan with the involvement of the public sector in infrastructure investment reducing the burden of capital requirements for privately operated railways.⁵

11.40 Other cities have incorporated separation of structure and operation systems but maintained public control. For example, in the case of Taipei’s Mass Rapid Transit (MRT) system, the city government paid for construction from its budget and handed over the system to the state-run Taipei Rapid Transit Corporation (TRTC). This approach enabled TRTC to set relatively low fares.⁶ Similarly in Seoul, the metropolitan government constructed the rail facilities and two public corporations, for the subway and rapid transit systems, then took responsibility for the operation of the system and its self-supporting financial management.

E. CONCLUSION

11.41 The need for capital subsidies for mass rapid transport arises through the insufficient revenue that is collected from fares and/or the policy to keep fares low for political or social objectives. Increasingly, therefore, governments look toward land and development methods to generate extra income. If governments seek to reduce the extent of subsidy and facilitate private participation, they must create an attractive investment environment.

11.42 Forecast ridership is not always realized and this has significant bearing on the income to repay loans in concession projects. There is evidence that ridership eventually increases to anticipated levels although this can be a lengthy and therefore financially insufficient process. The reasons for low ridership are not always clear but competition with other modes, high fares, stagnant income growth, inadequate access to the system, and the need for a period for the public to become accustomed to the new system certainly contribute. This finding

⁵ The relative merits and demerits of public sector and third sector approaches are discussed in the Kobe case study.

⁶ Fare levels in urban rail projects are largely tied to the repayment of high capital costs from construction. In the absence of such onerous repayment demands, e.g., if costs are absorbed by a government’s general account or value capture methods are employed, fares can be set more flexibly. Concession systems can be tailored to maintain low or regulated fares through governmental control. For example, BLT arrangements effectively transfer risk to the government, which can then set fares as appropriate; BOT or separated facility arrangements can include stipulations on maximum fare levels with operator subsidies covering any revenue shortfalls.

underlines the importance of integrating urban rail with other modes and revenue-building ventures. Simply implementing a large urban rail project on a stand-alone basis poses significant risks.

11.43 It is important as well as desirable to institutionalize a value capture mechanism so that rail construction may benefit from related land development revenues. However, the transferability of the successful Japanese practice in this area is a major issue.

11.44 The application of long-term plans is fundamental to the effective implementation of urban rail projects. Local government should therefore coordinate the construction and operation of projects to ensure compatibility with strategic development and land use plans. Local government lost control of the planning process in Metro Manila following the dissolution of the Metro Manila Commission and the transfer of authority to the central government office. Formulation of a coordinated city development plan was consequently interrupted and projects proceeded independently.

Table 11-1 Financial Aspects of Urban Rail Transit within Case Study Cities

City	Scheme	Private Finance	Funding	Commercial Ventures ^a	Responsibilities		Problems	Ridership
					Construction	Operation		
Manila	LRT1	N/A	No Earmarked Tax. Loan from Belgium Government. Expansion through OECF loan.	N/A	Government Light Rail Transit Authority (LRTA)	Metro Transit organization Inc.	Some difficulties in repaying loans exacerbated by currency fluctuations.	High
	LRT2	N/A	No Earmarked Tax. OECF loan and central government subsidy.	Station area development business.	LRTA	N/K	Delays within construction contract bidding process.	N/A
	MRT3	BLT (BOT Law established)	Loans guaranteed by government.	Right to commercial development in rail areas.	MTRC private corporation	Government (DOTC)	Delays due to lawsuit. Increasing costs due to currency depreciation	Less than forecast
	MRT4	BOO/BT	Loans guaranteed by government.		MRTC private corporation	Private Sector	Increased construction costs due to currency depreciation.	N/A
Bangkok	BTS Skytrain (Tanayong)	BOT (30 year concession)	Thai Syndicate provides Thai baht loans. International syndicate provides US dollar loans.	N/A	Bangkok Mass Transit System Co. Ltd (MTSC) owned by Tanayong PCL.		Low revenue from low ridership. High costs due to economic problems and currency devaluation. Delays in land acquisition.	Less than forecast.
	BERTS	BOT	Hopewell Corporation private funds.	Real Estate development rights of SRT land. ^b	Hopewell Corporation		Contract terminated due administration and financial problems.	N/A
	MRTA Subway	Separation of Facilities. Private sector operation, including procurement of rail facilities (25 year concession)	No Earmarked Tax. Construction: ODA loan from OECF and government bonds Operation: private funds	MRTA Law permits underground non-retail development.	Metropolitan Rapid Transit Authority (MRTA)	Private Sector.	Difficult land expropriation due to land owner refusals. Conflict with properties during construction.	N/A
Taipei	MRT	N/A	Taipei City Government General Account	N/A	City Government (DORTS)	State-run Taipei Rapid Transit Corporation (TRTC)	Construction problems, increasing land prices and difficult acquisition. Problems in coordination.	Less than forecast but increasing
Seoul	Subway, LRT	N/A	Seoul City General Account. Special Account for urban rail improvement exists.	Property owners pay transport inducement charges.	City Government	City-owned Seoul Metropolitan Rapid Transit Corporation (SMRTC)	N/K	Less than forecast but improving

Notes: a: Income from fare revenue is applicable to all schemes.

b: Revenue also includes rail fares and road tolls.

N/A: Not Applicable

N/K: Not Known

F. SOURCES

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12

ADMINISTRATION AND INSTITUTIONS ISSUES IN DEVELOPING COUNTIES

A. OVERVIEW OF CHAPTER

12.1 Considering that most weaknesses in urban transport policy implementation in developing countries stem from inadequate administrative and institutional arrangements,¹ the Terms of Reference (TOR) for this study call for the consultants to examine institutional structures for urban transport administration at the metropolitan and municipal level in developing countries, consider alternative means for securing coordination between different tiers of governments and between jurisdictions, and to consider alternative arrangements for securing coordination of urban transport functions in different kinds of cities.

12.2 To address these issues, this chapter considers both the vertical and horizontal perspectives. The vertical perspective in this taxonomy, addressed in Section B, refers to the relative authority of national versus local (i.e., state/provincial and metropolitan/municipal) governments. The horizontal perspective, addressed in Section C, refers to the way metropolitan areas organize the delivery of urban transport within their boundaries. As explained in Section B, the theoretical extremes regarding national structures are complete centralization within a single national government and complete decentralization (i.e., no central government). As presented in Section C, extremes in the horizontal dimension range from centralized metropolitan government to geographical/jurisdictional and functional fragmentation. In the analysis of the horizontal and vertical dimensions, examples are presented from various metropolitan areas and countries in the developing world as well as from transitioning economies, e.g., from the former Soviet Union). Where appropriate, comments are offered on the effectiveness of urban transport organization in selected developing country metropolitan areas, with descriptions of metropolitan transport organization in metropolitan areas that have made steps toward improved organization (e.g., through measures to improve coordination between jurisdictions and functions),² often with World Bank assistance.³

12.3 Most of the examples cited in this chapter are from cities other than the case study cities. The reasons for this drawing upon a much wider range of examples are (i) the emphasis

¹ The World Bank, *Urban Transport Sector Strategy Review, Concept Paper*, Draft 4, November 17, 1999, paragraph 15.

² The output of this analysis is necessarily limited by the data available in what is mainly a desk study. Assessment of institutional issues often requires in-depth, on-site probing, which was not possible given the limited resources available in this study. Also, while many of the sources relied upon (e.g., World Bank staff appraisal documents) present proposed approaches, the underlying organizational forms are only in summary form and ex post evaluations of these efforts were not available.

³ The consultants also endeavored to illustrate these issues with studies sponsored by the Japan International Cooperation Agency and the Overseas Economic Cooperation Fund of Japan (a predecessor of the Japan Bank for International Cooperation), but found that generally these studies did not include detailed assessments of issues related to urban transport administration and institutions.

in the TOR on the positive aspects of issues relating to administration and institutions (i.e., the consultants are to describe “well organized metropolitan areas” and “forms used to secure *proper* coordination” [emphasis added]) and (ii) the focus of the Administration and Institutions section of the TOR on “developing countries” (which excludes Japan and a number of the other Asian case study cities)⁴; as it happens, the number of instructive examples found in the developing country case study cities (especially Bangkok and Manila)⁵ are relatively limited, and accordingly, following the TOR, the consultants have examined examples throughout the developing world in preparing this chapter, including a number of instructive examples from Latin America.

B. THE VERTICAL DIMENSION: CENTRALIZATION VERSUS DECENTRALIZATION

12.4 From a vertical perspective, a key variable distinguishing different administrative structures for urban transport administration is the *relative authority of national versus local (i.e., state/provincial and metropolitan/municipal) governments*. A number of observations are pertinent here.

12.5 As indicated in Figure 12-1, the theoretical extremes regarding national structures are complete centralization within a single national government and complete decentralization (i.e., no central government). With respect to urban transport (and most other urban subsectors), most countries lie between the extremes, although in the case of city states (e.g., Singapore and the semi-autonomous Hong Kong Special Administrative Region), micro-states (e.g., certain Pacific island and Caribbean countries), and small states (e.g., Lao PDR,⁶ Ghana) there is often complete or near-complete centralization as well; however, in no instance is there complete decentralization.

12.6 In the larger states, there is a dichotomy between unitary systems (e.g., China, Indonesia), where lower level governments are a matter of central policy and do not enjoy any constitutional guarantees, and federal systems (e.g., Brazil, Argentina),⁷ where the powers, duties, and responsibilities of state/provincial governments are constitutionally defined and local governments are usually creations of the state/provincial governments.⁸

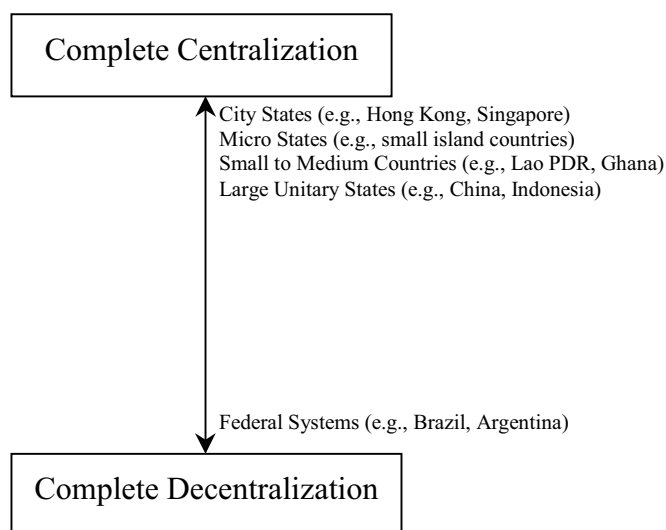
⁴ Terms of Reference, paragraph 3.2.6.

⁵ The case of Bangkok, for example, is characterized by: (i) excessive direct provision of transport infrastructure and services, (ii) resistance to competition and structural change, (iii) overlapping responsibilities, and (iv) a lack of fiscal planning. The World Bank, Transport Sector Unit, East Asia and Pacific Region, Thailand, *Bangkok Urban Transport: Options for Sustaining Mobility*, pp. 10-15, June 10, 1999 [Draft].

⁶ In the Lao People's Democratic Republic (population of about 5 million in 2000) very little local authority is evident and transport infrastructure is dominated by the Ministry of Communication, Transport, Post and Construction; while the Government is initiating reform in the institutional and financial framework for urban infrastructure, this currently concerns only Vientiane, the capital city. Asian Development Bank, *Urban Infrastructure Finance*, edited by Royston A.C. Brockman and Allen Williams, 1996, p. 56.

⁷ The Brazilian Constitution (1988) states that urban transport should be the responsibility of local (state or municipality) governments.

⁸ Roy W. Bahl and Johannes F. Linn, *Urban Public Finance in Developing Countries*, 1992, pp. 400-01.

Figure 12-1 Vertical Dimension (National versus Local)

Source: Inspired by Roy W. Bahl and Johannes F. Linn, *Urban Public Finance in Developing Countries*, 1992, Chapter 12

12.7 In nearly all countries, including decentralized federal systems, certain policy decisions affecting urban transport are made at the central government level, such as the level and structure of vehicle and fuel taxes and vehicle emission standards.⁹ There is little evidence in the literature examined that the concerned central government ministries in such cases routinely consider the impacts of such policy decisions on lower-tier jurisdictions.

12.8 In many countries, the capital city is accorded special status within the national urban system, with a degree of political and fiscal autonomy in urban transport and other sectors that is not enjoyed by other cities. Examples include Seoul, Bogota,¹⁰ and Jakarta, which are national capital districts with both city and provincial powers. In China, a number of cities have provincial status.¹¹

12.9 On the one hand, decentralization offers a number of advantages over centralization, e.g., enabling objectives and conditions to be shaped by local conditions and preferences, improving responsiveness and accountability to system users, and promoting experimentation with innovative approaches to urban transport problems.¹² On the other hand there may be weaknesses with decentralized approaches, e.g., where decentralized decisions result in spillover effects across jurisdictional boundaries, raise issues related to scale economies, or

⁹ The World Bank, *Urban Transport Sector Strategy Review, Concept Paper*, Draft 4, November 17, 1999, paragraph 32.

¹⁰ The Constitution of Colombia (1991) established administrative autonomy for the Capital District of Santafé de Bogotá; pursuant to this provision, the Government issued Decree 1421 in 1992 through which the District enjoys a special status in administrative, organizational, and fiscal terms. The World Bank, *Staff Appraisal Report, Colombia, Bogota Urban Transport Project*, Report No. 14901-CO, April 26, 1996, p. 5.

¹¹ Roy W. Bahl and Johannes F. Linn, *Urban Public Finance in Developing Countries*, 1992, pp. 385-400.

¹² A recent World Bank Working Paper argues that decentralized structures may be particularly well-suited to developing countries because information requirements and transaction costs are lower at lower levels of government and the government can be more responsive to the citizenry. Anwar Shah, "Balance, Accountability, and Responsiveness: Lessons About Decentralization," Policy Research Working Paper No. 2021, The World Bank, December 1998.

raise issues related to inter-jurisdictional trade;¹³ decisions related to the level and structure of vehicle and fuel taxes and vehicle emission standards would all fall in this category and hence are taken at the national level in most countries.

12.10 A number of conditions must obtain for decentralization to be successful: (i) clear assignment of functional responsibilities among government levels, (ii) matching of revenue sources with functional responsibility, and (iii) establishment of a system of accountability that balances central authority and local political participation. Decentralized systems work better when based on rules rather than on negotiations, and political autonomy requires matching financial autonomy.¹⁴

12.11 In this context, a recent World Bank publication had pointed to the dangers of (i) an “overcontrolled local sector,” the classic pattern in developing countries, by which the central government dominates total public sector expenditure (e.g., Mexico, Tunisia, Jordan), controls local government hiring of personnel (e.g., Turkey), controls the sectoral composition and size of local government budgets (e.g., Morocco), and regulates municipal revenue levels (e.g., Hungary, Mexico, Republic of Korea, China);¹⁵ (ii) “laissez-faire decentralization,” where there are multiple levels of government, each with political and financial autonomy, but without clearly defined functional responsibility (e.g., Brazil with respect to roads although not urban transport); and (iii) a “perversely regulated local sector,” where there is some degree of local political autonomy (de facto if not de jure) and some assignment of functional responsibilities, but there is a lack of correspondence between the revenue authority of local governments and their expenditure responsibilities, and this gap is addressed in undesirable ways, e.g., through ad hoc expenditures by the national government (e.g., Brazil) or by assigning responsibility for construction to the national government and maintenance to the local governments, which leads to disputes over debt liabilities and maintenance obligations on new assets (e.g., the road sector in India).¹⁶

12.12 In practice, there is often an evolution over time from centralized to more decentralized structures for urban transport administration. For example, the institutional development process often commences with the creation of a national traffic management agency within a government ministry that assumes both national and local responsibilities. As the agency gains experience by implementing projects in the most congested areas and corridors in the country’s main cities, it expands and reaches a point where national and local responsibilities can be split. At this juncture, the day-to-day management of urban transport

¹³ Warrick Smith and Ben Shin, “Regulating Infrastructure: Perspectives on Decentralization,” in *Decentralizing Infrastructure: Advantages and Limitations*, edited by Antonio Estache, World Bank Discussion Paper 290, 1995, pp. 53-55.

¹⁴ Bill Dillinger, “Decentralization, Politics and Public Services,” in *Decentralizing Infrastructure: Advantages and Limitations*, edited by Antonio Estache, World Bank Discussion Paper 290, 1995, pp. 5-21.

¹⁵ This is also the situation in Thailand. While in principle it is the government’s policy to delegate more responsibilities to the Bangkok Metropolitan Administration or BMA (as well as to provincial governments), in practice BMA’s effectiveness is constrained by a lack of powers, funding, and technical capability. Also, competition for power between and among the various fragmented transport agencies of the central government has made the necessary strategic functional coordination impossible. The World Bank, Transport Sector Unit, East Asia and Pacific Region, Thailand, *Bangkok Urban Transport: Options for Sustaining Mobility*, p. 14, June 10, 1999 [Draft].

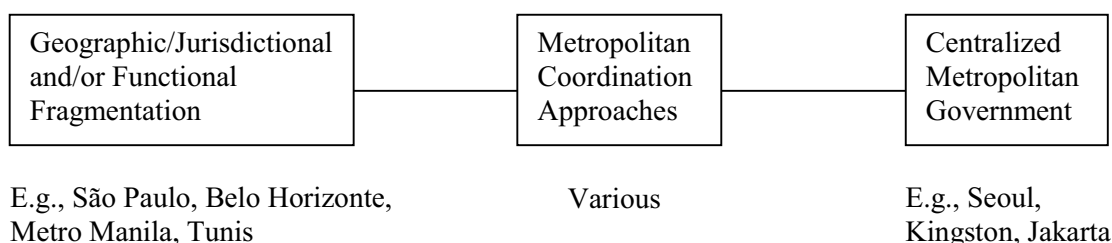
¹⁶ The World Bank, *Better Urban Services: Finding the Right Incentives*, 1997, pp. 37-44.

systems can be handed over to local authorities leaving the national agency to continue its work at the policy level.¹⁷

C. THE HORIZONTAL DIMENSION: CENTRALIZED METROPOLITAN GOVERNMENT VERSUS GEOGRAPHIC/JURISDICTIONAL AND FUNCTIONAL FRAGMENTATION

12.13 While the division of responsibility between the national and local governments is the vertical dimension, the horizontal dimension consists of the way metropolitan areas organize the delivery of urban transport within their boundaries. The importance of this dimension may be understood by considering the size of many of the world's largest metropolitan areas, both relative to certain countries and within their respective countries.¹⁸ As indicated in Figure 12-2, approaches may range from centralized metropolitan government to approaches characterized by geographic/jurisdictional and/or functional fragmentation.

Figure 12-2 Horizontal Dimension (Within Metropolitan Areas)



Source: Inspired by Roy W. Bahl and Johannes F. Linn, *Urban Public Finance in Developing Countries*, 1992, Chapter 12

12.14 Many of the largest metropolitan areas in the world are characterized by **geographic or jurisdictional fragmentation**, with responsibility for urban transport (and other urban services) vested in many local governments. In these cities there are a number of autonomous municipal jurisdictions, sometimes overlaid with conflicting regional, state, and central government powers. For example, São Paulo has at least 31 municipalities with a population of over 100,000, Belo Horizonte (Brazil) comprises 18 independent municipalities, Metro Manila has 17 cities and municipalities, and Tunis consists of 13 communes. Such geographic/jurisdictional fragmentation is rarely rational, but is merely a natural consequence of urbanization, i.e., the expansion of urban areas beyond old core cities into surrounding minor centers and formerly rural areas without changes in jurisdictional boundaries. While such geographic fragmentation does move government closer to the people by creating smaller government bodies, there are many disadvantages, e.g., diseconomies of scale, disparities in tax burdens and services in different jurisdictions. As stated by the World Bank Staff Appraisal Report for the Belo Horizonte Metropolitan Transport Decentralization Project, the problem presented with respect to transport is “how to plan and manage a transport system consisting of many municipalities, each with its own administrative powers,

¹⁷ Richard Barrett, *Institution Building for Traffic Management*, World Bank Technical Number 8, Urban Development Policy Paper Number 7, 1983, p. 22.

¹⁸ Roy W. Bahl and Johannes F. Linn, *Urban Public Finance in Developing Countries*, 1992, p. 403.

when the necessary inputs for, and effects of the transport system extend well beyond the administrative boundaries of any one municipality.”¹⁹

12.15 Within the urban transport sector, **functional fragmentation** is also present in most developing country metropolitan areas, i.e., in which the provision of services is areawide but different functions are handled by essentially autonomous local bodies. For example in China, where ministries in the unitary national government have corresponding commissions at the municipal level, each commission exercises a substantial degree of autonomy and is not very susceptible to influences from organizations in other structures. The autonomy of the commissions has encouraged them to spread horizontally, extending their administrative responsibilities across a range of activities (as well as vertically through a hierarchy of executive departments, agencies, institutes, and enterprises); Appendix G presents the organization of transport functions in the Guangzhou Municipal Government, a typical one in China. This system suffers from overlaps among the responsibilities and activities of different organizations and creates vested interests in protecting and expanding assets and revenues sources. The relative ranking and authority of subsidiary departments at similar levels under different commissions is not clearly defined, and coordination of policy-making and administrative action between and among subsidiary organizations is inhibited. As a technique for coordination, a “campaign” directed from a level as high as the Mayor’s Office may be initiated to encourage all concerned agencies to work toward common objectives. However, such initiatives have proved difficult to sustain, as follow-up action is complicated by unclear rankings, overlapping functional responsibilities, and vested interests.²⁰

12.16 It is possible to conceive of a **hybrid approach with elements of both geographic/jurisdictional and functional fragmentation**. For example, the draft Concept Paper for the Urban Transport Sector Strategy Review suggests that parking strategy in a metropolitan area, including supply and pricing issues, might be best formulated at the metropolitan level, while issues of parking management and enforcement may be better addressed at the lowest level in the spatial hierarchy.²¹ If adequate data were readily available,²² it would be a helpful exercise to prepare Agency Responsibility Analyses (ARA) and Agency Performance Evaluations (APE)(see Figure 12-3)²³ for a large sample of

¹⁹ Roy W. Bahl and Johannes F. Linn, *Urban Public Finance in Developing Countries*, 1992, pp. 409-11; The World Bank, *Staff Appraisal Report, Brazil, Belo Horizonte Metropolitan Transport Decentralization Project*, Report No. 14265-BR, June 5, 1995, pp. 3, 41; and SAPS Team for The Overseas Economic Cooperation Fund, Japan, Final Report on The Special Assistance for Project Sustainability (SAPS) on Metro Manila Traffic Engineering and Management Projects II (L/A No. PH-P54) and III (L/A No. PH-P86), January 1995, p. 3-14.

²⁰ Richard Meakin, “Municipal Transport Management: Overseas Experience,” in *China’s Urban Transport Development Strategy, Proceedings of a Symposium in Beijing*, November 8-10, 1995, ed. by Stephen Stares and Liu Zhi, World Bank Discussion Paper No. 352, 1997, pp. 203-205; and The World Bank, *Urban Transport Sector Strategy Review, Concept Paper*, Draft 4, November 17, 1999, paragraph 35.

²¹ The World Bank, *Urban Transport Sector Strategy Review, Concept Paper*, Draft 4, November 17, 1999, paragraph 34.

²² One interesting attempt at assessing the level of government at which different urban transport functions are found is Pacific Consultants International and Suuri-Keikaku Co., Ltd., *A Study on Integrated Urban Transportation Strategies for Environmental Improvement in Kuala Lumpur, Final Report, Volume II*, prepared for The Federal Territory Development and Klang Valley Planning Division, Prime Minister’s Department, and the Japan International Cooperation Agency, February 1999, p. 14-1-14-6. However, without analysis of the performance of each agency in fulfilling its respective functions, this study provides only limited information to assess the appropriate level for the efficient performance of different urban transport functions.

²³ Richard Barrett, *Institution Building for Traffic Management*, Urban Development Technical Paper Number 8, Urban Development Technical Paper Number 7, 1983, Annex I.

metropolitan areas to assess the optimal level for efficient performance of different urban transport functions.²⁴ A likely outcome of such an analysis, as suggested by a seminal World Bank Technical Paper, is set out in Box 12-1.²⁵

12.17 Some developing country metropolitan areas have sought to address the typically adverse impacts of geographic/jurisdictional and/or functional fragmentation through *centralized metropolitan governments*. Examples include Seoul, Kingston (Jamaica), and Jakarta (DKI); perhaps also instructive are the cases of two city states (Singapore and the semi-autonomous Hong Kong Special Administrative Region), for which organization charts are provided in Appendix H. This approach provides for an ease in coordination of activities and implementing plans, has a reduced likelihood of duplication of services relative to alternative systems, allows for economies of scale in service provision, and internalizes externalities. However, large metropolitan governments may be difficult to manage and not provide a ready mechanism for responding to differences in demand within the metropolitan area for the package of services to be delivered. The problem may be addressed with small subarea administrative units, but usually is not done so.²⁶

12.18 A number of other developing (and transitioning) country metropolitan areas have addressed the problems of geographic/jurisdictional and/or functional fragmentation with a more incremental approach by establishing *metropolitan-region wide transport and coordinating agencies*. **Instructive examples** from World Bank sponsored projects, many of which happen to be in Latin America (particularly Brazil), are described in the paragraphs that follow.

²⁴ The World Bank, *Urban Transport Sector Strategy Review, Concept Paper*, Draft 4, November 17, 1999, paragraph 16.

²⁵ For reference purposes, urban transport administration in Japan is generally under the control of the local government, with the role of the national government to advise and approve planning of urban transport facilities and to oversee/implement public transport licensing, as well as to provide subsidies, grants, and tax exemptions for construction, and to develop major intercity trunk roads. At the national level, the Ministry of Construction advises on and approves urban planning, constructs intercity roads, provides subsidies for the construction of urban roads and transit systems by local governments, and establishes and invests in public corporations for urban expressways; the Ministry of Transport provides subsidies for bus transport, establishes the license system for public transport services in terms of construction and operation, and inspects vehicles and rolling stock; and the National Police Agency installs traffic signs and signals, enforces traffic regulations, and issues driver licenses. Various local agencies are also involved, including municipalities and prefectural governments (urban roads, new transport systems, parking, station plazas, truck terminals, and traffic safety facilities), public safety commissions (traffic signals), the police (traffic regulations), public corporations (urban expressways and subways), private developers (parking and truck terminals), private operators (urban railways, buses, and station plazas), and the third sector (subways, urban railways, and new transport systems). See City Bureau, Ministry of Construction, *Urban Transport Facilities in Japan*, published by the Japan Transportation Planning Association, March 1993.

²⁶ Roy W. Bahl and Johannes F. Linn, *Urban Public Finance in Developing Countries*, 1992, pp. 403-07, 421.

**Figure 12-3 Agency Responsibility Analysis (ARA) and
Agency Performance Evaluation (APE)**

Agency Responsibility Analysis (ARA)

Responsibility	Urban Trans- port Policy Coordina- tion (A)	Road Infra- structure (B)	Public Trans- port Infra- structure (C)	Public Trans- port Coordi- nation (D)	Traffic Manage- ment (E)	Road Safety (F)	Traffic Enforce- ment (G)	Traffic & Road Safety Coordi- nation (H)	Accident Record- ing (I)	Vehicle Licens- ing (J)	Vehicle Safety (K)	Traffic Trans- port Training (L)	Traffic Trans- port Research (M)
1. Policy Formulation													
2. Program Finance													
3. Project													
A) Identification													
B) Preparation													
C) Appraisal													
D) Implementation													
E) Supervision													
F) Monitoring													
G) Evaluation													
4. Standards													
5. Regulations													
6. Control													

Agency Performance Evaluation (APE)—Checklist of Headings

1. Agency History:
2. Political Linkages:
3. Areas of Responsibility:
4. Performance in Areas of Responsibility:
5. Coordination with Other Agencies:
6. Agency Development:
7. Staff—Qualifications and Experience:
8. Staff Training and Development:
9. Conditions and Employment:
10. Equipment:
11. Agency Funding and Budget:
12. Conclusions

Source: Richard Barrett, *Institution Building for Traffic Management*, Urban Development Technical Paper Number 8, Urban Development Technical Paper Number 7, 1983, Annex I

Box 12-1 Principal Transport Functions at the National and Local Levels***National Level***

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Formulating and Implementing Policies for: <ol style="list-style-type: none"> (a) Urban Transport (b) Public Transport (c) Traffic Management 2. Formulating Standards and Specifications for Materials, Design, Siting, Operation and Maintenance of: <ol style="list-style-type: none"> (a) Traffic Signs (b) Road Markings (c) Traffic Control Devices 3. Formulating Laws and Regulations Concerning: <ol style="list-style-type: none"> (a) Use of Highway by Various Vehicle Types (b) Licensing, Regulation and Testing of Vehicles (c) Licensing of Drivers (d) Vehicle Loading (e) Speed Limits | <ol style="list-style-type: none"> <ol style="list-style-type: none"> (f) Traffic Control Devices (g) Road Safety 4. Assisting Local Authorities with Traffic and Transport Plans: <ol style="list-style-type: none"> (a) Appraising Plans (b) Supervising Implementation (c) Monitoring (d) Evaluating Performance 5. Monitoring of Urban Transport: <ol style="list-style-type: none"> (a) General Traffic (b) Public Transport (c) Road Accidents (d) Vehicle Operating Costs 6. Developing Training Courses in: <ol style="list-style-type: none"> (a) Transport Planning (b) Transport Economics (c) Traffic Engineering |
|---|---|

Local Level

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Formulating and Implementing Policies for: <ol style="list-style-type: none"> (a) Urban Transport (b) Public Transport (c) Traffic Management 2. Monitoring of Traffic and Transport <ol style="list-style-type: none"> (a) Road Traffic (b) Public Transport (c) Road Accidents (d) Vehicle Operating Costs 3. Traffic and Transport Projects <ol style="list-style-type: none"> (a) Planning (b) Design (c) Implementation (d) Maintenance (e) Evaluation 4. Traffic Signs <ol style="list-style-type: none"> (a) Siting (b) Erection (c) Maintenance | <ol style="list-style-type: none"> 5. Road Markings <ol style="list-style-type: none"> (a) Siting (b) Laying (c) Maintenance 6. Traffic Control Devices <ol style="list-style-type: none"> (a) Siting (b) Installation (c) Maintenance 7. Parking Schemes <ol style="list-style-type: none"> (a) Design (b) Implementation (c) Management 8. Cycle Routes <ol style="list-style-type: none"> (a) Planning (b) Implementation (c) Maintenance 9. Heavy Vehicles <ol style="list-style-type: none"> (a) Parking (b) Routes |
|--|--|

Box 12-1 Principal Transport Functions at the National and Local Levels (Continued)**Local Level (Continued)**

- | | |
|---|--|
| 10. Formulation of Traffic Regulations
(a) Parking
(b) Loading
(c) Speed Limits
(d) Others | 13. Accident Blackspot Remedial Measures
(a) Identification
(b) Design
(c) Implementation
(d) Monitoring |
| 11. Enforcement
(a) Parking Regulations
(b) Loading Regulations
(c) Moving Vehicle Regulations | 14. Public Transport
(a) Coordination
(b) Planning
(c) Control |
| 12. Accident Information
(a) Collection
(b) Analysis | 15. Traffic Management Coordination |

Source: Richard Barrett, *Institution Building for Traffic Management*, Urban Development Technical Paper Number 8, Urban Development Technical Paper Number 7, 1983, Annex I

12.19 In connection with the World Bank sponsored **Rio de Janeiro** Mass Transit Project, the Transport Secretariat of the State of Rio de Janeiro (*Secretaria de Transportes do Estado do Rio de Janeiro, SECTRA*) and the Secretary of Transport of Rio de Janeiro Municipality signed an implementation agreement (*protocolo de intenções*) to create a Metropolitan Urban Transport Agency (*Agência Metropolitana de Transporte Urbano, AMTU-RJ*). The approach was consistent with the mandates of the state constitution, which requires that public transport of regional interest be planned and coordinated by state government together with the concerned municipalities; in fact, even some transport services wholly within the boundaries of only one of Rio de Janeiro's 17 municipalities can be of regional interest and as such should be planned jointly. The key elements for the sustainability of the coordination arrangement were conceived as follows: (i) it should be based on a permanent structure, designed to outlive executive or legislative mandate periods; (ii) it should be accepted by the parties as an additional asset and not a threat to their autonomy or decision-making powers (even though the balance of power may shift at its inception or over time); (iii) it will not interfere with jurisdictions that belong to the concerned parties, notwithstanding the fact that it will be granted a specific political status and its own specific powers; and (iv) it should not assume the functions of a public enterprise (*empresa*) nor should it be in charge of operations of any kind. While these conditions for long-term sustainability may restrict the scope of work to only a few functions, these may provide a basis for developing further coordination responsibilities over time; experience suggests that the planning function provides the best support for actions aimed at transport coordination. It was decided that, within the planning function, actions might start with (for example) investment policy and fare coordination, and subsequently encompass physical planning, traffic management, and systems operations; such a phasing in was to be supported by a common strategic vision of the metropolitan transport system.²⁷

²⁷ For a similar approach also see The World Bank, *Belo Horizonte Metropolitan Transport Decentralization Project*, Report No. 14265-BR, June 5, 1995, p. 41-44.

12.20 The structure of *AMTU-RJ* includes: (i) a deliberative council, composed of the Secretary of Transport of the State of Rio de Janeiro who acts as chair and president, the Secretary of Transport of the Municipality of Rio de Janeiro, who acts as vice president, five mayors representing the subregions of the metropolitan area,²⁸ the president of planning institute of the Municipality of Rio de Janeiro, the president of the Rio de Janeiro Train Company (*Flumitrens, Companhia Fluminense de Trens Urbanos*), the president of the state road transportation department, the president of the private road operators' association, the president of the National Economic and Social Development Bank (*Banco Nacional de Desenvolvimento Econômico e Social, BNDES*), and a representative of a users' association entity; (ii) an executive committee, the chair of which is the representative of the Secretary of Transport of the State; and (iii) a technical committee, as an advisory and support secretariat, composed of representatives from public transport companies.

12.21 The role of *AMTU-RJ* is to: (i) plan, coordinate, and suggest to all levels of government the priority of transport investments, taking into consideration economic efficiency, financial sustainability, environmental, and land use issues; (ii) propose transport alternatives integrating different systems and modes; (iii) propose fare guidelines for transport in the metropolitan area; (iv) formulate compatible guidelines for licenses and permits; and (v) establish criteria and monitor the costs and performance of different systems.²⁹

12.22 As part of the efforts to prepare the **Dhaka** Urban Transport Project, the Government of Bangladesh has set up a Greater Dhaka Transport Planning and Coordination Board (GDTPCB), an interagency unit responsible for overall transport planning and coordination in the Dhaka Metropolitan Area (DMA), thereby filling a major gap in the institutional framework. GDTPCB is to play a lead role in carrying out transport planning for the DMA as well as assist in policy formulation and the coordination of major urban transport operational and investment decisions in the DMA, with other agencies and stakeholders.³⁰ The functions of GDTPCB are also to be coordinated with structure and land use planning for the DMA so that transport planning is consistent with the regional development vision.³¹ Chaired by the Mayor of Dhaka, GDTPCB also includes representatives of the smaller municipalities in the DMA, the private sector, and all other important agencies with a stake in transport planning and coordination in the DMA. GDTPCB is administratively under the Ministry of Communications (MOC) because transport planning, policy, and regulation in Bangladesh are functionally the responsibility of this Ministry; the Executive Director of the Board reports to the MOC Secretary. The organizational structure of the GDTPCB was formulated in the light of studies by local and international experts that examined the mandates and capacities of

²⁸ For representative purposes, the metropolitan area has been split into five subregions following the main transport corridors. Each group is to deliberate transport and traffic management issues and elect a mayor to represent it on the executive committee.

²⁹ The World Bank, *Staff Appraisal Report, Brazil, Rio de Janeiro Mass Transit Project*, Report No. 15937-BR, December 2, 1997, pp. 39-43.

³⁰ As a condition to the World Bank loan, review by GDTPCB is required before the undertaking of any new transport investments in the DMA exceeding US\$5 million.

³¹ The Government of Bangladesh has set up a Capital Area Development Coordination Committee for metropolitan structure development, chaired by the Minister of Local Government and the Mayor of Dhaka as a Joint-Convenor; GDTPCB is to coordinate its work with this larger and more important regional planning and coordination entity.

existing institutions and coordination problems. The option of retrofitting existing institutions with planning and coordination functions was examined, but it was found that existing institutions lacked the necessary coverage, mandates, and capacities to provide effective coordination;³² none of the existing institutions was in a position to ensure effective coordination of transport-related activities and investments for the entire DMA. The World Bank sponsored Dhaka Urban Transport Project has contributed to this positive development by providing technical assistance, training, and equipment to make the new coordination agency fully functional.³³

12.23 Four government bodies were mainly responsible for overseeing the urban transport sector in **Recife (Brazil)**: (i) the State Roads Administration (*Direção de Estradas de Rodagem do Estado de Pernambuco, DER-PE*), which regulates intermunicipal bus services and the regional road network; (ii) the Recife Metropolitan Transportation Company (*Empresa Metropolitana de Transportes Urbanos, EMTU*), a state agency that coordinates all intermunicipal bus services in the metropolitan area plus, by delegation, all the Municipality of Recife bus services; (iii) the State Traffic Administration (*Departamento de Transito do Estado de Pernambuco, DETRAN-PE*), which is in charge of traffic engineering in the region; and (iv) the Brazilian Urban Trains Company (*Companhia Brasileira de Trens Urbanos*), which through its Recife subdivision (*STU-REC*) operated the metropolitan and suburban train services. To facilitate coordination of investment and operation among the major providers of urban transport services, a proposal to create a coordinating body was put forward at the time of preparation of the World Bank sponsored Recife Metropolitan Transport Decentralization Project. It was stressed that this would not be a new level of government and would not assume the powers of the State or municipality; rather, it would provide a forum to review all proposals in relation to their compliance with an agreed transport strategy, evaluate alternatives, and make recommendations based on a regional, intermodal perspective. The so-called Regional Transport Coordination Commission (RTCC) would include representatives of the state governor and metropolitan area mayors (including the mayor of Recife Municipality), as well as *STU-REC*, *DER-PE*, *DETRAN*, the bus operators' association, and agencies responsible for municipal and regional planning. An Executive Secretariat was established to develop and evaluate proposals and carry out day-to-day activities.³⁴

³² On this issue, a JICA study in Kuala Lumpur also found it was necessary to establish a new organization for metropolitan transport coordination; the reason given was that none of the existing organizations could consider issues from a regional perspective. Pacific Consultants International and Suuri-Keikaku Co., Ltd., *A Study on Integrated Urban Transportation Strategies for Environmental Improvement in Kuala Lumpur, Final Report, Volume II*, prepared for The Federal Territory Development and Klang Valley Planning Division, Prime Minister's Department, and the Japan International Cooperation Agency, February 1999, p. 14-11.

³³ The World Bank, *Project Appraisal Document on a Proposed Credit in the Amount of DSR 129.3 Million (US\$177 Million Equivalent) to the Government of the People's Republic of Bangladesh for Dhaka Urban Transport Project*, Report No. 18339-BD, December 17, 1998, pp. 6-8, 11, 15, and 21.

³⁴ The World Bank, *Staff Appraisal Report, Brazil, Recife Metropolitan Transport Decentralization Project*, Report No. 14264-BR, June 5, 1995, pp. 2, 43-44. The following were determined to be critical questions in establishing the RTCC: (i) Is a single entity responsible for preparation of transport plans across all modes (highways, metro, suburban rail, and bus/busways) or are separate plans to be prepared by the respective municipalities, building and operating companies, and then put together by a coordinating agency? (ii) Who monitors the coordination and performance of the transport systems, and how do the results of the monitoring feed into the planning process? (iii) What is the relationship between the transport plans and the respective land use plans developed by the municipalities? (iv) What is the relationship between the plans developed under (i) and the multi-year capital program developed by the implementing authorities? (v) Is the project flow top-down

12.24 Recognizing that the **Buenos Aires** Metropolitan Area (the *Area Metropolitana de Buenos Aires, AMBA*) was lacking a consistent, coherent, and cooperative approach to urban transport management, with the quality, regulations, enforcement and administration varying widely among jurisdictions, and with neither intermodal nor fare integration having been achieved, resulting in avoidable costs and travel time increases, proposals were formulated in the early 1990s by the Mayor of Buenos Aires and the Argentine Minister of Economy to create a multi-jurisdictional body to facilitate planning, regulation, and control of transport in the *AMBA*. However, political constraints hindered the establishment of a Metropolitan Area Transport Authority (*Autoridad de Transporte del Area Metropolitana, ATAM*) to address these issues, with the Argentine Congress unable to pass the requisite legislation. Accordingly, the World Bank sponsored Buenos Aires Urban Transport Project was designed to increase commitment to a greater level of metropolitan transport coordination by demonstrating the advantages of coordinated action, based on strong technical capability, to deal with commonly recognized problems. This was to be accomplished through (i) the development of a core group of technical skills in metropolitan transport planning to ensure a sound technical basis for the design and implementation of metropolitan transport and traffic measures; (ii) the carrying out of an urban transport study that would require the cooperation of diverse agencies throughout the metropolitan area, and produce planning tools and projections useful to all of them; and (iii) the creation of a management committee including representatives of the different functions and jurisdictional levels, to identify problems common to the separate jurisdictions and provide policy guidance to the technical core group. Thus, the approach of the project to coordination is problem-oriented and “bottom-up,” but with a long-term view of converting the management committee into a permanent body responsible for transport planning for the entire *AMBA*.³⁵

12.25 Prior to the World Bank’s appraisal of the **Bogota** Urban Transport Project, there was a critical lack of coordination of urban transport programs, characterized by duplication of functions, turf conflicts, and waste or retention of information produced by each agency, which led to increased inefficiency in the transport system. A set of institutional reforms instituted in 1991 made the District Secretariat for Traffic and Transport (*Secretaría de Tránsito y Transporte, STT*) the focal agency for the District for traffic management and public transport, but this proved unsuccessful because of inadequate staffing in *STT* and the tendency of *STT* to focus more on day-to-day operational (and income-generating) activities and operate permanently on a crisis-driven basis. Accordingly, a proposed reorganization was planned including: (i) the creation of a single transit authority for the District; (ii) the liquidation or amalgamation of the existing sector entities into this new institution; and (iii) the review of all current functions and processes within the current sector entities, in order to rationalize the functions of the new institution.³⁶

(i.e., flowing from the plan), bottom-up (generated by implementers and operators), or both? and (v) Do the various operating companies have direct access to funding or should their capital budgets be approved by the State Government or the new RTCC?

³⁵ The World Bank, Staff Appraisal Report, *Buenos Aires Urban Transport Project*, Report No. 15951, April 11, 1997, pp. 2-5, 30-44.

³⁶ The World Bank, Staff Appraisal Report, *Colombia, Bogota Urban Transport Project*, Report No. 14901-CO, April 26, 1996, pp. 5-6, 34-37.

12.26 Based on a diagnostic study of **Dakar** finding that there were too many jurisdictions in the city's urban transport system and a consequent lack of coordination, the World Bank sponsored an Urban Transport Reform and Capacity Building (Technical Assistance) Project to help the Government set up a Dakar Urban Transportation Executive Council (*Conseil Exécutif des Transports Urbains de Dakar, CETUD*) under the Ministry of Infrastructure and Land Transportation with extensive operating autonomy and the required financial and legal resources. Its responsibilities were to include: (i) determination of the routes to be served and the technical means to be employed; (ii) drafting of specifications, terms of reference and calls for bids, evaluations of bids, conclusion of agreements with transport enterprises, and verification of performance of contracts; (iii) proposal of a new transport rate-setting policy; (iv) identification of public-service constraints and determination of financial compensation; (v) preparation and management of the budget of the Urban Transportation Development Fund and authorization of expenditures and collection of revenues; (vi) formulation of studies and training, information, or promotion actions designed to foster the harmonious operation and development of public transport in the metropolitan area; and (vii) intermodal coordination, with special reference to the allocation of receipts in the case of fare integration. *CETUD* was to include a Plenary Session and Permanent Secretariat. The Plenary Session would serve as the Council's deliberative and decision-making body, have a Chairman, and include members equally representing the State, the local authorities of the metropolitan area, and the operators and users of public transport. The Permanent Secretariat would be the Council's implementing body, be under the authority of the Chairman, and be provided with the technical means to perform its functions; it is to be run on private sector management lines, subject to budgetary checks and controls and audit requirements.³⁷

12.27 The strategy of the **Salvador [Brazil]** Urban Transport Project has been to create a formal regional coordinating body for planning, coordinating, and setting priorities for new investments and modal integration in the Salvador Metropolitan Region. Prior to implementation of the project, there was a lack of consistency in the fares charged by similar or competing modes, duplication of investments, absence of criteria to prioritize investments, and only embryonic integration of the urban transport system—as a consequence, bus services operated along trunk corridors where rail was more suited, there was a lack of promotion of hub-and-spoke services to encourage feeder services, and subsidy policies varied among municipalities. To address these issues, the establishment of a Regional Transport Coordination Commission (RTCC) was made a condition for appraisal of the World Bank project loan.³⁸

12.28 **Bishkek**, the capital of the Kyrgyz Republic, has been lacking a strong institution for overall planning and management of its transport sector, regulating operators, and enforcing regulations. There has been a Transport Coordination Committee, but it has had very limited staff and resources, and its role has been limited to providing general coordination and licensing private operators; also the Committee has had overly strong ties to the transport operators, which it has sought to protect. In response, the World Bank has urged the establishment of an independent and competent urban transport planning and management

³⁷ The World Bank, *Technical Annex, Republic of Senegal, Urban Transport Reform and Capacity Building (Technical Assistance) Project*, Report T-7052-SE, May 7, 1997, pp. 21-24, 46, 50-51.

³⁸ The World Bank, *Project Appraisal Document on a Proposed Loan in the Amount of US\$150 million to the Federative Republic of Brazil for the Salvador Urban Transport Project*, Report No. 18773 BR, May 14, 1999, pp. 3-6.

agency (a City Transport Department, a CTD), whose functions would include coordinating with other municipal agencies involved in managing urban roads and traffic, and formulating and implementing urban development strategies. The World Bank has counseled that the CTD be placed high within the city administration, directly under a Deputy Mayor; in addition, the CTD should have an independent source of funding, perhaps based on licensing and franchise fees. Also, the CTD should be adequately staffed to fulfill its functions, which may require transferring employees from the former State-owned urban transport operators. Finally, the CTD should be separate from the National Transport Inspectorate, which is responsible for different regulations (e.g., regulations on vehicle weights and dimensions, roadworthiness, and quality licensing of operators).³⁹

12.29 In **Ashgabat**, the capital of Turkmenistan, the responsibility for regulating and providing urban transport services has been shared by several organizations, resulting in poor service and duplication. Drawing on the experience of other countries, the World Bank advised that urban transit services could be more efficient and better coordinated if all services were under the control of a single independent authority accountable to the municipality. In response, the Turkmen Government has already taken measures to consolidate these services in Ashgabat under an independent Public Transportation Agency accountable to the city authorities. Also, the Government plans to reduce the role of the Ministry of Motor Transport in the operation and management of urban transit in the country.⁴⁰

D. SUMMARY OF LESSONS LEARNED

12.30 Lessons learned from the discussion of issues and instructive case studies presented in the previous sections of the chapter include the following:

12.31 **The Vertical Dimension: Centralization versus Decentralization:** On the one hand, **decentralization offers a number of advantages** over centralization, e.g., enabling objectives and conditions to be shaped by local conditions and preferences, improving responsiveness and accountability to system users, and promoting experimentation with innovative approaches to urban transport problems.

12.32 On the other hand there may be **weaknesses with decentralized approaches**, e.g., where decentralized decisions result in spillover effects across jurisdictional boundaries, raise issues related to scale economies, or raise issues related to inter-jurisdictional trade; decisions related to the level and structure of vehicle and fuel taxes and vehicle emission standards would fall in this category and hence are taken at the national level in most countries.

³⁹ The World Bank, *Kyrgyz Republic, Urban Transport Review*, June 30, 1998, Report No. 18310-KG, pp. 5, 20-21. It should be noted city governments in the Kyrgyz Republic have limited independence from the central ministries; little can be gained from the transfer of formal responsibility to agencies without genuine independence.

⁴⁰ The World Bank, *Staff Appraisal Report, Turkmenistan*, Urban Transport Project, Report No. 16176-TM, April 28, 1997, pp. 4-5, 58. The comment in the previous footnote with respect to the Kyrgyz Republic also applies to Turkmenistan, a country where consolidation of responsibility in public transport agencies accountable to city authorities at least arguably means more on paper than in fact.

12.33 A number of **conditions** must obtain **for decentralization to be successful**: (i) clear assignment of functional responsibilities among government levels, (ii) matching of revenue sources with functional responsibility, and (iii) establishment of a system of accountability that balances central authority and local political participation. Decentralized systems work better when based on rules rather than on negotiations, and political autonomy requires matching financial autonomy. It is important to avoid the cases of the “overcontrolled local sector,” “laissez-faire decentralization,” and the “perversely regulated local sector.”

12.34 **The Horizontal Dimension: Centralized Metropolitan Government versus Geographic/Jurisdictional and Functional Fragmentation:** While **geographic/jurisdictional fragmentation** moves the government closer to the people by creating smaller government bodies, there are many **disadvantages**, e.g., diseconomies of scale, disparities in tax burdens and services in different jurisdictions.

12.35 **Functional fragmentation** also creates problems such as overlaps among the responsibilities and activities of different organizations and the creation of vested interests in protecting and expanding assets and revenues sources.

12.36 It is possible to conceive of a **hybrid approach with elements of both geographic/jurisdictional and functional fragmentation**. For example, the draft Concept Paper for the Urban Transport Sector Strategy Review suggests that parking strategy in a metropolitan area, including supply and pricing issues, might be best formulated at the metropolitan level, while issues of parking management and enforcement may be better addressed at the lowest level in the spatial hierarchy.

12.37 Some developing country metropolitan areas have sought to address the typically adverse impacts of geographic/jurisdictional and/or functional fragmentation through **centralized metropolitan governments**. This approach provides for an ease in coordination of activities and implementing plans, has a reduced likelihood of duplication of services relative to alternative systems, allows for economies of scale in service provision, and internalizes externalities. However, large metropolitan governments may be difficult to manage and not provide a ready mechanism for responding to differences in demand within the metropolitan area for the package of services to be delivered. The problem may be addressed with small subarea administrative units, but usually is not done so.

12.38 A number of other developing country metropolitan areas have addressed the problems of geographic/jurisdictional and/or functional fragmentation with a **more incremental approach** by establishing **metropolitan-region wide transport and coordinating agencies**. Key elements for the sustainability of such coordination arrangements may include the following: (i) it should be based on a permanent structure, designed to outlive executive or legislative mandate periods; (ii) it should be accepted by the parties as an additional asset and not a threat to their autonomy or decision-making powers (even though the balance of power may shift at its inception or over time); (iii) it will not interfere with jurisdictions that belong to the concerned parties, notwithstanding the fact that it will be granted a specific political status and its own specific powers; and (iv) it should not assume the functions of a public enterprise nor should it be in charge of operations of any kind. While these conditions for long-term sustainability may restrict the scope of work to only a few functions, they may provide a basis for developing further coordination responsibilities over time; experience

suggests that the planning function provides the best support for actions aimed at transport coordination. Within the planning function, actions might start with (for example) investment policy and fare coordination, and subsequently encompass physical planning, traffic management, and systems operations; such a phasing in should be supported by a common strategic vision of the metropolitan transport system. [Rio de Janeiro]. Experience also suggests that all funds destined for the transport system should be controlled by the same body [Bangkok].⁴¹ The option of retrofitting existing institutions with coordination functions requires that such institutions have the necessary coverage, mandates, and capacities to provide effective coordination [Dhaka]. However, it may be important that a coordinating agency not be a new level of government and not usurp the powers of existing governments; rather, it may be better for it (at least at the outset) to provide a forum to review all proposals in relation to their compliance with an agreed transport strategy, evaluate alternatives, and make recommendations based on a regional, intermodal perspective. Where political constraints hinder the establishment of a metropolitan transport coordination agency, one approach may be to demonstrate the advantages of coordinated action, based on strong technical capability, to deal with commonly recognized problems—this approach to coordination is problem-oriented and “bottom-up” [Buenos Aires].

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13

URBAN TRANSPORT AND POVERTY

A. OVERVIEW

13.1 The overarching objective of the World Bank is to reduce poverty through sustainable economic development. Transport can influence poverty through its contribution to economic growth, and also in directly facilitating access to social requirements. For example, access to employment markets is often a problem for the urban poor because they typically live in informal, unplanned areas away from job opportunities; these areas tend to be poorly served by roads and public transport, which are concentrated on main radial routes.

13.2 Moreover, the poor tend to suffer in the development of transport systems due to requirements for efficiency and cost-effectiveness. The provision of transport infrastructure tends to favor higher-income groups, with efficiency considerations dictating an emphasis on motorized transport. Many transport projects are justified by economic returns so that consideration of the poor is ignored. To the extent that the urban poor in developing countries are concentrated on the periphery of urban areas and have relatively few alternative residential locations, they must travel proportionally longer distances and their needs for affordable transport are heightened.¹ The dilemma that faces planners is how to effectively address the problems of the poor without restricting the economic growth of cities.

B. TRAVEL CHARACTERISTICS OF THE URBAN POOR

13.3 **Transport Services Used by the Urban Poor.** In order to gauge the magnitude of the travel problems confronting the urban poor, an understanding of their travel characteristics is required. It is important to recognize the services that are most commonly used by the urban poor, the influences on their travel choices, and the problems they encounter. The transport modes available to people of low incomes are: walking, bus, rail, motorcycle, and non-motorized vehicles.

13.4 *Walking.* As would be expected, there tends to be a close correlation between low incomes and a dependence upon walking as a mode of transport. The use of this mode is influenced by the level of poverty, city size, and distances involved. For example, in Jakarta in 1985, walking accounted for almost 60% of all trips taken by the lower-income population.² Pedestrian facilities tend to be overlooked in planning strategies but are warranting wider attention as accidents increase.³

¹ C.A. Gannon and Z. Liu, *Poverty and Transport*, prepared for the World Bank, Discussion Paper, September 1997, p. 12, paragraph 2.31.

² Japan International Cooperation Agency, *Arterial Road System Development Study in Jakarta Metropolitan Area*, Ministry of Public Works, 1987.

³ PADECO Co., Ltd., *Non-Motorized Vehicles in Asian Cities, Technical Guidelines*, prepared for the World Bank, 1993.

13.5 *Bus.* Bus is widely used by low-income commuters in developing countries but users tend to suffer from overcrowding, congestion, and discomfort. Also, limited car ownership in low-income areas reduces the justification for constructing high-quality roads, which in turn results in roads of an inadequate standard for bus operation.

13.6 *Urban Rail.* Over two-thirds of all urban rail systems in Asia are found in high-income countries such as Japan, Singapore, and Hong Kong. Despite high capital and operating costs, urban rail is also found in low-income countries such as China and India. However, the construction of urban rail systems is not achievable for many cities in developing countries due to the high capital costs with little chance for recovery. The use of revenue to pay back loans for construction and to cover operating costs also tends to increase fare levels beyond low-income affordability.

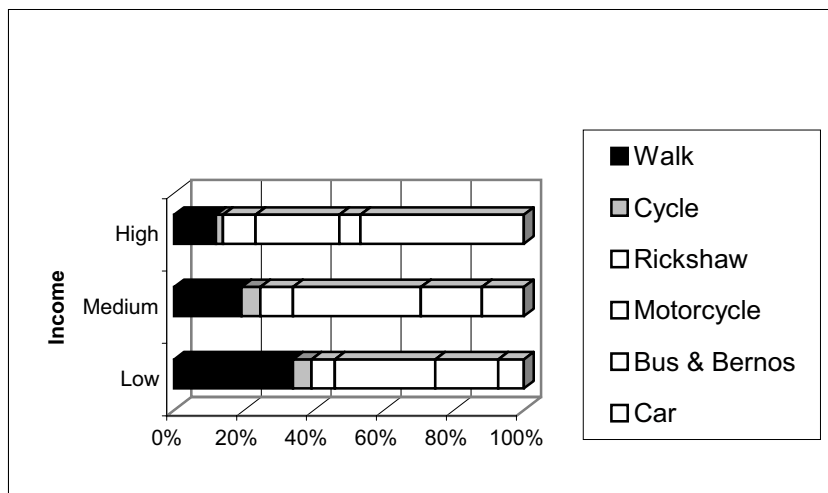
13.7 In some countries rail systems are largely the product of historical development. Often urban rail systems, which were established as part of a national system at earlier stages in urban development, have since contributed to the urban transport system. For example, in large cities in India, many low-paid employees travel long distances at low fares on suburban railways.

13.8 *Motorcycles.* Small motorcycles are used extensively within a high number of low-income cities. In Ho Chi Minh City, it was estimated that 80-90% of households had access to at least one motorcycle by 1996. High motorcycle use, as witnessed in Vietnam, Malaysia, Indonesia, and Thailand, tends to be associated with poor public transport. Although motorcycles can be problematic in terms of pollution, noise, and accidents, they are relatively affordable.

13.9 *Non-Motorized Transport.* Non-motorized vehicles (NMVs) become particularly attractive when bus services are poor and incomes low. In poorer countries, NMVs are important providers of employment as well as transport. While in wealthier countries bicycles are commonly used as a feeder mode to public transport services, in most NMV-dependent, low-income cities, bicycles tend to be used for the entire trip.⁴ While hot and rainy climates are not conducive to cycling, there is conflicting evidence on the impact of climate/weather and the extent to which it either affects modal choice or is simply tolerated by necessity. Although a high tolerance of rain is observed in many cities, climate can affect the ratio of bicycle to cycle-rickshaw usage, with the latter mode offering the traveler more protection from the elements than the former. It is also possible that NMVs are considered a more bearable alternative to overcrowded buses without air conditioning, although there is little quantitative evidence addressing this issue. In contrast, higher-income persons may opt for air-conditioned modes.

13.10 **The Effect of Income on Choice of Travel Mode.** There is no consistent evidence on whether the poor spend a higher proportion of their income on transport than other groups and the specific conditions of the area that affect household expenditure. Figure 13-1 shows the relationship between travel mode and income for Surabaya (Indonesia); this study showed that the lower-income group tends to walk, and public transport was used by lower- and middle-income groups but less so by the high-income persons.

⁴ PADECO Co., Ltd, *Non-Motorized Vehicles in Ten Asian Cities*, prepared for the World Bank, Report TWU 20, 1995.

Figure 13-1 Trip Modes According to Income in Surabaya

Source: PT. M. Konsultama, *Assessment of Transportation Growth in Asia and its Effects on Energy Usage, Environment and Traffic Congestion, Case Study Surabaya, Indonesia*, December 1991, p. 89

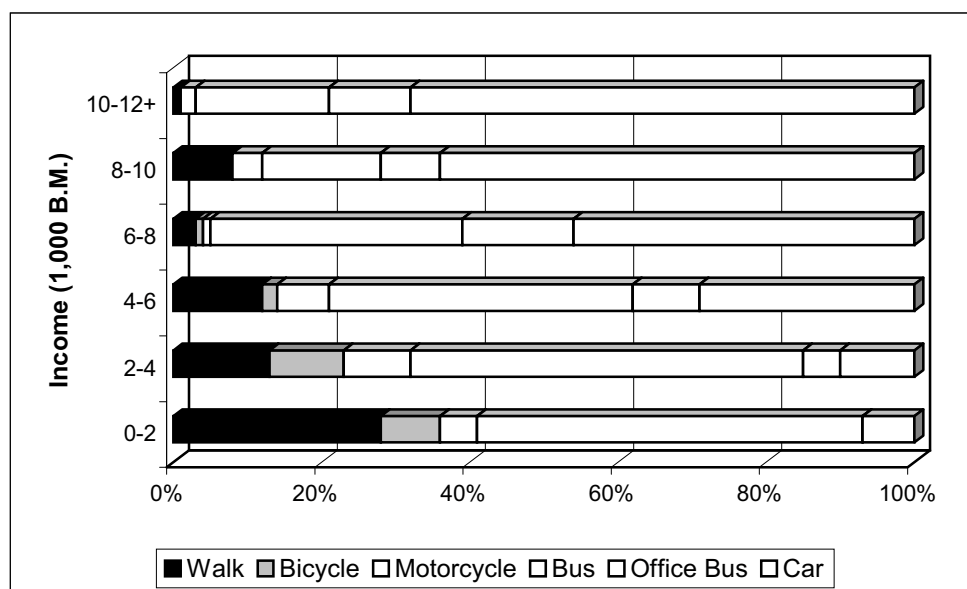
13.11 Analysis of the modal split of commuting trips in Bangkok (Figure 13-2) shows that, as expected, walking, cycling, and motorcycle use becomes less frequent as income increases, while car use rises with income. When considering shopping trips, the incidence of walking rises further for the low-income bracket.⁵ Bus is the main mode of transport in Bangkok, particularly for the poor, as fares are politically suppressed although user satisfaction is low and car ownership is an aspiration of many.

13.12 While bicycle prices are relatively low in developing country cities, the price of a new standard model bicycle is high in relation to income and this ratio can compare to the price of a motor car in wealthier countries. The availability of economy models and used bicycles helps to alleviate this problem, although in Bangladesh relatively high taxes on bicycles have made them less affordable.⁶ The prices of cycle-rickshaw prices vary more than bicycle prices; they are considerably cheaper than motorized rickshaws but prices are sufficiently high for them to be rented more often than owned.

⁵ The low-income group has been assumed to consist of households with an income of 5,000 baht or less.

⁶ The lack of a significant domestic bicycle industry and high tariffs on imports in Bangladesh contributes to bicycles being beyond the reach of the poor in Dhaka. R. Gallagher, *The Rickshaws of Bangladesh*, Dhaka, University Press Limited, 1992.

Figure 13-2 Bangkok—Mode to Work by Income



Source: Noboru Harata, "Some Basic Characteristics of Travel Behavior in Bangkok – Comparison Among Typical Residential Areas in Suburbs," p. 21 Figure 9, in University of Tokyo, *Survey on the Local Housing System of Non-Planned Human Settlement in the Rapid Growth Urban Sprawl Area*, 1987

13.13 Relationship between Trip Frequency and Income. Vehicle ownership is an important variable as it relates the use of the vehicle. Higher-income persons tend to make more trips; a study in Surabaya showed about 20% more trips per person in the high-income group than in the low-income group.⁷ While the poor tend to make fewer trips, there are certain trips that only become necessary in poor informal areas. For example, collecting water or disposing waste can be onerous and could be removed by basic service provision. A study of low earners in two areas of Delhi found that most journeys were undertaken for work and schooling, with few optional trips made; in this study, about 10 per cent of all household expenditure was on transport, mainly for bus fares.⁸

13.14 Safety Issues. Developing countries have high incidences of pedestrian and NMV casualties arising from conflicts with motor vehicles, which suggests that lower-income groups are particularly vulnerable to accidents. Cities such as Manila, Kuala Lumpur, and Bangkok have reported overall accident death rates per 10,000 vehicles of 11, 23, and 10 respectively, compared to Tokyo's figure of 1.2.⁹ These differences may be attributed to a number of factors such as undisciplined road use, poor vehicle maintenance, poor road conditions, and high numbers of pedestrians including recent migrants from rural areas. Motorcycle, a high growth mode, is particularly accident prone; in Surabaya it contributed to

⁷ International Institute for Energy Conservation and PT. Mojopaht Konsultama, *Assessment of Transportation Growth in Asia and its Effects on Energy Usage, Environment and Traffic Congestion, Case Study, Surabaya Indonesia*, 1991, p. 4-23.

⁸ D.A.C. Maunder, *Household and Travel Characteristics in Two Residential Areas of Delhi, India*, Transport and Road Research Laboratory Report, No. SR 673, 1991.

⁹ H.T. Dimitrou, "Transport Problems of Third World Cities," *Transport Planning for Third World Cities*, 1992, p. 64 (citing K. Ichihara, "Survey on Road Safety Conditions in Major Southeast Asian Cities," *Proceedings of SEATEC Workshop*, Volume 3, Bangkok, 1983).

57 per cent of all vehicle accidents in a recent year.¹⁰ NMVs in low-income cities often lack basic safety devices such as rear-view mirrors, lights, and reflectors; this can be attributed to expense, risk of theft, and the speed-retarding effect of dynamos.

13.15 While large volumes of bicycles on city streets have a self-preservation effect, increasing motorization exacerbates the situation. NMVs in Asian cities have been found to be a relatively unimportant cause of traffic accidents although urban transport officials often perceive them to adversely affect road safety. The larger issue seems to be the safety of pedestrians from accidents caused by motorized vehicles. However, there is no clear evidence suggesting that safety influences the modal choice of the urban poor.

13.16 **Gender Issues in Choosing Travel Mode.** Women are estimated to account for 70% of those living in poverty throughout the world¹¹ and yet they are rarely considered in transport planning. Transport policies are primarily geared toward the needs of men as many activities of women are considered low status and disregarded in resource planning and allocation. The daily activities of females relating to childcare, household management, and less stable forms of employment result in different needs from those of men. For example, trips may be shorter, during off-peak hours when services are reduced, off main routes with fewer services, and also involve complex trip patterns making them more expensive or burdensome. Women can be less physically strong, which can make their journeys on crowded public transport more onerous, and in most countries they are less likely to have control over the household budget or use of the household bicycle.

C. MAIN ISSUES IN TRANSPORT FOR THE URBAN POOR

13.17 In assessing the characteristics of transport and the urban poor, the main issues arising are restricted accessibility due to inequity in access to the transport system and the importance of informal transport as an employment source. The displacement of the poor due to construction of transport infrastructure is also recognized as an issue.

13.18 **Restricted Accessibility.** A fundamental need of any population group is access to basic services and markets. The provision of a transport system that enables such access is essential to improving quality of life. Much of the research into the relationship between income and transport finds a dependence on cheaper modes and reduced trip making by low-income persons. It also suggests the importance of maintaining such low-cost modes and warns against the possibility of high rates of motorization as incomes rise. However, most assessments of the scale of the problem of limited accessibility to workplaces are subjective. It is likely that other economic and social factors have a greater influence on such issues. Factors such as travel discomfort and fare levels are issues that can be addressed directly by transport policymakers and planners while poor social conditions and low incomes can only be addressed indirectly by these officials. However, there are clear links among economic

¹⁰ See previous source, p. 83, citing G.D. Jacobs and I.A. Sayer, *A Study of Road Accidents in Selected Urban Areas in Developing Countries*, Transport and Road Research Laboratory Report No. LR 775, 1977.

¹¹ A. Rahman Paul Barter, "Transport and Poverty in Asia: A Brief Introduction to the Key Issues," in UNCHS (Habitat) Regional Symposium on Urban Poverty in Asia, Fukuoka, 27-28 October 1998, at <http://www.fukuoka.unchsh.org/> (citing United Nations Development Programme, *Human Development Report*, New York, 1995).

growth, poverty reduction, and transport—if the core issues are not addressed, transport problems and poverty will persist. The previous figures demonstrated the high use of bus, NMV, and walking modes by the urban poor in typical cases; in the absence of extensive research, it is presumed that low-income persons adjust to available services despite their clear inadequacies.

13.19 Danger of Policies Favoring Higher Income Groups. Cities in developing countries in Asia tend to have high urban densities in low-rise construction, intense mixing of different land uses, and a high proportion of employment in the central areas although not focused in a particular area. This form evolves in response to the use of non-motorized transport and, with continued growth, requires greater support by bus services for transport to the city center. In many ways, this form accommodates the needs of the poor and it is the trend for personal motorization among higher-income groups that undermines the system.

13.20 New residential developments, sought by the more wealthy, promote car access and therefore investment in road infrastructure, which in turn tends to promote long road corridors with haphazard development. The accompanying high car ownership in such areas leads to overloading of the city's roads and competition with non-motorized modes, which are then viewed as an obstruction. In addition, high requirements for transport infrastructure in new developments can also raise property costs to the disadvantage of lower-income groups. Therefore, in addressing transport for the urban poor, the provision of services for the higher-income groups has some bearing on the poor as it is often the side effects from the travel and dwelling patterns of the more wealthy that impinge on and obstruct the poor.

13.21 Importance of Informal Transport as an Employment Source.¹² The informal sector, while providing an important mode of transport for low earners, also provides opportunities for employment. Employment is the most effective instrument to reduce poverty. It is difficult to estimate the number of people that may be employed in informal transport but in non-motorized transport, the number of drivers or pullers, the owners, manufacturers, spare part shopkeepers, repairers, and the like, is clearly significant. Data and statistics on NMVs, in general, is scarce although recent studies have consolidated some of this information¹³ and it is evident that any restraint on these modes will have far-reaching consequences on the informal employment sector and therefore on the poor. As alternative employment sectors expand, the importance of NMVs for employment may decline; although demand for transport will of course continue, the continued use of NMV passenger services will depend on the improvement and operation of alternative forms of mass transit and controls on motor car use.

13.22 The informal motorized sector is particularly prevalent in Metro Manila where it is estimated that 60,000 jeepneys are the backbone of the city's transportation system, carrying nearly half of all passenger trips at peak times. Jeepneys are privately owned and operated, and are assembled locally by a thriving industry. The dominance of jeepneys (rather than

¹² For further discussion on poverty and the informal sector see International Labor Organization, S.V. Sethuraman, and United Nations Development Programme, *Urban Poverty and the Informal Sector: A Critical Assessment of Current Strategies*, New York, August 1997 at: http://www.ilo.org/public/english/employment/strat/poldev/papers/1998/urbpover.htm#_1_12.

¹³ See, e.g., PADECO Co., Ltd., *Non-Motorized Vehicles in Asian Countries: Inventory of Needs and Opportunities*, prepared for the World Bank, 1992.

buses) in Metro Manila may have resulted partly from generally dispersed travel demand patterns that are not dense enough for large buses. The success of jeepneys highlights the contribution that the informal sector can make in motorized transport and its employment potential when supporting services are also considered.

13.23 Bus Services and Subsidies. While the poorest, who are mostly unemployed, may not have adequate means to pay for public transport, Figure 13-2 showed the frequent use of buses by the low-income sector highlighting the importance of bus as a mode of transport for the poor. Bus tends to be the preferred public transport mode for such individuals because it is ubiquitously provided, more likely to provide service to trip origins and destinations than rail, and tends to be cheaper than rail, the fares of which are often tied to recovering high capital costs (although rail allows competition between and among operators, which is in the interests of bus patrons).

13.24 Options for public transport subsidy include lump-sum subsidies, user-based vouchers, basic service assistance, and income supplements. However, such subsidies for the poor are usually blunt instruments and require careful design to be justified. One of the main difficulties lies in targeting the poor. Subsidies are open to abuse by both operators and non-poor patrons. They can weaken transit operators' cost control and expose opportunities for rent-seeking. In many cases, subsidies are captured by operators due to inflated transit operating costs or effectively captured by property owners who inflate values in the improved areas. Direct income transfers to the poor may be difficult to organize where income tax systems are weak (as in most developing countries) and income cannot be verified. Fare revenue suffers leakage, either from unscrupulous ticket collectors or passengers simply avoiding payment.

13.25 Governments often provide subsidies to transport operators in order to maintain low fares. However, this practice tends to degrade services as operators lose the incentive to achieve efficiency and social objectives. The lack of funds for reinvestment also leads to service deterioration. A more effective approach is to subsidize the end-user public rather than the enterprise or business. Such a subsidy is transparent and has been used in several large cities. For example, in Lima (Peru), tickets are sold at kiosks and outlets around the city at a reduced price considered affordable by lower-income persons¹⁴; the bus companies then redeem costs from the regulatory authority and receive the commercial value of the tickets that had been agreed in franchise negotiations. In this way, the operator's income is directly related to ridership and profit and therefore related to operating efficiency. It also avoids a situation in which bus operators avoid sectors of the population that pay reduced fares. In Brazil, subsidies are paid to certain groups of workers through deductions on their income taxes equivalent to the difference in their transportation costs and a certain percentage of their salary. The disadvantage of this system is that it only reaches workers employed in the formal sector, who are not necessarily the poorest and constitute only about 40% of the working population.

13.26 A system for subsidizing spare bus parts in Jakarta is an example of subsidizing groups that may not have been intentionally targeted. The government helped to reduce the economically inflated prices of spare parts for buses by removing import duties and while

¹⁴ While it is understood that this system does not include controls to ensure direct subsidy to the poor, it is considered that most buyers of such tickets would be within the poor bracket.

there can be benefits in this approach, in this case it tended to benefit importers and suppliers rather than bus operators and users.¹⁵ Also in Jakarta, a policy of free entry under the bus licensing system reduces the potential for protecting disadvantaged groups through low fares; in contrast, a competitive contract system with transparent tendering would allow the government to choose an operator that has bid with the lowest fares or required subsidies.

13.27 Privatization of Bus Services. The commercialization and privatization of bus services promotes competition among operators, which can reduce fares to the particular benefit of the poor, although the profitability of routes is a significant factor and, in the absence of appropriate subsidy, may cause the neglect of poor neighborhoods. Such services can be maintained through competitive tendering with contracts awarded to the operator willing to provide the service for the lowest subsidy payment.

13.28 Competition can be introduced by free entry to private sector operators. The disadvantages to this approach, such as difficulties in scheduling multiple operators, predatory behavior on shared routes, and a reduction in quality, can be addressed by maintaining appropriate controls over fares, and service quality etc. The use of competitive tendering for franchises ensures that services are provided as cheaply as possible, and operational discipline can be stipulated within the contract.

13.29 Integration of Bus and Land Development. The city of Curitiba (Brazil) provides an example of a transport system that directly serves the poorer population while maintaining financial viability.¹⁶ Curitiba has developed an exclusive express bus network with travel speeds and passenger capacities similar to metro systems but at a fraction of the cost. It is also notable for the development of 17,000 units of low-income housing along the busway, which has resulted in high ridership levels. A flat fare system effectively facilitates cross-subsidization of poorer suburban groups by upper middle class residents in the central city¹⁷. Further, the system is self-financing and the private operators do not receive state subsidies. Much of the success of this project lies in the political support it has received, the relatively few bus companies involved in negotiations, the long-running allocation of land corridors for transport, and the compact nature of the city, which has allowed for a flat fare system. Such factors may limit the scope for replicating this type of system in other cities.

13.30 Rail Services. Many of the case study cities have high fares for new urban rail projects in an attempt to generate sufficient revenue to recover their high capital and operating costs. However, high fares, such as those of Bangkok's Tanayong elevated rail project, can put such systems out of the reach of low-income persons, resulting in low ridership. Further, the diversion of bus commuters rather than motorists to a new urban rail service, as often happens, can jeopardize bus services and/or increase fare levels. Robust, transparent financial planning for urban rail development is therefore necessary and raises questions of whether funds could be better invested in other projects to better serve the public in an equitable manner.

¹⁵ Pandu Gunadi, *Improving the System of Bus Management for Jakarta*, at <http://cities.canberra.edu.au/publications/Polycypaper/Pandu.htm>. It is presumed that importers/suppliers took advantage of this form of subsidy by not 'passing' on the savings to end-users. Such a situation is more likely to occur where a high degree of monopoly exists.

¹⁶ For information on Curitiba's bus transit system, see Robert Cervero, *The Transit Metropolis: A Global Inquiry*, Island Press, 1998, Chapter 10.

¹⁷ For a discussion on issues in the choice of fare systems, see S.J.LaBelle, *Common Issues in Fare Structure Design*, available at <http://www.fta.dot.gov/library/technology/symops/LABELLE.htm>.

13.31 In Bombay, rail season tickets are priced cheaply enabling low-income users to commute longer distances. Since the fares required to meet operating costs would result in severe hardship for most users, the deficit is cross-subsidized by profitable intercity and freight traffic¹⁸. In Singapore, where housing programs have relocated the poor into purpose-built flats, increases in income have kept pace with increases in the costs of commuting. The poorest sector of the population is spending about the same proportion of its household budget on transport while the richest have borne the extra costs of car ownership. However, the poor have experienced large increases in housing expenditure despite rents being held low.

13.32 **Non-Motorized Vehicles.** There is a strong link between NMVs and the poor in terms of both trip making and employment. In regard to the overall transport network, the relative advantages and disadvantages of NMVs can be summarized as follows:

Table 13-1 Advantages and Disadvantages of Non-Motorized Transport

Advantages	Disadvantages
• Low-cost operation • Personal mobility • Suitable for short urban trips • Non-polluting characteristics • Provision of local employment opportunities • Privately ownership, therefore does not require government subsidy • Affordable by all income groups	• Incompatible with faster-moving motorized traffic • Tendency to reduce road capacity • Crime-related image • Inadequate for long distances created by urban sprawl • Difficult to control and legislate • Not associated with economic growth and aspirations

Source: PADECO

13.33 Frequently, city officials focus on the disadvantages of non-motorized transport and take the view that it is contrary to modernization goals. While NMVs in large low-income cities are arguably the most efficient form of transport for trips up to 10 km, they are viewed as part of an era to be left behind rather than an asset to be improved. There are many examples of Asian cities with high NMV use but poor facilities (e.g., discontinuous routes, insufficient parking). In some cities, NMVs are being actively phased out or other policy measures effectively obstruct travel opportunities for low-income persons. For example, pedicabs (bicycles with sidecars) are not favored by government officials in Metro Manila. The government prohibited tricycles and pedicabs, although not bicycles and pushcarts, from operating on main thoroughfares. Pedicabs in Metro Manila are banned on streets that allow speeds over 40 kph. In the City of Manila and Quezon City, pedicabs are further prohibited in areas already served by jeepneys or buses. NMVs are not considered in transportation plans. However, driving a pedicab is a relatively cheap and easy means of livelihood and there appears to be a direct relationship between the number of poor and the number of pedicabs. In Dhaka, NMVs have been banned from certain roads. In both Jakarta and Delhi, the authorities seized and disposed of cycle-rickshaws and in Surabaya the government devised a system of

¹⁸ H.T.Dimitriou, G.A.Banjo, *Transport Planning for Third World Cities*, 1992, p.94.

day and night *becaks* to reduce the number operating at any one time. In George Town (Malaysia) cycle-rickshaw licenses have not been issued since 1969.

13.34 In order to improve non-motorized transport, it follows that unfounded biases against it must be addressed. NMV use is influenced by affordability, provision of dedicated infrastructure, motorization rates, and safety; these factors are in turn related to government policies, tax levels, and modal split. Public transport subsidies are sometimes used to offset the prohibition of non-motorized modes, although reforming such regulations may be a more effective and sustainable method of helping the poor.

D. TRANSPORT STRATEGY TO ASSIST THE URBAN POOR

13.35 The objectives for developing an urban transport system that contributes to equity and the amelioration of access difficulties faced by the urban poor are summarized below.

13.36 **Balancing Economic Growth with Poverty Reduction.** Investment in transport can address poverty either by targeting low-income persons or by seeking to improve economic efficiency and thereby reduce absolute poverty. In general, poverty reduction is a function of economic growth; therefore, when economic growth takes place it can be expected to help all income groups (at least to some extent) and the higher the growth, the greater the reduction in poverty.¹⁹ The most important asset of the poor is their human capital, and economic growth can increase the demand for their labor and subsequently increase wages; cases in point include Singapore, the Republic of Korea, and Taipei. Economic growth can be achieved by making use of cheap labor, which in turn requires mobilization by way of efficient transport. Singapore showed the importance of an effective public transport system in attracting foreign investment while Shanghai has shown the effect of the bicycle industry in both employment and transport. While other countries have shown the value of a car industry in employment and economic growth, these benefits have been at the expense of the problems caused by rapid motorization.

13.37 **Achieving a Transport System Accessible to All Sectors.** During the development of a country, the urban transport system generally changes from dependency on low-cost modes (particularly non-motorized) to mixed modes (low-cost and public transport) and then to public transport, and finally to private car. Some cities, such as Tokyo, have maintained a bias toward public transport even in the latter stages of economic development. However, there is typically a threshold effect in motorization by which at a certain stage a small increase in a city's income level can lead to a rapid surge in the ownership of private vehicles, as was experienced in Thai and Malaysian cities between 1987 and 1997.²⁰ Setting an overarching transport policy for developing cities may be difficult as each city has its own set of characteristics and values. Western solutions—such as urban motorways, underground railways, computerized traffic signals, and metropolitan bus corporations—may not be

¹⁹ See, e.g., David Dollar and Aart Kraay, *Growth Is Good for the Poor*, prepared for the World Bank, March 2000, at <http://worldbank.org/research/growth/absddolakrayt.htm>. Income of the poor rises one-for-one with overall growth. This general relationship between income and the bottom fifth of the population and per capita GDP holds in a sample of 80 countries covering four decades." Abstract

²⁰ V.S. Pendakur, *Urban Poor and Urban Transport: Their Mobility and Access to Transport Services*, International Forum on Urban Poverty, 1997.

uniformly effective for the poor. An integrated, mixed-mode transport system is recommended for large cities as it serves different income groups with correspondingly different levels of willingness to pay.

13.38 Seeking to Dissuade People from Using Cars. The motor car does not perform well in terms of sustainable efficiency, environmental considerations, and accessibility to all income levels. In many countries, despite the relatively low ownership of private motor vehicles, disproportionately large amounts are invested in road construction and maintenance in order to provide mobility for a small proportion of the total population. Providing for the private car is not only unsustainable but also excludes and disadvantages those with incomes insufficient to support car ownership. As the private car and its infrastructure develop, public transport, non-motorized traffic, and access to social needs inevitably deteriorate for those who are not car owners. It is worth noting that the lower-income groups effectively restrain or decelerate the move toward large-scale motorization. The implementation of restraints on private vehicles in the Republic of Korea throughout the postwar period may provide a particularly instructive example to other countries that have low incomes and low motorization.

13.39 Integrating Informal and Non-Motorized Transport into the Planning Process. Informal transport improves accessibility for the poor and provides an important source of employment. Developing countries undervalue NMVs and restrict their use, perceiving them to be a hindrance physically, socially, and technologically. Japan and many Western countries are actively encouraging bicycle use and cities in many other parts of the world would benefit from the integration of NMVs into transport fleets as it is the private ownership and operation of NMVs that tends to promote an untidy image. Obtaining reliable, updated data on key aspects of non-motorized transport is essential for future planning and decision-making and sensitive approaches are required.²¹ In addition, walking is one of the main modes of transport for the urban poor and therefore demands appropriate investment for the improvement of convenience and safety of pedestrians. Appropriate investments include basic footway construction and lighting to establish safe crossing points.

13.40 Utilizing Land Use Planning to Reduce the Need to Travel. The provision of suitable low-cost housing near large employment centers is fundamental land use planning. Both Singapore and Tokyo provide examples of effective land use planning that can greatly benefit low-income groups. In Tama New Town in western Tokyo, public housing, consisting of mid- and high-rise apartments, situated near rail stops, was targeted at low- and middle-income households; these apartments have been surrounded by privately built detached units for higher-income households. Singapore has avoided the urban sprawl witnessed in many other Asian cities by creating self-sufficient new towns and systematically addressing the housing needs of the poor. In other cities, such as Phnom Penh, new employment centers have been created outside the city center and housing supplied in close proximity. While the poor often walk or travel by other non-motorized means, these modes are not suited to long commuting distances, underlining the importance of effective land use planning.

²¹ Recommended actions for improving infrastructure and facilities for non-motorized transport have been set out in two reports prepared for the World Bank by PADECO, *Non-Motorized Vehicles in Ten Asian Cities: Trends Issues and Policies*, Report TWU 20, 1995 and *Non-Motorized Vehicles in Asian Cities, Technical Guidelines*, 1993. These reports describe possible actions at both local and donor agency level on a wide range of issues related to the promotion of NMV use.

13.41 Developing Efficient Subsidy Schemes for Public Transport. The frequent use of buses by low-income persons has been highlighted and methods to improve their availability are likely to be more cost effective than costly new urban rail projects. A strategy involving appropriately targeted subsidies and incentives is essential to better integrate the poor into the transport system. In many cities, the informal sector has proven its viability in providing inexpensive, convenient transport that is not necessarily located along main corridors. The contribution of this sector to transport and employment should not be underestimated and cooperation between public authorities and operators should be a key feature of the strategy adopted.

13.42 Facilitating Participation of the Disadvantaged in Transport Planning. Consultation with the poor can provide meaningful insight into their needs and reduce conflicts of interest. Without broad-based consultation, the main voices to be heard tend to be well-organized and wealthy industries related to motor vehicles, oil, and construction. Gender issues also require more prominence in the decision-making process.

13.43 Minimizing Resettlement due to Displacement by Transport Projects. Transport projects are the primary cause of resettlement in cities and poorer areas tend to be viewed as easier targets for route clearance. Good practice to address this issue has been developed,²² with the aim to reduce resettlement and ensure proper standards of treatment and compensation for those affected. The use of existing rights of way, for example in urban rail projects, will help to minimize the potential for disruption to residential areas.

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14

MOTOR VEHICLE SAFETY AND ENVIRONMENTAL MEASURES IN JAPAN

A. OVERVIEW

14.1 Vehicular traffic in an urban area generates negative externalities that can interfere with the urban environment. In particular, vehicular traffic concentration, common in cities around the world, contributes to the intensity and spread of air and noise pollution, as well as to traffic accidents caused by vehicle safety deficiencies. In the short term, this damages the quality of life, while in the longer term it can affect urban development patterns.

14.2 Severe urban pollution is observed in many Asian metropolises.¹ In order to improve this situation, regulation of fuel quality, gas emission quality, and vehicle inspection systems are urgently required. While some countries have already introduced such regulations, they are not always fully implemented or enforced. Common causes of pollution prevalent in each metropolis are:

- excessive motorization and traffic saturation caused by population growth, insufficient mass transit, and inappropriate urban planning;
- poor engine maintenance due to nonfunctional or nonexistent registration/inspection systems.
- leaded petroleum fuel, which causes lead pollution;
- emissions of particulate matter (PM) and hydrocarbons (HC) from the two-cycle engines of motorcycles; and
- insufficient recognition of pollution due to nonfunctional or nonexistent air quality observation systems.

14.3 Lack of proper vehicle safety standards is an equally important issue in developing countries. Although no statistics are available for the number of traffic accidents caused by vehicle safety deficiencies, it is clear that improvement of vehicle safety standards and inspection systems is urgently required in many developing countries.

14.4 In Japan, well-organized measures for addressing urban environment and vehicle safety issues affecting the quality of life have been developed. This chapter describes Japan's experience and knowledge in mitigating air pollution, noise, and vibration impacts as well as

¹ For example, Thailand's Ministry of Health and Welfare has found that one-quarter of Bangkok's citizens have some kind of respiratory disease caused by air pollution. Further, according to a United Nations study, if 20 percent of PM and lead pollutants in Bangkok were eradicated, the benefit would be worth US\$1.0-1.6 billion in disease recovery costs and US\$0.3-1.6 billion in reduction of the death rate. United Nations, *State of the Environment in Asia and the Pacific*, prepared for the United Nations Economic Commission for Asia and the Pacific (UNESCAP) and the Asian Development Bank, 1995 (cited in Japan Environmental Conference, *Asian Environmental White Paper (Asia Kankyo Hakusho)*, 1998, in Japanese, Chapter 2).

measures for reinforcing vehicle safety. Japan's roadworthiness inspection system will be explained in a separate section as it has made an important contribution to the efficient enforcement of restrictions on pollutant emissions, vehicle safety, and the collection of automobile tax; the involvement of the private sector in vehicle inspection is also indicated as a notable feature of the system. Finally, infrastructure-related measures to reduce noise and vibration along urban arterial roads will also be presented.

B. TRANSPORT RELATED ENVIRONMENT CONTROL MEASURES IN JAPAN

14.5 National Level Measures. The control of urban transport pollution in Japan was initiated in 1965 in response to research concerning the pathological effects of carbon monoxide poisoning. In 1966, the first regulation of vehicle emission gas for newly registered vehicles was promulgated.² During this period, air pollution caused by rapid industrial growth was becoming an important issue. The national government subsequently enacted comprehensive legislation in the form of a Basic Law for Environmental Pollution Control, which established environmental standards for air quality, noise, and vibration. By the end of the 1960s, several additional pollution countermeasures were implemented. These included:

- legislation setting out environmental standards for both newly registered vehicles and those under operation;
- establishment of vehicle inspection procedures and facilities;
- introduction of continual air quality monitoring sites along arterial roads; and
- regulation of unleaded petroleum and the dissemination of catalytic converters, which contributed to a rapid reduction in lead pollution.

14.6 With these measures, Japan was more progressive than European countries in air pollution control standards.³ The following subsection will describe the details of these four movements.

14.7 Regulating Legislation and Organization. The most effective method of reducing pollution is by regulation of the pollutant source, i.e., by setting emission standards. In Japan, several institutions were involved in determining standards for air emissions and vehicle noise. The Director General of the Environment Agency and the Central Council for Environmental Pollution Control (CCEPC) first agree on environmental standards for ensuring a desirable "quality of life." The Automotive Pollution Control Division of the Ministry of Transport (MOT) assumes the role of specifying a permissible limit and notifies the Ministry accordingly; the Ministry then circulates this standard to concerned parties such as the automotive industry.

14.8 Vehicle Inspection System. The method of enforcing emission standards differs for new and in-use vehicles. For new vehicles, vehicle manufacturers designate the type of

² Japan Automobile Service Promotion Association, *Jidousha Haishutugasu Taisaku (Countermeasures for Automobile Emission Gas)*, Tokyo, 1999 (in Japanese).

³ Y. Moriguchi, "Environmental Acts Related to Transportation and View for Sustainable Transport," *Journal of Japan Society of Traffic Engineering*, Vol. 33, pp. 3-10, 1998 (in Japanese).

vehicle with an official certification system, thereby simplifying inspection of individual vehicles. As for in-use vehicles, a nationwide vehicle inspection system organized by the MOT checks vehicles and enforces emission standards. This system, composed of 92 government inspection stations and 85,000 private garages, checks about 37 million vehicles annually (1997 data) throughout the country.

14.9 Monitoring Stations. Air Quality Monitoring Stations (AQMS) were first established in 1965, and now there are 492 stations operating in major cities in Japan.⁴ Noise monitoring stations have also been developed. Although the Environment Agency supervises their activities, most of the monitoring stations have been established by prefectural and municipal governments that receive grants from the national government. The monitoring equipment is connected to a data center so that real-time monitoring is available.⁵ The data can then be compared to CCEPC's recommendations. According to analysis carried out in 1998, concentrations of nitrogen dioxide (NO₂), PM, and ozone have remained above the recommended levels for a decade, especially in metropolitan areas, despite the implementation of the countermeasures; this finding has led CCEPC to introduce stricter regulation and road pricing measures.

14.10 Petroleum Quality Standards. Oil companies in Japan reduced the sulfur content of gasoline during the 1970s. It is notable that Japan's petroleum industry became the first in the world to eliminate alkyl lead⁶ from regular gasoline in 1975, and also from premium grade gasoline in 1983. These developments were brought about by official notice from the MOT and Ministry of International Trade and Industry, and through coordination with the motor vehicle manufacturing industry. CCEPC also makes recommendations on the quality of fuel. The necessary plant investment for the petroleum industry amounted to some 800 billion yen for which the Development Bank of Japan provided assistance through long-term loan programs and preferential assistance for environment-related capital spending. Most complaints from the automobile industry concerned the cost of engine re-design and modified petroleum quality.

14.11 Regional and Local Level Measures. Localized emission control measures may be as important as measures implemented in the national context. Recognizing that the emission level of mobile-source pollutants such as nitrogen oxides (NO_x) had been alarmingly high in major metropolitan areas, the Government of Japan enacted the Law To Reduce the Total Volume of NO_x Emissions in Designated Areas, and has applied it in the metropolitan areas of Tokyo, Osaka, and Kobe. Older vehicles that do not conform to these standards are prohibited from operation unless the owners have the emission performance of their vehicles improved within a certain grace period.

14.12 The majority of the vehicles targeted were commercial vehicles such as trucks, buses, and other utility vehicles; nearly 98 percent underwent appropriate modifications between 1992 and 2000, benefiting from tax privileges granted to commercial users. However, despite

⁴ A total of 171 stations are established along main roads. In the Tokyo Metropolitan Area, 82 AQMS (of which 35 are along main roads) are in place.

⁵ An Internet site provides real-time monitoring data: <http://www.kankyo.metro.tokyo.jp/cgi-bin/tokyokh/bunpu1/p101.cgi>.

⁶ Alkyl lead is used to raise the octane level of gasoline but it leads to lead compound poisoning symptoms in humans.

the success in converting high-polluting vehicles, according to a recent report of the Environment Agency,⁷ there has been no improvement in air quality because of an increase in traffic and greater use of diesel cars. The Tokyo Metropolitan Area has now introduced a strategy to reduce air pollution by through the development of Diesel Exhaust Particles (DEP) filters and conversion systems for diesel vehicles.

14.13 Air Quality Control in Asian Cities. Some cities in Asia have initiated air quality control measures through the use of compressed natural gas (CNG) and prohibition of old diesel cars from city areas. For example, in Surabaya, the second largest city in Indonesia and the capital of East Java, CNG utilization is emerging as highlighted by the action of a private firm, Zebra Company, which provides 50 per cent of the city's cab service, in converting all its vehicle engines from gasoline to CNG in 1998.⁸ The conversion kit cost approximately US\$1,000 for each vehicle. Some paratransit vehicles running near Surabaya's main railway have also been converted to CNG with subsidies provided by the company.⁹

14.14 On the other hand, in Delhi, designated by the World Health Organization as one of the four worst cities in the world in terms of air quality, the Supreme Court decreed a prohibition of older buses to be operated within the city, with the court finding that diesel engines of buses older than eight years severely damage the environment. This prohibition amounted to the abolition of over 6,000 buses of the National Bus Company (DTC) as well as the fleets of private companies. Although the Court recommends the use of CNG as an alternative fuel, the dissemination of CNG has been hindered by the poor supply of CNG and a price system that favors diesel fuel.

C. VEHICLE SAFETY STANDARDS

14.15 Enforcement. An effective system for controlling vehicle quality has been developed in Japan; the system contains three phases of enforcement: (i) registration, (ii) inspection and testing, and (iii) maintenance. Each is described below.

14.16 Vehicle Registration. All motorized vehicles to be operated on public roads must be registered at the Land Transport Offices or Municipal Government Offices.¹⁰ Vehicles with engine displacements of less than or equal to 50 cc, or motorcycles with engines with displacements less than or equal to 125 cc, must be registered at Municipal Government Offices; other types of motor vehicles are to be registered at the Land Transport Offices. Non-motorized vehicles such as bicycles and animal-drawn carts are exempt from the

⁷ Council for Regulation of NOx Emissions from Automobile, Report of Discussion, March 2000; <http://www.eic.or.jp/eanet/index.html>.

⁸ PADECO and Japan Transport Cooperation Association, *Urban Bus Development Study in Surabaya and Chiang Mai*, 1999 (in Japanese).

⁹ In Indonesia, the petroleum industry is operated by a public company, and the price and demand for gasoline is controlled by the national government.

¹⁰ In addition to the vehicle registration to be made by each motorized vehicle owner, there is the Motor Vehicle Type Certification System by which where producers (and importers) of motorized vehicles must register their vehicles based on tests and inspections in regard to safety and environmental regulations, thereby ensuring vehicle safety before purchase, as well as efficiently implementing the registration and inspection of individual vehicles by vehicle owners.

registration requirement at the Land Transport Office. Registration should be renewed if ownership changes. The system specifically requires all registered vehicles to:

- display sealed number plates;
- display an inspection sticker and carry a motor vehicle inspection certificate; and
- carry compulsory motor vehicle liability compensation insurance.

14.17 Vehicle Inspection and Testing. The second phase of vehicle quality enforcement provides effective quality control measures for vehicles in use. This phase has three functions: (i) testing roadworthiness in regard to safety and environmental regulations, (ii) collecting an automobile tonnage tax, and (iii) providing a reminder of the need to renew compulsory insurance.¹¹ The first function is the main one and the frequency of testing varies according to vehicle category and use. As for the second function, the roadworthiness permit is not issued unless payment of the tonnage tax is received, an approach that contributes to a stable pool of financial resources for road improvements.¹² As for the third function, some insurance premium payments are synchronized at the time of inspection.

14.18 As stated before, the inspection and testing system is composed of government inspection stations and private garages throughout the country. About 30 million vehicles are tested each year. Nearly 70 percent of the inspections and tests in a recent year (1997) were performed in private garages with appropriate testing equipment and personnel licensed and audited by local MOT offices. MOT has established a skill testing system for mechanics and provides training courses. The association of service agencies (garages) is actively linked to the training system and development of inspection skills. Most service shops work as new/second-hand vehicle dealers, private insurance distributors, and maintenance shops so that they can provide a total maintenance service from vehicle purchase to scrapping. In order to ensure the undertaking of an adequate level of vehicle inspection and testing across the country, a special account system has been used to earmark part of the vehicle inspection fees for building and operating the government inspection stations (as well as providing training programs for inspection and testing).

14.19 Vehicle Maintenance. The last phase stimulates car owners to periodically ensure their vehicle's roadworthiness in regard to safety and environmental regulations. The system for the enforcement of safety standards was originally organized in 1951, while environmental standards were attached in 1966.

14.20 Safety Standards. A system centering upon on MOT has been developed to secure safety standards for motor vehicles. The system is similar to the environmental system described above whereby MOT is responsible for setting appropriate standards. Enforcement of the system also depends on the vehicle inspection stations. This system was established in

¹¹ The Japanese compulsory insurance system, enacted in 1955, applies to all vehicles to the mutual benefit of all automobile users. It was established to support casualty victims and strengthen the payment ability of perpetrators. The national government (MOT) reinsures 60 percent of payment responsibility as it is considered a social security measure. The national government operates another system to cover damage caused by hit-and-run accidents and accidents involving uninsured vehicles. Approximately 70 percent of all vehicle owners have contracted additional insurance because of recent increases in compensation for traffic accidents.

¹² The automobile tonnage tax contributed 16 percent of total tax revenues earmarked for roads in 1998.

its original form in 1951 before the rapid motorization of Japan in the 1960s. Since then, the safety standards have been gradually strengthened incorporating the technical requirements for vehicle safety judged appropriate based on the records of traffic accidents, technological trends, and recommendations made by an advisory council to MOT on transport technology. This is still an ongoing process, and the measures recently adopted include the following: (i) strengthening safety standards, addressing the mandatory provision of safety equipment including, for example, antilocking braking systems (ABS) and collision-proof structures; and (ii) providing an information service on safety, including the dissemination of safety equipment as well as analysis of traffic accidents.

D. OTHER ENVIRONMENTAL AND SAFETY MEASURES

14.21 Infrastructure-Related Measures to Reduce Noise and Vibration. In addition to the vehicle-related measures explained above, there are a number of infrastructure-related measures that have been implemented by Japanese Ministry of Construction. Among them are:

- construction of noise barriers;
- construction of underground sections in built-up areas;
- subsidies for noise relieving measures;
- low noise pavement; and
- traffic management.

Each is addressed below.

14.22 Noise Barriers. Countermeasures for noise and vibration pollution are best implemented in the early stages, especially at the planning stage of land and street development, or otherwise in construction, although the latter is at best an ad hoc approach. A toll road between central Tokyo and Chiba City,¹³ the first intercity expressway in Japan (1960), provides a major case study of noise barrier development. As the population along the route has increased, the road authority, the Japan Highway Public Corporation (JHPC), has constructed noise absorbing/reflecting walls. The necessary financial resources were obtained from tolls collected from the road section that runs through this a high-density industrial area.

14.23 Construction of Underground Sections in Built-Up Areas. Ring Road No. 8 in the Tokyo Metropolitan Area provides another example of environmentally friendly road improvement. A 1.9 km segment in western Tokyo was reconstructed underground to reduce traffic congestion and vehicular externalities exacerbated by urban railway level crossings and arterial road crossings. Half of the construction cost for the grade separation was granted from the national budget, although the local municipality would expect an increase in municipal property tax revenues to the extent that land prices reflect the environmental improvement. As for new developments, underground construction is being considered for

¹³ This toll road is called *Keiyo Douro*.

the Chuo Ring Expressway of the Metropolitan Expressway Public Corporation and the Outer Ring Expressway of JHPC.

14.24 Subsidies for Noise Relieving Measures. Using the special fund raised through automobile fuel and taxes, the national government provides subsidies for construction works along high-volume roads. The subsidies are targeted for the acquisition and construction of “environment zones,” the construction of buildings that act as noise barriers for the area behind, and other countermeasures to relieve noise pollution such as double-glass windows. Road sections eligible for this subsidy should have environmental pollution indicators exceeding national standards over the past three years.

14.25 Low Noise Pavement. One technical solution has been the introduction of low noise pavement. This technology adopts porous asphalt material that absorbs noise created by tires and the road surface; it is reported to provide reductions up to five decibels.

14.26 Traffic Management. In the traffic management field, the “center-lane-running-regulation” for trucks on urban arterial roads provides an example of an environmental measure that reduces traffic congestion caused by obstructing parked vehicles. Trucks have also been restricted in certain areas to reduce the impact of noise and vibration pollution arising from heavy vehicles in urban areas. Another effective method of reducing traffic noise is the reduction of traffic speeds; various traffic signs and automated cameras to identify speeding vehicles have been installed in strategic locations.

14.27 Reduction of Environmental Impact by Strategic Land Use Control. In the case of residential areas in the vicinity of roads linked to industrial areas, traffic noise and vibration caused by heavy vehicle traffic can cause serious environmental impacts. To address such impacts, the land use pattern may have to be transformed into a form that will minimize the impacts. Municipal governments, with the support of the National Government, have adopted land use policies to encourage appropriate locations of industrial and commercial centers in relation to residential areas.

E. ISSUES AND LESSONS

14.28 Necessity for Appropriate Regulatory Framework for Environmental Protection and Vehicle Safety. In response to research concerning the pathological effects of air pollution caused by rapid industrial growth in the mid-1960s, the Government of Japan enacted comprehensive legislation in the form of a Basic Law for Environmental Pollution Control. This Law established environmental standards for air quality, noise, and vibration. Several additional pollution countermeasures including using the vehicle inspection system to regulate vehicle exhaust emission levels were implemented subsequently. Implementation of an appropriate regulatory framework in the relatively early stages of motorization significantly contributed to a reduction in mobile-source air pollution in urban areas.

14.29 In order to ensure vehicle safety and reduce mobile-source air pollution, it is extremely important to establish legally designated and clearly defined vehicle standards specifying technical requirements with respect to safety and the environment. Standard

setting should be based on the assessment of effects on the reduction in road traffic accidents and environmental pollution.

14.30 Inspection System and Role of Private Agencies. The objective of the vehicle inspection system is to ensure the roadworthiness of vehicles on public roads with respect to safety and environmental regulations; it requires an appropriate institutional framework for its effective implementation.¹⁴ In Japan, a fiscal instrument has been used to help ensure the undertaking of an adequate level of vehicle inspection and testing across the country; a special account system has been used to allocate part of the vehicle inspection fees specifically for building and operating government inspection stations (as well as providing training programs for inspection and testing).

14.31 In addition, within the institutional and regulatory framework established by the national government, private garages play an important role in the nationwide system of securing vehicle safety and emission standards, performing nearly 70 percent of the 30 million vehicle tests/inspections performed annually. These private garages are licensed, supervised, and audited by local Land Transport Offices, thereby ensuring the quality of their inspections.

14.32 Importance of Providing Training Programs for Vehicle Inspectors. In view of the technical complexity and technological advances of motor vehicles, it is important to establish a system to provide technical training for vehicle inspectors (public and private), thereby allowing them to keep up with technological advances and maintain their knowledge and skills on vehicle testing and inspections at an appropriate level.

14.33 Importance of an Appropriate Monitoring System. There are 492 stations to monitor air quality and vibration in Japan. These monitoring stations have been established by prefectural and municipal governments under supervision of the Environment Agency. Without these permanent monitoring stations, implementation of effective vehicle emission and vibration control measures may not have been possible.

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¹⁴ It is also important to establish a system that contributes to the effective undertaking of vehicle inspection, including the vehicle registration system, which facilitates notifying vehicle owners of the inspection requirements.

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APPENDIX A

LIST OF JAPANESE STEERING COMMITTEE MEMBERS

<u>Name</u>	<u>Position and Organization</u>
Hitoshi IEDA	Professor, University of Tokyo
Masayoshi TANISHITA	Assistant Professor, Chuo University
Katsuyuki OZAWA	Director, Second International Affairs Division, Transport Policy Bureau, MOT
Naota IKEDA	Deputy Director, Second International Affairs Division, Transport Policy Bureau, MOT
Atsushi KAWAI	Senior Planning Officer, Railway Bureau, MOT
Akira YAMAZAKI	Senior Officer, Road Transport Planning Division, Road Transport Bureau, MOT
Hiroshi NISHIDA	Special Assistant, Engineering and Safety Department, Road Transport Bureau, MOT
Ryosuke KIKUCHI	Senior Planning Officer, International Affairs Division, Economic Affairs Bureau, MOC
Toshiaki FUKUMOTO	Director, City Planning Division, City Bureau, MOC
Kouji WATANABE	Deputy Director, Street Division, City Bureau, MOC
Shigeru KIKUKAWA	Director, Planning Division, Road Bureau, MOC
Yasuto Tsuji	Deputy Director, Road Administration Division, Road Bureau, MOC

APPENDIX B

MAPS OF CASE STUDY CITIES

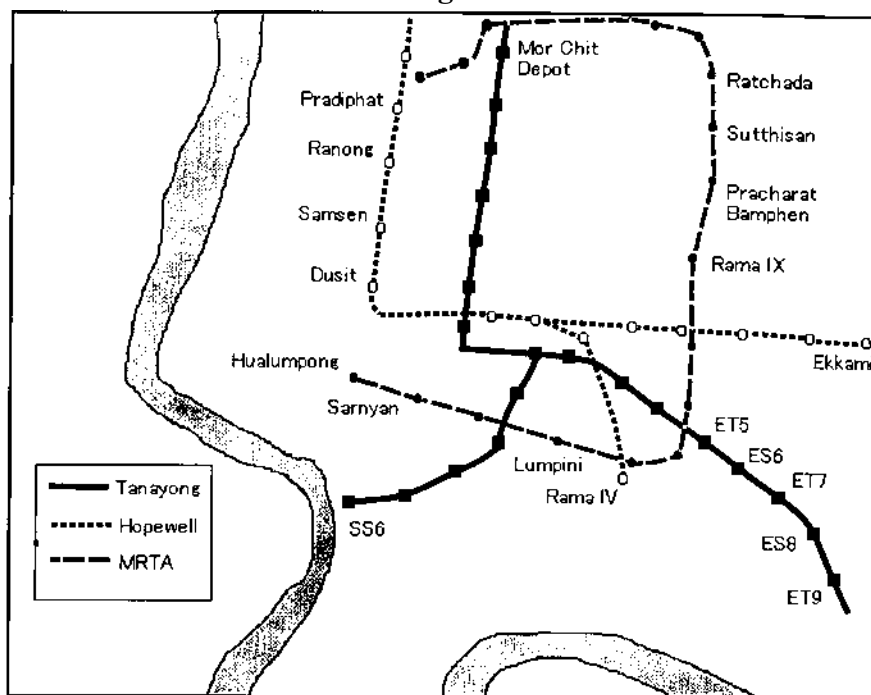
Note: The maps of Tokyo, Kobe, Nagoya, Seoul, Singapore, and Taipei, included within this report, were reproduced by permission of Jane's Information Group but are unavailable at this site due to copyright prohibition. The maps for these cities are included in the hard copy version of the report.

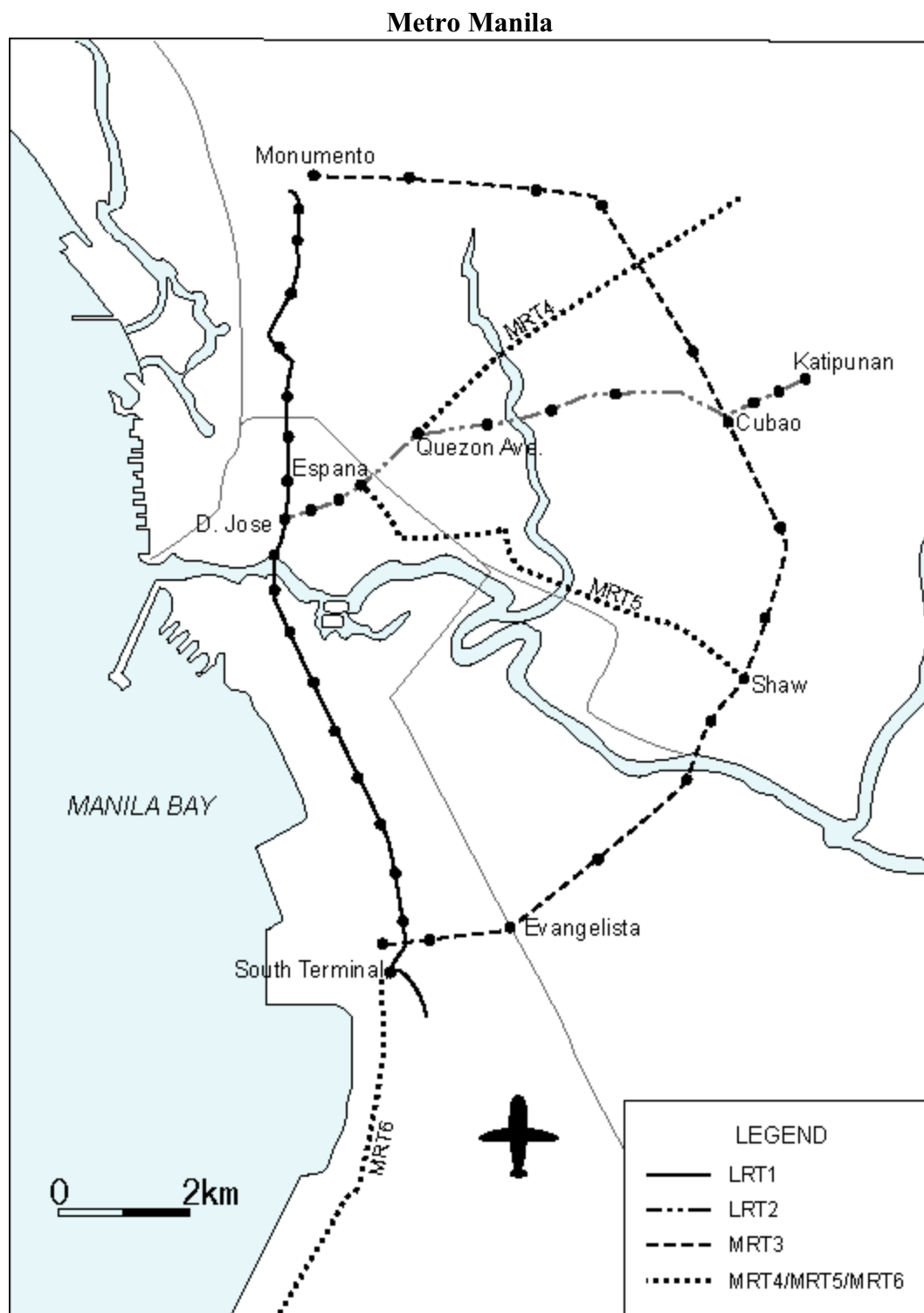
Hamamatsu



Source: <http://test.mapoo.or.jp/jp-map.html>

Bangkok





Source: PADECO Co., Ltd.

APPENDIX C

SOCIOECONOMIC CHARACTERISTICS OF THE STUDY CITIES

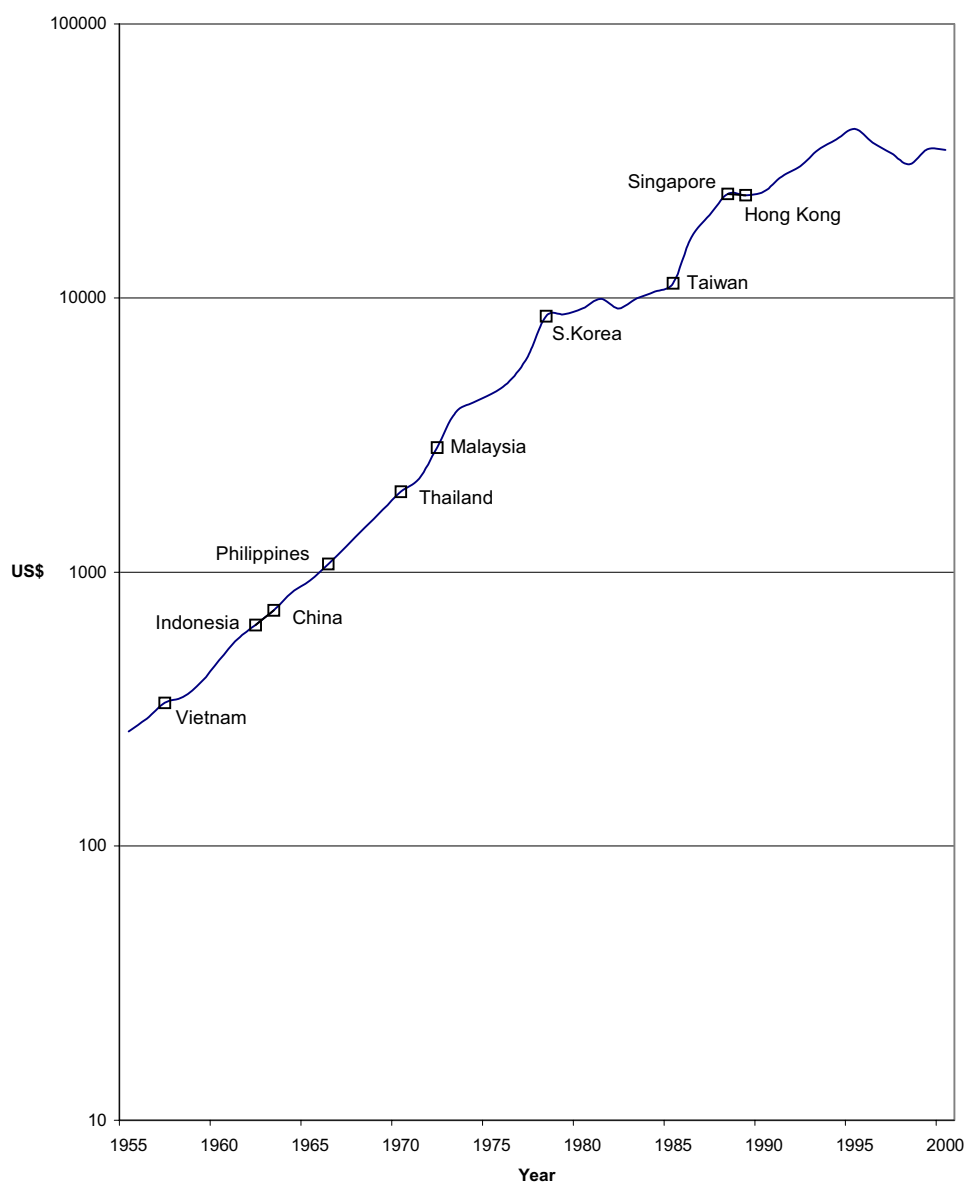
City	Country GNP/capita (US\$) ^a	Population (million) ^b	Population Density (pop./km ²)	Car Ownership (per 1000 pop.)	Journey to Work by Private Transport (%) ^c	Journey to Work by Public Transport (%) ^c
Tokyo	34,720	12.0	5,460 ^d	230 ^e	29	49
Nagoya	34,720	2.2	6,650 ^f	390 ^g	N.A	N.A
Kobe	34,720	1.5 ^h	2,760 ⁱ	260 ^j	N.A	N.A
Hamamatsu	34,720 ^k	0.58 ^k	2,264 ^k	422 ^k	N.A	N.A
Singapore	22,710	3.2 ^l	5,000	110 ^m	22	56
Bangkok	1,850	6.0	3,950	220 ⁿ	60	30
Manila	1,050	9.5	12,320	90 ^o	28	54
Seoul	8,580	10.4	17,000	220 ^p	21	60
Taipei	13,250	6.0	10,000	210 ^q	N.A	N.A

Notes:

- a Latest available figure from national and multilateral sources as published in Asiaweek, June 9,2000 (except where otherwise noted).
- b Metropolitan Region (except where otherwise noted).
- c P.Newman, J.Kenworthy, Island Press, 1999, Sustainability and Cities: Overcoming Automobile Dependence.
- d The figure is given for the Metropolitan Area. The density of the core area (23 wards, 620km²) is estimated at 13,000/km².
- e Tokyo Metropolitan Government.
- f Nagoya City Government, Statistics Office 2000.
- g 1998, vehicle registration, Road Transport Bureau, Ministry of Transport.
- h Population in 1995 before Great Hanshin Earthquake.
- i Kobe City Government, Statistics Office 2000.
- j 1998, vehicle registration, Kobe City Government, Road Transport Bureau, Ministry of Transport.
- k 1998, <http://www.city.hamamatsu.shizuoka.jp/db/statistics/data/index.htm>
- l Figure for permanent residents, 1999. Singapore Department of Statistics.
- m Figure for 1995, C.Willoughby, 00/1/12, Motorization in Singapore.
- n Figure for 1998 estimated from Department of Land Transport, Ministry of Transport and Communications statistics on vehicle registration.
- o Figure for 1996, UNCHS (Habitat) Global Urban Indicators Database, 1996.
- p Figure for 1997. Seoul Metropolitan Government, 1998.
- q Figure for 1997. Department of Transportation, Taipei City Government, 1998.
- N.A Data not available.

APPENDIX D

COMPARISON OF ASIAN COUNTRIES WITH THE TREND IN GNP PER CAPITA FOR JAPAN



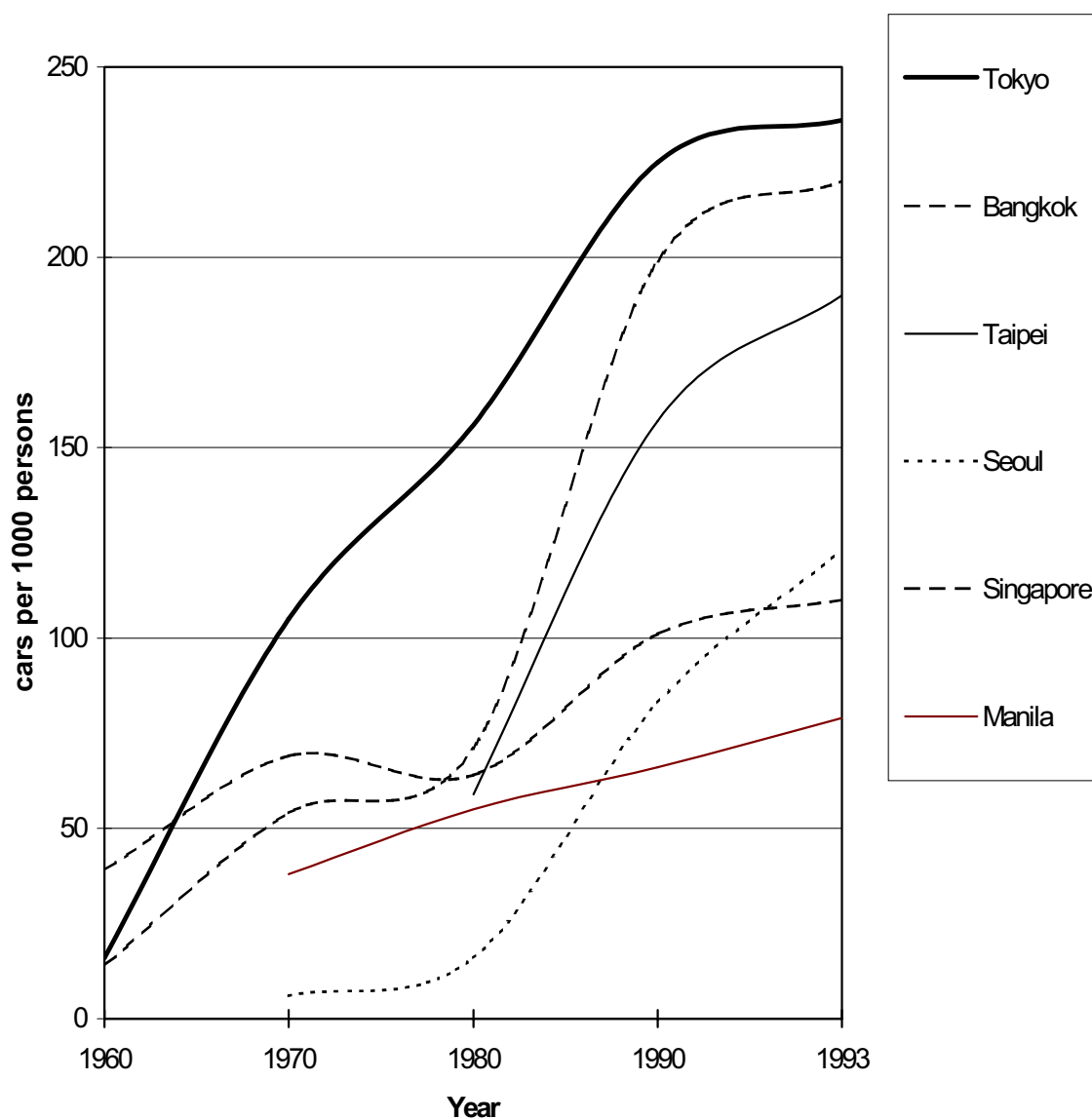
Notes: 1) Countries in the Asia Pacific Region are arrayed along the GNP curve for Japan.

2) GNP values are the latest available, as indicated in *Asiaweek*, June 9, 2000.

Source: Japan GNP data: Economic Planning Agency, Japan.

APPENDIX E

TRENDS IN CAR OWNERSHIP



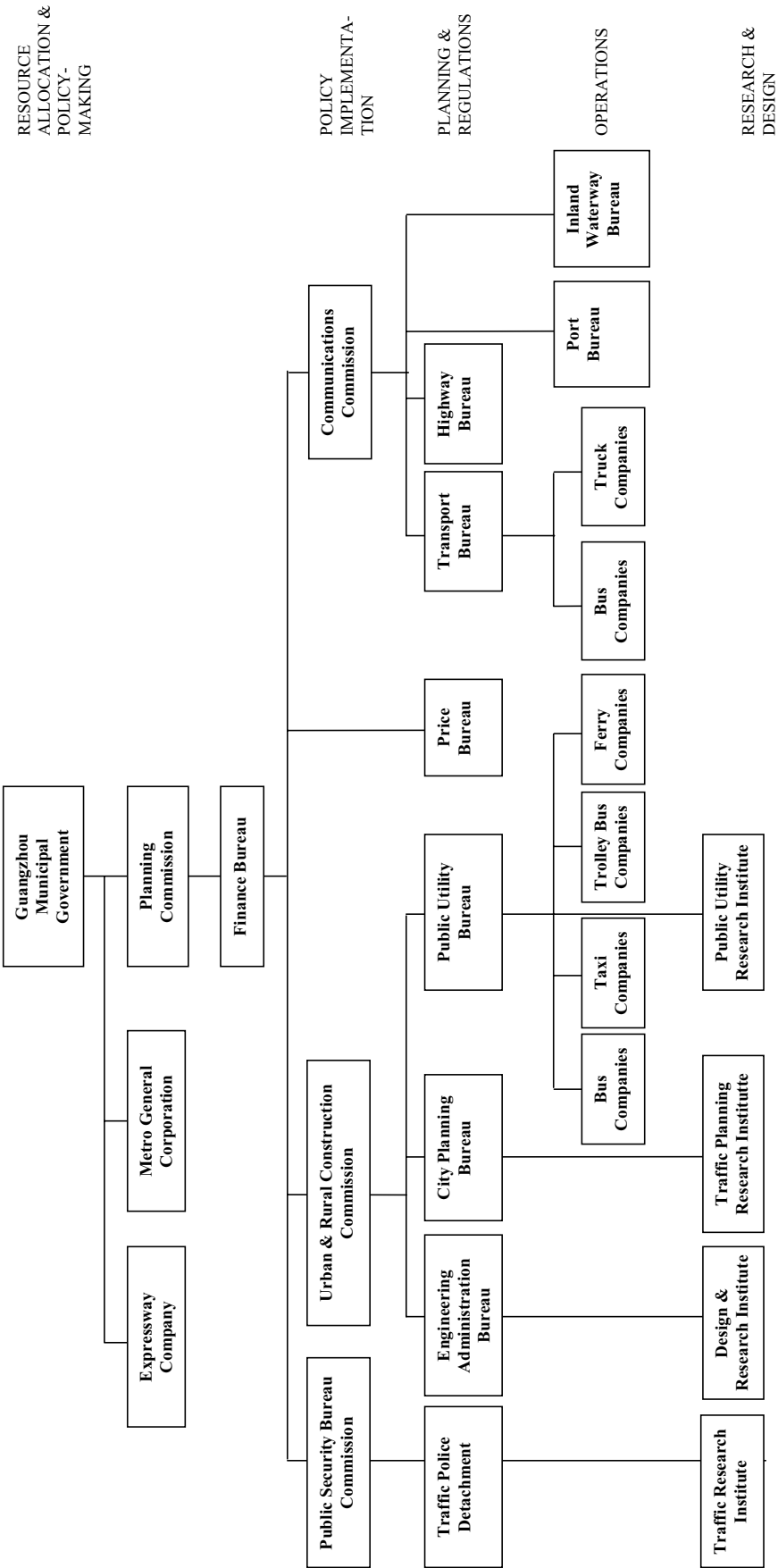
Source: Data from Dr. Paul Barter, Ph.D. Dissertation, *An International Comparative Perspective on Urban Transport and Urban Form in Pacific Asia: The Challenge of Rapid Motorization in Dense Cities*, 2000.

APPENDIX F

CHRONOLOGY OF TRANSPORT DEVELOPMENT IN JAPAN

<u>Year</u>	<u>Transport Development</u>
1872	First railway service started, between Shinbashi and Yokohama
1882	Horse-drawn railway started between Shinbashi and Nihonbashi
1889	Tokaido Line completed between Shinbashi and Kobe
1895	Kyoto Electric Railway started operation
1927	First subway line started operation between Asakusa and Ueno
1945-49	Reorganization of private railways
1948	Promulgation of Japan National Railway Law and National Railway Fare System Law
1955	Establishment of the Urban Transportation Council
1958	Promulgation of Emergency Action Law for Road Maintenance; decision to construct the Tokaido Shinkansen (Bullet Train) - construction started in 1959
1959	Decision to remove streetcars in metropolitan Tokyo taken by Urban Transportation Council; commencement of financing of private railway development in major metropolitan areas by Japan Development Bank; Marunouchi Line completed between Ikebukuro and Shinjuku via Ginza;
1960	Toei Subway No. 1 of Tokyo Metropolitan Government linked to Keisei Line and started through-train operations
1961	Promulgation of Railway Crossing Improvement Law
1964	Tokaido Shinkansen (Bullet Train) started operation between Tokyo and Shin-Osaka; monorail system operation between Haneda Airport and Hamamatsucho started; Tokyo Olympics held
1966	Government established subsidy scheme for regional bus service development
1967	Motor vehicle registrations exceed 10 million for the first time
1969	Establishment of government subsidy program to elevate rail system in urban areas; construction of Tomei (Tokyo-Nagoya) Expressway completed
1970	Number of deaths from traffic accidents reached a peak of 16,765
1972	Promulgation of Law for Urban Monorail Development
1973	First Energy Crisis
1975	Shinkansen (Bullet Train) extended to Hakata
1978	Bicycle parking development project to reduce illegal bicycle parking around railway stations; New Tokyo International Airport opened at Narita
1981	Housing, Urban Infrastructure Corporation Law came into force
1982	Tohoku Joetsu Shinkansen started operations; establishment of bus route improvement project
1986	Promulgation of National Railway Reformation Laws
1991	Parking system included in designated traffic safety facility maintenance project
1993	Promulgation of Safe Bicycle Use and Bicycle Parking Promotion Law; shares of JR East listed
1994	Introduction of traffic congestion relief program; Kansai International Airport opened
1995	Introduction of Program to Improve Comfort of Railway Station Users and Pedestrians
1997	Kyoto Global Warming Conference; introduction of program to improve space for accommodating street cars; introduction of program to improve traffic flows in metropolitan areas

APPENDIX G
THE ORGANIZATION OF THE TRANSPORT FUNCTION IN
THE GUANGZHOU MUNICIPAL GOVERNMENT

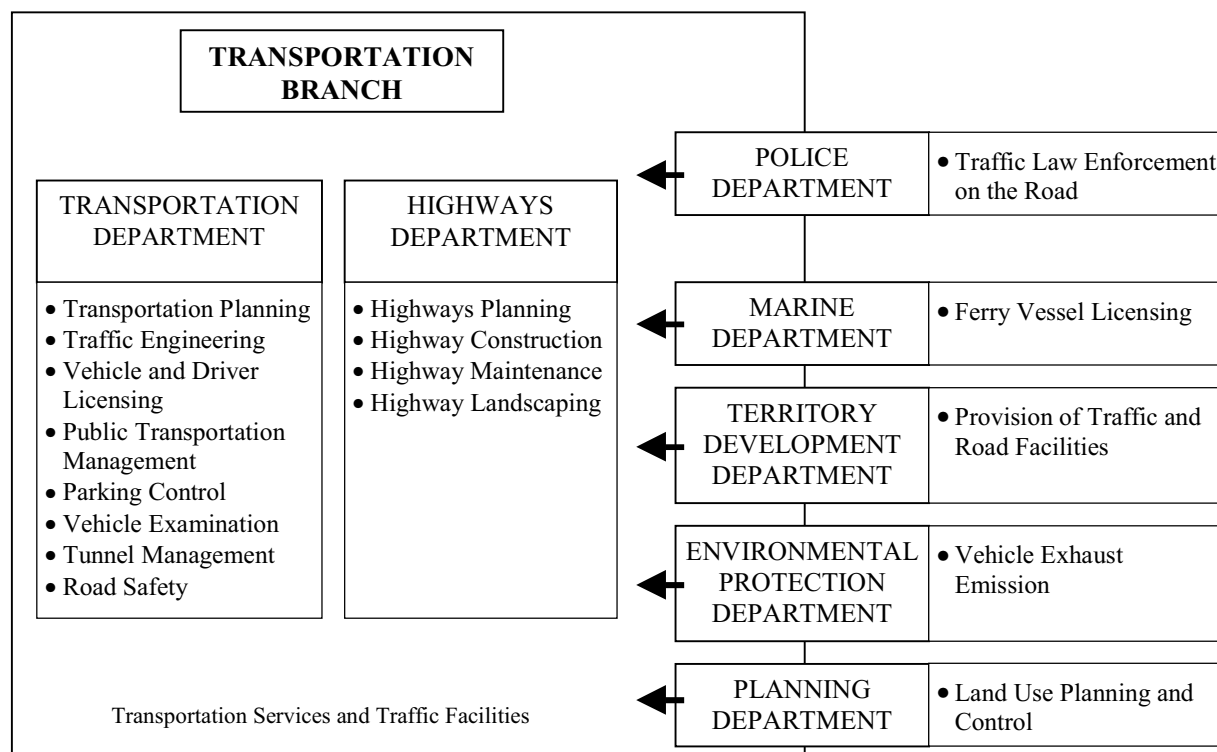


Source: Richard Meakin, "Municipal Transport Management: Overseas Experience," in *China's Urban Transport Development Strategy, Proceedings of a Symposium in Beijing*, November 8-10, 1995, ed. by Stephen Stares and Liu Zhi, World Bank Discussion Paper No. 352, 1997, p. 204

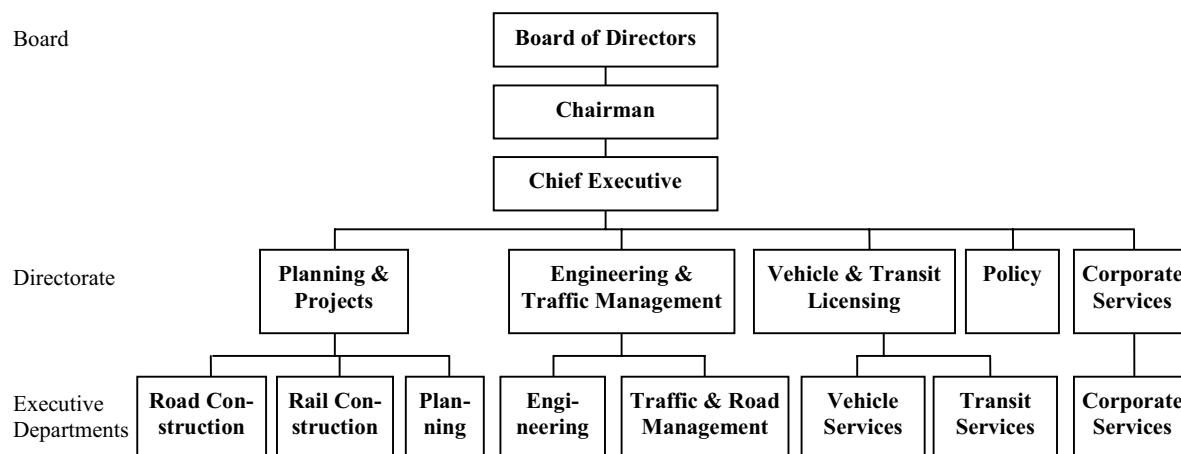
APPENDIX H

ORGANIZATIONAL STRUCTURES IN HONG KONG SAR AND SINGAPORE

Hong Kong Special Administrative Region



Singapore



Source: Richard Meakin, "Municipal Transport Management: Overseas Experience," in *China's Urban Transport Development Strategy, Proceedings of a Symposium in Beijing*, November 8-10, 1995, ed. by Stephen Stares and Liu Zhi, World Bank Discussion Paper No. 352, 1997, pp. 187 (Hong Kong) and 195 (Singapore) [citing "Ernest Shu Wing Lee, "Traffic and Transportation Facilities in Hong Kong: An Overview," *Chinese Environment and Development*, Fall 1994, Vol. 5, No. 3]