

PAPER 8B

OPTIONS FOR BUS TRANSPORT—THE OVERSEAS EXPERIENCE

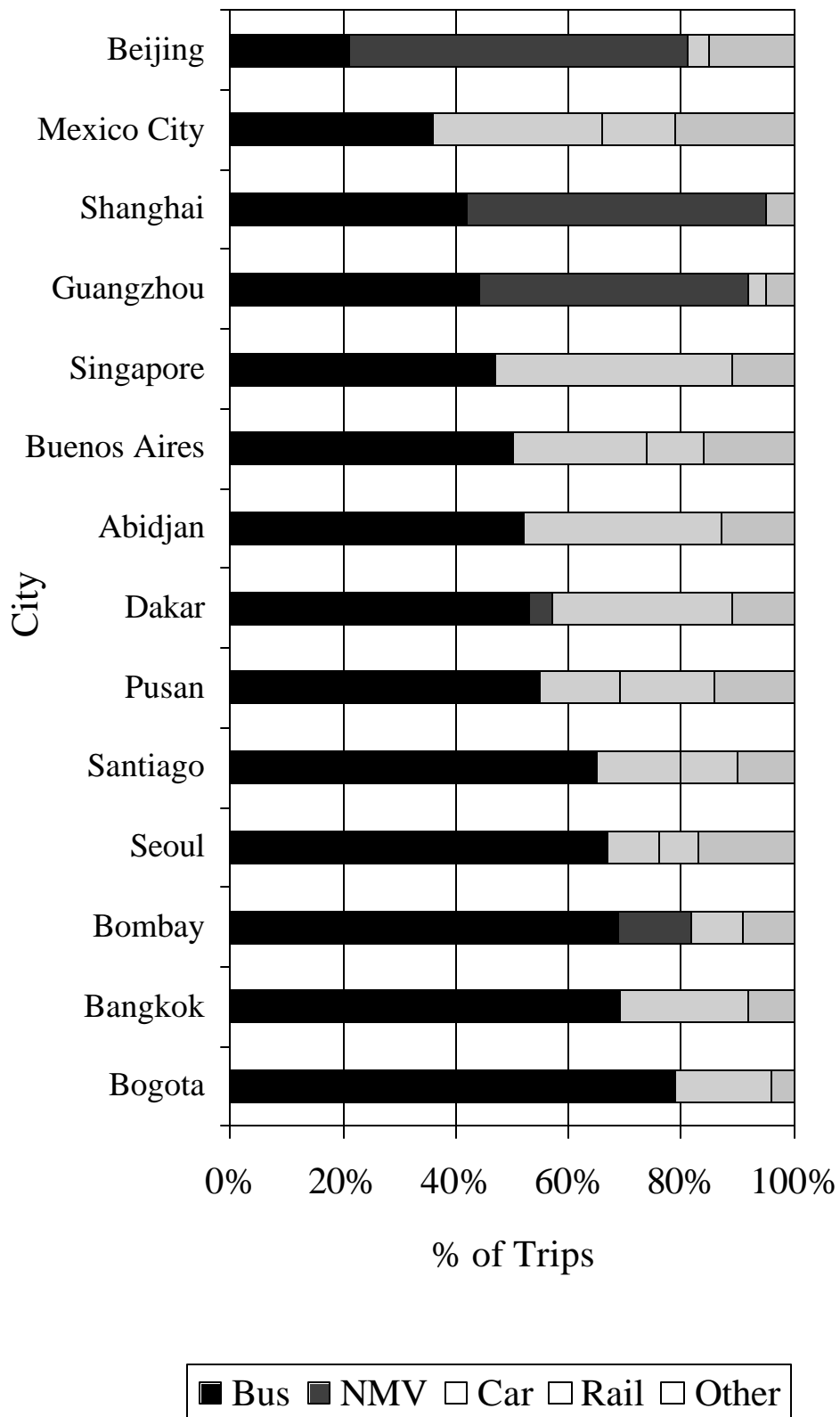
ROLE OF BUSES IN THE URBAN SYSTEM

1. Accessibility to jobs, social services, education, and cultural opportunities is essential to economic growth of a community and the social well-being of its citizens. In smaller communities, the distance between home and work, school, or shopping tends to be relatively short, usually within 5 or 6 kilometers. Walking and other forms of individual transport such as the bicycle provide adequate levels of access except for the aged and infirm. As urban areas continue to grow, however, and economies improve, journeys tend to become longer and more frequent. Individuals spend much more of their time commuting. While many cities try to practice efficient land use planning, combining residences, jobs, schools, commercial and health services in close proximity to one another, actual experience in most parts of the world has indicated a need to provide effective transport systems which enable citizens to take advantage of opportunities which may not exist within their communities. Without efficient public transport, the competitiveness of a city's economy suffers due to the adverse effect on labor availability, and individuals spend much more time and money commuting.

2. This is happening now in China as urban areas are spreading outward, new factories are opening across town, and people living in the rapidly expanding suburban areas come to the city center each day to take advantage of the many amenities and service jobs available there. While walking and bicycles have traditionally been the primary modes of transport in Chinese cities in the past, accounting for over 60 percent of trips in large cities like Shanghai and Guangzhou, and over 90 percent in smaller cities, the need for improved public transport service is becoming evident as the trips increase and journeys become longer. This is not unusual and mirrors experience in much of the rest of the world.

3. While most transport systems are made up of many modes—walking, bicycles, bus, trains, autos, boats—buses form the backbone of most urban transport systems. With the exception of some automobile dominated cities such as Los Angeles or Detroit in the United States, buses are typically the most important form of transport for trips in excess of approximately 6 kilometers. Buses are an affordable means of transportation, and provide a high degree of flexibility and convenience (“door-to-door” service) when compared to other means of mass transport. They are relatively easy and inexpensive for government planning bodies to organize and implement, and are amenable to operation by the private sector, competitive practices, and changing conditions. Through appropriate management, they can efficiently carry as many as 20,000 passengers per hour in high demand corridors, or can serve sparsely populated areas cost-effectively. They also play a major role in providing access to and integration with high volume transport modes such as suburban trains and metros. They often receive less attention because they cost less, and may be operated by many different companies, but they are truly the “workhorse” of the transport industry. Figure 1 indicates the modal split in various cities of the world, and the role buses have in providing access to economic and social opportunity.

Figure 1. Urban Modal Splits



4. At the present time in China, however, buses are not providing the same levels of service as can be found in most other parts of the world. In the medium-size cities such as Chengdu and Jinan, buses carry only 10 to 13 percent of the trip demand, and only about 25 percent in larger cities such as Shanghai and Guangzhou. Of particular relevance is that despite these low levels of use and increasing trip lengths, ridership is actually decreasing in many cases. The reason cited by many potential users is the lack of reliability of service and the delays encountered when riding the bus. Traffic congestion is increasing rapidly in many Chinese cities and buses must compete with bicycles, pedestrians, automobiles, and vendors for road space. Bus speeds in many cities are less than 10 kilometers per hour, and long waits for the next bus are common. Lack of equipment and spare parts make many bus fleets inadequate to provide the necessary service. Consequently, people continue to use less efficient forms of transport which leads to more congestion and further deterioration of bus service.

5. As mentioned previously, the bicycle is a key element in the Chinese transportation system and should remain so. It is the most efficient mode in terms of short trips and as a means of getting to and from high-volume mass transit systems. At present, however, uncontrolled use of available street space by bicycles is discouraging the use of buses. In corridors with high demand, this is an inefficient use of road space inasmuch as the capacity of a traffic lane devoted to buses is much higher than one devoted to bicycles. Bicycles are and should remain an important element in the transport system, but it is necessary to develop appropriate policies toward the use of bicycles and, in high-demand corridors, provide appropriate separation between bicycles and motorized transport. The role of the bicycle in urban transport and planning and design criteria will be further discussed in Paper 9: *Treatment of the Bicycle*.

6. Effective traffic management is another key to realizing the efficiency of buses. In addition to uncontrolled usage of street space by bicycles, China is beginning to experience rapid rates of motorization. While levels of car ownership and usage have not reached crisis proportions as yet, ineffective management of the street system is already producing unacceptable delays for bus operations. Freight movements, automobiles entering and leaving the roadway at any point, frequent turning movements, unrestricted parking, poorly timed traffic signals, geometric design which is no longer suitable for conditions, and conflicts between fast and slow moving traffic and pedestrians all contribute to congestion, slow bus speeds, and consequent poor utilization of buses.

ORGANIZATION OF BUS TRANSPORT

7. The organization of bus transport takes many different forms around the world, and there is no single system that can be taken as the ideal model for all cities. The optimal organizational structure must be suited to local conditions, attitudes, objectives, and resources. There are several basic principals, however, which seem to be associated with the most cost-effective and efficient systems. First among these is the need to separate the operation of the services from the administrative and regulatory functions and the need for local control.

8. There is inherent conflict of interest in having a single entity as the owner, planner, regulator, and operator of a bus company. The primary role of government is to represent the people's interest, and

protect the public welfare. With respect to bus services, this means the creation of an environment that allows and assures that adequate and efficient service is provided at affordable rates. Government's primary role should therefore be strategic planning, setting standards, and appropriate regulatory regimes. The actual operation of services should be carried out by separate autonomous entities operating under commercial conditions.

9. At the present time, urban bus operations in China are owned, managed, operated, and regulated by municipal authorities. Standards, operational parameters (i.e. staff per bus, etc.) and fare levels are generally prescribed at the national level. Innovative practice and efficiency gains based on local conditions are difficult (often discouraged) and the conflicts presented when the regulator of service performance is also the operator contributes to deteriorating service. While different forms of ownership exist in various countries of the world, those bus systems operating most efficiently have one thing in common: (i) local control of operational parameters and fares, and (ii) autonomous operating entities separate from the planning/regulatory function. Some insight may be gained by examining international experience and the more successful organizational arrangements.

10. ***Private Sector Operation***. While ownership and organization take many different forms, the most cost-effective and efficient—measured in terms of levels of service and cost to government—are those where government provides strategic planning, sets the standards of service and regulates compliance, and the private sector provides the service. Private sector companies, route associations, or individuals own the buses and bid for the right to provide bus services within specific areas or routes within the urban area. Hong Kong, Singapore, Seoul, Korea, cities in England, as well as most all major cities in Latin America are typical examples of this type of arrangement.

11. The benefits of involving the private sector derive primarily from the private sector's incentive to reduce costs and increase income—thereby maximizing profits—and access to private capital. While sometimes there are efficiency gains from more skilled management, this is not necessarily the case. Public officials are often equally capable, if not more so, than their private sector counterparts. Bound by public regulations and procedures, however, as well as no tangible reward for innovation or service improvement, the public company does not have the same incentive to increase ridership and income by being more attentive to customer demands or institute cost-saving procedures. In fact the reverse is often true; efficiency gains could threaten the jobs of employees. Cumbersome bureaucratic procedures, originally developed to protect the public, quite often become barriers to efficient procurement and operation. Public companies also, over time, tend to have many more employees than is necessary to run an efficient operation and usually it is very difficult to reduce their number. Employee costs are a major problem for government-owned Chinese bus companies due to general overstaffing and because they must bear the financial responsibility for the social programs and costs of retirees.

12. Another major benefit is the access the private sector has to financial resources. Municipal companies usually must rely on government budget allocations to buy new vehicles or

spare parts, as well as the construction or repair of terminals and stations. Consequently, in times of reduced budgets, no replacements can be financed and service deteriorates. Availability of financial resources for the private sector is more related to direct income, and contracts are more likely to be honored between government and the private sector than between two government agencies. Boxes 1 and 2 describe typical private sector operations in England and Brazil.

Box 1. Urban Bus Services in the UK

Prior to 1985, all UK urban bus service operations were publicly owned and planned. Since that time the situation has changed dramatically. The private sector has been introduced. Government subsidy has been reduced in all areas, though both the form of competition and the effects of competition have differed between London and the rest of the country.

Outside London. The major changes were introduced in the 1985 Transport Act. Free entry was allowed for all operators, the publicly owned companies were corporatized and gradually privatized, and labor regulations were relaxed. Regional public planning authorities retained the residual role of planning and contracting for non commercial, socially necessary services.

Since 1985, bus kilometers operated have increased, on average, by 24 percent, costs have fallen by 28 percent, and passenger kilometers traveled have fallen by 27 percent. Prices have consequently risen a little in real terms despite the reduction in real costs. The reduction in bus patronage continued, at a slightly reduced rate, the trend of the previous decade. Most significantly government subsidy has fallen by 55 percent. The main problem has arisen in the larger metropolitan areas where freedom of entry and exit of private sector operators has entailed some loss of integrated information and ticketing, and some instability of service have caused rather more patronage loss than might have been expected on the basis of the price and service quantity changes. These adverse effects appear to have been avoided in London, where a slightly different competitive system applied.

London. Following the London Transport Act of 1984 private sector operators were gradually introduced through competitive tendering (at gross cost, with fares set and revenues retained by the planning authority.) Initially public operation continued, through subsidiary “arm's length” companies, though in 1994 these were also privatized. All routes (including service levels) are now planned publicly and operated privately. In most cases these are under three year competitively bid contracts. Those routes which had not been placed for competitive tender before last year's privatization, are now operated under negotiated net cost contracts (i.e., the private operator retains fare revenues.) It is planned that all services will be operated under competitively bid, net cost contracts from 1998. Performance measurement is used to ensure that service quality is maintained.

Under this regime bus mileage operated in London has increased 20 percent, the cost per bus mile has fallen 40 percent, and total network costs have fallen by 27 percent. Passenger journeys have increased by 0.5 percent, in contrast to a preceding period of steady decline. Above all, real government subsidy has been reduced by 80 percent. Competitive franchising can thus reduce costs of operation and fiscal burden without losing the benefits of network integrity and intermodal coordination in large metropolitan systems.

Box 2. Urban Buses in Curitiba, Brazil

The urban bus system in Curitiba is one of the most efficient and cost-effective in Brazil. While recent performance improvements have in part been due to a combination of well-chosen transportation and land-use planning decisions, one of the most important changes has been the elimination of municipal involvement in the provision of passenger services. Instead, over the last two decades, Urbanizacao de Curitiba (URBS) has evolved itself from the role of service provider into a regulatory body responsible for system administration and planning, as well as property management for publicly owned transportation infrastructure.

Private bus companies in Curitiba operate under parameters established by municipal decree in 1987. In place of the previous systems of territorial concessions, the decree established a system of permissions, which reimburse bus companies subject to the number of scheduled kilometers that they actually travel. A simple two page document sets out the basic legal framework and standard form for all permissions, with fares calculated based on URBS experience and private firms' operating costs, including both those that vary with kilometers traveled (maintenance costs, personnel and administrative costs) and capital costs.

Currently there are ten bus companies operating specified routes in Curitiba, with companies tending to concentrate their routes in certain areas of the city. Some routes are shared, especially central area routes, interdistrict routes, direct routes, and certain express routes that serve more than one area of the city. Classification of companies and consequent assignment of routes is done according to the size of bus fleets, with the largest bus companies operating over 200 buses and the smaller ones around 50-60 buses.

The expansion in ridership and capacity after privatization has been dramatic. In 1974 the first of the cities express buses operated along two arterial routes and carried 54,000 passengers per day. By 1982, the existing system of five structural roads carried approximately 400,000 passengers per day. Today, after improvements in fare collection and distribution, vehicles, and route extensions, the system transports more than 1,000,000 passengers per day at cost and service levels which have outstripped other large- and moderate-sized Brazilian cities.

13. **Commercial Operation of Government-owned Companies.** An alternative arrangement can be found in many cities in which the government is the owner of the company providing the bus services. Toronto, Canada and most major cities in Germany (Box 3) are examples of this arrangement in which an independent Transport Authority—or Government Corporation—is created by legislation responsible for providing transport services. While different forms exist conforming to the laws of each country, the Authority has its own board of directors, and has legal authority to borrow and act independently. It has its own budgeting, accounting, and auditing responsibilities and is usually financially independent of government except for the possibility of capital contributions. Government control, however, is often exercised through the appointment of government officials to the board of directors. Often this Authority is responsible for all forms of public transport (bus, tram, rail) and is charged with coordination and integration of services, fare integration, and investment.

Box 3. The Bus System in Wuppertal, Germany

Wuppertal's bus system is owned, planned and operated publicly, by Wuppertal Stadtwerke AG (WSW AG). The company was reorganized in 1993 to reduce costs and improve service efficiency. WSW AG operates 250 buses and 28 tramcars, employs 1400 people, and carries 87 million passengers each year.

Passenger demand has increased by around 40 percent over the last five years, leading to service expansions, and higher net costs. The city of Wuppertal has been under financial stress and was not able to absorb these higher transport costs. Hence WSW AG looked to the 1993 reorganization to reduce costs, without reducing performance levels or quality of service, to increase revenues in the traditional areas of business, and to enter new fields of activity to generate new revenues.

Cost Reduction. Cost reductions were achieved by rationalizing the management structure. At the same time the workforce was reduced by 10 percent, through early retirement schemes and a hiring freeze. Profit centers were introduced, with clear business mandates and budgetary responsibilities. Internal contracts were established between the profit centers, to increase the downward pressures on costs. A 5 percent reduction in the reserve fleet, made possible by the improved maintenance efficiency, illustrates the success of this strategy. Route level accounting was also introduced to enhance both planning and management.

Increasing Fare Revenues. Fare levels are controlled by the regional transport authority and hence to increase revenues WSW AG must carry more riders. Given the need to reduce costs, the new riders must be attracted in the off peak, when spare capacity is available without increasing service levels. A 1994 marketing campaign helped to produce a 7 percent increase in passenger numbers.

The budget deficit has been reduced, from 102 million DM in 1993, to a predicted 97 million DM in 1995, whilst increases in service have continued (6 percent increase in vehicle kilometers in 1993 and 3 percent in 1994.)

14. The actual services are typically provided by separate operating companies managed independently from the Authority on a day-to-day basis under contractual arrangements with the Authority. Although levels of service are good under these arrangements, the cost to government per passenger/kilometer is typically higher than in those systems where the private sector provides the operation. Despite well-qualified staff, the incentive for cost-cutting efficiency and responsiveness to changes in demand are not as evident in government-owned operations as in those provided by the private sector. By having several operating companies, however, management in the Authority can compare performance among the various operators. On-time performance, utilization of buses, number of buses available for use each day, and other performance parameters can be compared to stimulate more effective management.

15. Under this arrangement, it is necessary to develop performance contracts between the Authority and the operating companies. At the beginning of the fiscal year, contracts are agreed between the Authority and the operating companies which provide complete details regarding the objectives of the contract, and obligations and terms and conditions regarding performance for each party. The operating company commits itself to provide agreed levels of service and appropriate maintenance under a specified budget. The Authority agrees to provide, if necessary, financial payments to support social objectives of the community which may preclude full cost-recovery, or to assist with the capital costs of equipment and facilities. While, in theory, this system should prove effective, there have been mixed results. In times of particular budget constraints, the government, through the Authority has not provided the financial support to which it agreed, or did not do so in a timely manner. In these situations, the operating companies have no real recourse except to cut maintenance and services and a spiral effect begins which ultimately leads to overall deterioration of service. Although the public suffers, the service companies cannot ultimately be held accountable for poor service. The opposite is also true. The operating companies may, because of management, planning, or lack of incentive, not be providing the levels of service to which they have agreed. The Authority does not usually have the recourse of canceling the contract and choosing another provider; they must continue to work with the government company. They can withhold budget transfers but this typically causes service to deteriorate further. Once again, it is the public that suffers. In general, performance contracts have worked only where there are incentives for management and personnel to meet contracted expectations, and where the performance of the parties is not dependent on the performance of other governmental bodies.

16. ***Combination of Public and Private Operations.*** Some cities tend to combine the two systems. In France, municipal and regional authorities are responsible for planning and coordination of urban transport services, setting bus fares, and assuring proper levels of service (Box 4). While some of these authorities operate their own bus fleets, most contract with the private sector to provide bus services under contracts which specify the routes, frequency and other standards of service, and fare levels. Consequently, there is greater recourse for the public Authority in the case of non-performance by the operator (the contract can be terminated and another contractor hired). In Sao Paulo, Brazil all services are provided by the private sector under concessions from the municipal government with the exception of one government operating company. After several years of losses, this government company has just signed contracts with the private sector to provide the services for which it is responsible. Not only is it no longer losing money, it is making money by leasing its buses to the private sector. Under this form of organization, however, the incentive for innovation and quick response to changes in public demand is less than in the “private sector” example cited in earlier paragraphs due to the level of government control over routes, fares, and service standards, and the financial nature of the contracts.

Box 4. Organization of Urban Mass Transport in France

In the early 1970s, after decades of vacillating between state and private ownership of urban mass transport operators, France introduced a new organization for this sector, featuring decentralized decision-making, locally generated finance, and private sector operation. The key sectoral institution is local transport authority (TA), made up of elected officials from constituent municipalities. TAs have jurisdiction for all mass transport matters in a given city, owning mass transport vehicles and infrastructure, and deciding on service routes, frequencies and fares. Actual mass transport services are provided by specialized operators, working under contract with TAs, awarded following open competition. Operators are mainly private firms, but can also be in mixed-ownership, involving various private operators and interests, but keeping the TA as a majority stockholder. The relations between operators and labor unions are defined through collective contracts. The mass transport industry has a high degree of concentration, with about 75 percent of the market in cities outside Paris held by subsidiaries of three holding companies (VIA-GTI, CGEA, and TRANSDEV). Early contracts featured fixed remuneration per vehicle-km of service supplied, or negotiated management contracts, with most commercial risks taken by TAs. The current trend is for operators to take on increasing levels of risk.

In the aggregate, fare revenues of mass transport operators in France cover only about 50 percent of their operating costs, reflecting a public policy of slowing down the loss of passengers in favor of the private car. The balance of operating costs is made from the proceeds of a special local tax (“versement transport”), levied on the wage bill of local firms employing more than 9 staff. A national law defines the principle of the tax, and sets a range of rates from which local TAs can choose the rate to be applied in their city, in accord with financial needs of their mass transport system. Discounts for low-income or handicapped citizens are decided by local governments and financed from their budgets, independently of operators.

Except in the Paris region, the National Government of France does not provide any operating cost subsidies for urban mass transport. It does provide capital subsidies, however, whenever the project in question represents a major expansion. This has so far taken place in some 10 large cities, typically for new metros or light-rail based lines. In return, the cities in question had to ensure that their uni-modal transport plans were integrated into a common framework. The new rules, adopted in 1994, vary the amount of subsidy depending on the project type, with 30 to 35 percent rate for at-grade mass transport projects, 25 percent for elevated sections, and only 20 percent for underground sections.

TRANSITION TO MORE EFFICIENT OPERATION

17. As previously described, international experience indicates that the old model of a government-owned and operated bus system is neither cost-effective nor, more importantly, does it provide the levels of service necessary to support the economic growth and social requirements of a community. Those systems which seem to provide the best service at the least cost to government have ultimately been developed around the model where the government’s role is that of strategic planner, coordinator,

and regulator, and the private sector is responsible for the actual operation of services under minimal regulation and in a competitive environment.

18. In some cities—for example, Santiago, Chile, cities in England, and Buenos Aires, Argentina—this organizational change was made all at once. As a result of deteriorating service and continued losses, the public bus company ceased operation, and concessions were awarded to competing private sector operators to provide the services under various degrees of regulation by the government. In several cities, however, a more graduated approach has been adopted.

19. In some cases, the first step was to separate the operations from the establishment of standards and regulation of compliance with these standards. Toronto, Canada is undergoing such a transition now. Public transport in Toronto is provided by the Toronto Transit Commission (TTC), a wholly-owned government corporation responsible to the Metropolitan Toronto Council. The TTC operates trams, light rail, and metro services in addition to bus services. The buses carry approximately 200 million passengers per year with a fleet of approximately 1800 vehicles. They are now separating the company into separate operating companies, each managed and operated independently. TTC will maintain administration and coordination of the system, continue to establish objectives and standards, and audit the accounts of the individual companies, but day-to-day operation including purchasing and maintenance arrangements, budgeting and accounting will be the responsibility of the operating entities. The bus operation will be divided into several operating companies assigned to various areas of the region and will operate under performance contracts agreed with TTC. The individual companies will have the authority to vary service frequencies and routes in their service area based on demand within the parameters of their service agreements. This separation of the operating companies begins the first step in more a commercial orientation.

20. The next step, as has already been taken in several cities in Canada, the United States, New Zealand, Latin America, and France, is to begin to contract certain services being provided by the operating companies to the private sector. Major rehabilitation, user surveys, training, and maintenance of facilities are candidates for contracts to the private sector. This reduces the administrative workload, overheads, and employee costs which, due to various pressures, can be quite substantial. In some instances the operation of certain routes can be contracted to private sector suppliers, or (as is being done in Guangzhou) joint ventures can be developed with the private sector for the provision of some services. Special services such as air conditioned buses, express routes, and facilities for the handicapped can also be contracted to the private sector.

21. This provides an opportunity to assess the performance of the private sector and develop and refine procedures for activities in which a public company may have little experience. These include procurement through competitive bidding processes, development and administration of contracts, and regulation of commercially-oriented entities. This will be discussed further in this paper, but it is important to recognize the difficulties inherent in these activities, and this transition can provide valuable experience.

22. The third step in this transition process would be the ultimate concession of all operations to the private sector. Government would retain control through the establishment of standards, coordination, and regulatory mechanisms, but the operation and maintenance of buses would be the responsibility of the private sector. Private sector operators would be selected using competitive bidding practices and regulated through provisions in their contracts. The experience of those cities that have adopted this system indicates two important points: (i) a minimum amount of regulation is needed to maintain social objectives; and (ii) several operators should be contracted in order to foster competition, enable comparison of performance, and maintain acceptable levels of service. Buenos Aires, Argentina, Santiago, Chile, Hong Kong, Seoul, and Singapore provide good examples of cities with bus services provided solely by the private sector under license to the government (Box 5).

Box 5. Urban Bus Services in Hong Kong and Singapore

Hong Kong and Singapore provide models of public transport operated entirely by the private sector on commercial lines. Social and “network” objectives are imposed by regulatory frameworks administered by specialist departments within government, independent of any interest in operation, exercising a high degree of regulation. In both cities the process of consolidation of small private operators resulted in the award of monopoly franchises which produced unsatisfactory levels of service and poor responsiveness to market conditions. Additional operators have been licensed to create competition and reinforce incentives to efficiency. Due to the favorable operating environment (high population density, restraints on private car use, travel patterns well dispersed in time and location) the costs of the social and network obligations can be met by the operators from internal cross subsidy without a need for external subsidy. In Hong Kong the regulatory framework includes a maximum level of annual return on assets invested.

The role of the government regulatory agency in both cities is that of planner and coordinator of the public transport system of which the bus operations form a major part. A more recent “network” obligation imposed by the regulating agencies is the coordination, or subjugation, of the bus network to the new mass transit railway networks. In Hong Kong MTR ridership has risen to the point where full competition can be permitted between bus and mass transit services and the incentive of competition with the railway has resulted in the rapid development of premium, air-conditioned bus services.

From a paper by Richard Meakin

23. The provision of competitive services through route franchising requires that substantial skills be exercised by the government in designing networks and bid documents. Franchises should contain a clear specification of the service to be provided, including details of monitoring and enforcement procedures, the terms of remuneration for the service supply and the penalties

for non-performance (specified in a form that is capable of being legally enforced). Safe and environmentally acceptable operation must also be monitored and enforced, though the more constrained the conditions, the less competition there is likely to be. Local knowledge and experience are key elements in designing and enforcement. Combining the planning skills of the existing state-owned enterprise in a regulatory role with the cost efficiency of private sector supply has generally led to the highest levels of service at the least cost.

REGULATION OF BUS SERVICES

24. The regulation of bus services is an essential element in assuring the public receives the level of service it expects, provided under safe and sanitary conditions. This is a primary role for government in facilitating the provision of urban transportation. Regardless of whether the operations are provided by government-owned companies or the private sector, government as a minimum, has the obligation to ensure that the vehicles used to provide service are safe and operated in a safe manner.

25. International experience has shown that the greater the degree of regulation, the less flexibility the provider has to respond to user demands and competitive practices. Consequently, most transport planners consider “least regulation the best”. An appropriately competitive environment enabling private sector operators (or, alternatively, autonomous commercially operated publicly-owned companies) to compete freely with one another for passengers should, theoretically, provide the best services at the least cost. In practice, however, most cities have found that some regulation is essential to balance social and commercial objectives. Regulations are typically used to assure comprehensive geographical coverage, adequate service on sparsely populated or undesirable routes, and during periods of little usage, and to provide integration of modes. In addition where there is the risk of the formation of cartels or where little real competition can be achieved, the regulation of fares is considered necessary. Regulations not only protect the public, but assure all transport providers that they will be treated fairly and equally, and protected from predatory practices. This is important in creating an environment that will encourage private sector participation.

26. Regulatory mechanisms take many forms but are generally administered in one of three ways: (i) a general regulatory body responsible for general regulation of all industry within a jurisdiction; (ii) a regulatory agency established specifically to regulate transport activities; and (iii) regulation through enforcement of the covenants of a specific contract or franchise with an individual bus operator. The last (regulation through contract) has been found to be the easiest to implement during the transition from public ownership and operation to operation involving the private sector. It is more flexible and allows conditionality to be matched to the conditions and objectives of the service. While all three methods are used equally throughout the world, it is essential that some form of regulation be adopted. Santiago, Chile provides a good example of the need for appropriate regulation (Box 6).

Box 6. Designing an Effective Competitive System: Buses in Santiago, Chile

At the end of 1977, public road passenger transport in Santiago was provided by a public sector operator with 710 large buses (90 seats) and a number of strictly regulated private associations operating about 3,167 regular buses (capacity 78 passengers) and 1,558 taxibuses (capacity 40 passengers). Fares, routes, frequencies and bus imports were strictly controlled.

In November 1979, entry to the sector was effectively deregulated, though a formal power of regulation remained. Fares were progressively decontrolled, and became completely unregulated in June 1983. Entry to the taxi business and taxi fares were also liberalized over the same period.

The effects of deregulation were dramatic. The public sector operator was driven out of the market. Total capacity more than doubled over the next decade, with beneficial effects on frequencies and seat availability. Other effects were not so benign. By 1985, the regular bus fares had increased in real terms to nearly three times their 1977 level (partly due to collusion between operators), and the differential between bus fares and taxibus fares had disappeared. The average age of buses increased from 6.95 to nearly 11.6 years and that of taxibuses from 4.95 to 9.51 years between 1980 and 1986. City center congestion and bus-generated air pollution increased substantially.

Those problems have since been addressed. In 1987, 20 percent of the vehicle fleet was not allowed to operate each weekday on a rotating basis. In March 1989, buses built in or before 1966 were prohibited in the city. Most recently, in order to reconcile the desire to maintain competition with restrictions on the congestion and environmental effects of buses in the central city, licenses have been put to competitive tender, with the quality and cleanliness of the vehicle, as well as the price to be charged, being among the decision criteria. In this way, competitive pressure is being retained while new environmental and quality incentives have been introduced. As a result of this renewed regulation, there has been a 12 percent reduction in fares, and pollution resulting from bus emissions has been reduced.

Source: Based on Ian Thomson. 1992. "Urban Bus Deregulation in Chile." *Journal of Transport Economics and Policy* September.

PUBLIC TRANSPORT FINANCING

27. A key element in the provision of adequate and sustainable bus service is the financial viability of the system. One of the most often cited reasons world-wide for poor bus service is the lack of financial resources to purchase vehicles and spare parts to maintain them. This is one of the primary issues in the deterioration of some of the bus systems in China. Throughout the world, those systems which have been most effective are those in which mechanisms have been developed to ensure a reliable source of income sufficient to meet the commercial and social goals of the providers and the community.

28. **Bus Fares.** Bus fares typically provide the single largest source of finance for bus companies. In general, the most cost-effective systems are those that are required to cover all operating costs through fare box revenues with associated income from activities such as advertising. This provides an incentive to the operator to match service with demand, to maximize ridership, and operate in the most cost-effective manner. Fares and service levels for public transport (whether supplied by government-owned companies or by the private sector) should be determined in a system-wide multimodal context and be clearly related to comprehensive economic and social strategies for urban development and transport. Efficient charges for road use will increase public transport patronage and allow greater cost recovery even if modal diversion does not occur. However, as long as road use is underpriced, the financial viability of public transport will be prejudiced and there will be a “second best” case for setting public transport fares in such a way as to compensate for the undercharging of private road transport. This would involve linking moves to recover the full costs of public transport to moves towards setting appropriate fuel tax or road use charge levels.

29. Many of the most efficient bus systems in the world are able to operate with no government subsidy. Most all systems in Latin America, Hong Kong, Singapore, Korea, and many others receive no government support. They are operated by the private sector under government regulatory control. In many countries, however, it is considered necessary to subsidize bus transport as a way of assisting the lower-income segments of the population and encourage public transport use. In doing so, two major issues must be addressed.

30. First, fare revenues will be insufficient to meet full operational and vehicle replacement costs. Financial sustainability thus requires some other “secure revenue” source such as contract payments from government in association with annual performance agreements financed from general taxation or by earmarked taxation as in France, (described in Box 4.). Many municipal governments have neither sufficient grant revenue from central government nor sufficient local taxing power to satisfy this requirement. In those circumstances, because failure to sustain the service will also involve failure to meet environmental and distributional objectives, *financial sustainability must be a pre-eminent concern.*

31. The second problem, referred to earlier, concerns management incentives. Where a public transport mode is expected to contribute to social objectives, full cost recovery directly from users may not be appropriate. When management knows that losses will be funded, or at least they will not be held accountable because of “external” circumstances, there is less incentive for efficiency or cost-cutting measures. In order to stimulate managerial efficiency and to prevent subsidy being appropriated by employees, any support, whether in the form of capital or operating subsidy, must be based on a contract specifying clear performance standards and effective penalties.

32. As described earlier, some of the most successful systems in the world operate with no government subsidy. Others, equally successful with respect to levels of service, only achieve approximately 50 to 70 percent cost recovery from their operation (i.e. companies in France, Germany, Austria, India, Indonesia). These companies rely on annual subsidies provided by government to meet operating deficits and capital expenses. This is similar to the current situation in most cities in China.

Where government subsidized operation is deemed to be the most appropriate for cultural or social reasons, however, there must be mechanisms in place to provide confidence to the operator that sufficient resources will be available. A social objective of providing low-cost transport to all citizens, no matter how well intentioned, is worthless if there are insufficient resources to provide enough buses operating on reliable schedules.

33. One of the most effective means of providing a subsidy to low-income citizens, while maintaining the incentive for operator efficiency, is to provide the subsidy directly to the person—not the enterprise. In that way, fares can be set at a commercially viable level, and operators would compete through efficiency measures that would allow them to operate with the best service at the lowest cost. Experience indicates that fares would remain at reasonable levels, and the operators would be much more responsive to user demand in order to raise ridership and income. This was achieved in Peru whereby tickets were sold at kiosks and other outlets around the city and neighborhoods at a reduced price which was considered affordable to the population. The bus companies would redeem these weekly with the regulatory agency and receive the commercial value of the ticket which had been agreed to in the franchise negotiations. The amount of income received by the operator was directly related to the ridership and his profit was related to his operating efficiency. This subsidy is financed by a special municipal tax on gasoline.

34. In Brazil, it is felt that no one should spend more than 6 percent of their salary on public transportation. (Note: the figure of 6 percent was derived at arbitrarily through negotiations with labor leaders and business and reflected local feeling at the time; most studies conducted world-wide indicate that a figure of 10 to 12 percent of income is a more realistic figure for low-income households to spend on transportation before it becomes an unrealistic burden.) Consequently, legislation was passed so that all major employers would provide a subsidy directly to workers equal to the difference in their transportation costs and 6 percent of their salary. The employer would then deduct this expense from his income taxes. This had the advantage, similar to that in Peru, of being a subsidy directly to the user, and the bus companies had the incentive for efficient operation in order to reduce costs and maximize ridership. The main disadvantage of the Brazil system is that it only reaches workers employed in the formal sector, only about 40 percent of the working population and not necessarily the poorest.

35. In France, as discussed in Box 4, a tax is levied on businesses and collected by the local governments. This revenue is used to subsidize transport operators that operate under franchise agreements with the local transport authorities. The franchise agreement stipulates the fare that can be charged (usually only about 50 percent of what would be necessary to fully recover costs) and the remaining costs are paid by the transport authority to the bus operator in a manner agreed to in the contract. While levels of service are very good, the costs per vehicle/kilometer are typically 20 to 30 percent higher than in those systems where the user is subsidized rather than the operator.

36. Subsidies in themselves cannot be described as good or bad; each community has its own values and must review the implications and tradeoffs that are associated with the use of subsidies. International experience has demonstrated some of the effects of subsidies, however, and it is important

to mitigate the adverse impacts so as to fully realize the benefits. In international experience, two issues stand out:

- (a) The incentive for efficient and responsive operation should not be negated by the payment of subsidies to operators which just serves to equalize revenues and costs. To the degree possible, subsidies should be targeted to the user. The ideal situation would be to subsidize low-income people through a system such as a general welfare program. Where this is not possible, those systems which subsidize the user directly (i.e. the example from Peru) and allow commercial rates to be charged under competitive conditions have resulted in the most cost-effective service. A third-best solution found in some countries such as France and India is to pay subsidies to the operating company based on achievement of predetermined performance criteria.
- (b) To facilitate the rational use of subsidy and ensure a reliable source of revenue, local governments should have the authority to determine the level of subsidy and raise the revenue necessary to finance it. Local taxes on business (which ultimately benefits from accessibility of workers and customers), gasoline and vehicle use taxes, or special sources of revenues such as Guangzhou's tax on hotel rooms can be used to finance the subsidies. Without these special taxes, however, bus systems—often inefficiently operated—are subsidized at the expense of other social programs.

TRAFFIC MANAGEMENT AND BUS OPERATIONS

37. As mentioned earlier, a primary reason given by people for not using the bus is its unreliability and delay. As cities continue to grow and economic activity is increasing, congestion has reduced bus speeds in some corridors to less than 10 km/hr. This has two dramatic effects on the viability of bus operation. Ridership is reduced as people seek alternative means of travel, and the costs of operation are raised causing further deterioration in the service. Effective traffic management, particularly in China whose cities are generally blessed with wide major streets, could greatly reduce the effects of congestion on bus operation. It is important to remember that the objective of an urban transport system is to move people—not vehicles. Consequently those means of transport which can accommodate the demand for accessibility most efficiently should receive priority.

38. In order to facilitate bus movement, the first step is to make the most efficient use of the road infrastructure network, constructing any critical missing links, providing safe movement for pedestrians and bicycles as appropriate, and ensuring integration between the transport system and land use development. The use of street space should be organized, and conflicts reduced to the degree possible to facilitate the movement of traffic in general, thereby reducing delays to buses. Some actions which have proven effective in this regard include:

- (a) Computerized traffic signal control and appropriate timing; in many cities of the world this has reduced delays by 30 to 50 percent.

- (b) Medians on wide boulevards to reduce traffic cutting across the roadway; in a group of secondary cities in Mexico, this produced significant results in reducing accidents (45 percent reduction), and in increasing overall speeds (about 25 percent increase).
- (c) Restriction of on-street parking in congested areas and in the vicinity of bus stops; this can significantly reduce delay depending on the capacity of the street and the volume of traffic;
- (d) Turning-movement restrictions during congested periods; in Bombay, India this reduced traffic delays at intersections by over 40 percent.
- (e) One-way streets with contra-flow bus lanes.

39. There are numerous other actions that can be applied including appropriate geometric design, paint marking, and signing to channelize traffic. Most cities have found, however, that the most critical element of traffic management is effective law enforcement. Unless rules and regulations are obeyed, the efficiency gains of traffic management will not be realized. Coordination between traffic management and enforcement should be a priority of street management.

40. Other actions may be taken to specifically improve bus operation such as priority for buses at intersections. The technique can work in two ways: (i) a green signal for all traffic moving in the direction the bus is traveling; and (ii) a green signal for the lane in which the bus is in, applicable to buses only. In the first case, the bus usually is equipped with a transponder and as it approaches the intersection a signal is sent to the traffic signal controller which causes the signal to advance its cycle and give the approach with the bus the right of way. This is most applicable where there are distinct differences in the volumes of traffic, including buses, between the approaches to the intersection. Experience in the United States has shown reductions in delays to buses of as much as 40 percent in central networks. Delays to other vehicles usually increases depending on the number of buses and the timing of the signals.

41. In the second situation, a specific lane is designated at the intersection for the bus. The traffic signal display includes a separate indication for this lane and it is identified for buses only. The traffic signal timing is then adjusted so as to provide a leading or lagging green for this lane when a bus is there in order to enable the bus to advance ahead of traffic, turn without interference, or maintain prescribed synchronization with the next intersection. The experience in Japan, United States, and Brazil indicate savings in time of 10 to 30 percent on bus journey speeds. The critical factor here is having sufficient width at the intersection to devote to the bus, and avoiding overly long signal cycles.

42. Where bus demand becomes heavier, the most appropriate solution has been the dedication of street space for the use of the bus only. Bus lanes have been used in many countries for this purpose. The capacity depends on the frequency of intersections and stops. Passenger flows of up to 18,000 passengers per hour have been recorded in several cities but typical volumes range in the 12,000 to 15,000 range. Most cities have found that it is necessary to provide some type of physical separation for the bus lane to keep other vehicles from using it and blocking the buses. The physical separation, however, needs to be low enough for the bus to cross to get around other stalled or delayed buses.

43. The ultimate action to facilitate efficient and high capacity bus movement are bus ways. These are distinguished from bus lanes in that they are usually built especially for the use of buses only and provide for movement in each direction. Bogota, Colombia is now starting on an extension of its 4-lane bus way; the first in the world. With a capacity of about 20,000 passengers per hour, busways rival light rail modes of travel and are much less expensive. Bus ways are discussed more fully in Paper 7.

BUSES AND ROAD SPACE

44. As discussed earlier in this paper, buses are an integral part of the transport system in cities throughout the world. In most cities they are the single most important element. In China, this is not yet true because of a number of factors which, however, are changing. In the past, the proximity of jobs, homes, schools and commercial activities meant that most trips were short. People were encouraged to use bicycles and walk. Changes in policy, economic growth, and rapid growth of urban areas, however, are changing people's travel patterns. Trips are becoming more frequent and longer, and the bicycle and walking are not as attractive alternatives as they once were. Although motorization is increasing, there will still be a large part of China's population for many years to come that will not be able to afford an automobile, or to drive it for every trip purpose. This leaves mass transit and cities across the world have found the bus to be the favored alternative. In designing street systems and planning traffic management schemes, the bus should be given priority based on the volumes it carries. Up to about 3000 passengers per hour, the bus can be accommodated in general traffic if effective traffic management is provided to reduce delays and conflicts. As passenger volumes increase, priority for buses should also increase following the adage that the purpose of the system is to move people not vehicles. Special lanes, turning movements, and priority signal timing should give priority to buses at the expense of other vehicles. When passenger demand begins to exceed 7000 passengers per hour, exclusive busways should be considered. They have been found by the cities which have introduced them to be both economically and socially very valuable investments.