Bus Services

Reducing Costs, Raising Standards

Alan Armstrong-Wright and Sebastien Thiriez
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Bus Services

Reducing Costs, Raising Standards
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Bus Services
Reducing Costs, Raising Standards

Alan Armstrong-Wright and Sebastien Thiriez

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ABSTRACT

Certain conditions are generally present when bus services are financially viable and of a reasonable standard. This conclusion is based on the examination of a large number and a wide variety of bus services throughout the developing world.

Important aspects to consider include ownership of bus services and the variety of vehicles and services, as well as cooperation and competition and their impact on viability and standards. Governments can play a role in improving bus services, and various degrees of regulation and freedom are needed to enhance the opportunities for viable bus services.

A set of basic indicators can be used to measure and monitor the performance and quality of bus services so that deficiencies and opportunities for improvements can be readily identified.

Draft terms of reference for bus service studies, a summary of data on bus services, and brief case studies on the urban transport situation in several developing countries add to the understanding of the issues.
FOREWORD

Most cities in developing countries rely heavily on the use of buses as the major means of mobility, particularly for the urban poor. Even in cities with extensive rail networks, the majority of trips are made on buses or minibuses. An estimated 600 million trips a day were being made in buses in the developing cities in 1980; by 2000 that figure will have at least doubled -- with so many people affected, it is not surprising to find the quantity and quality of bus services as a worldwide topic of considerable concern.

This technical paper recognizes the pressing need in most developing cities to improve both the supply and standard of bus services and, in the light of experience, suggests way in which these improvements might be achieved.

Bearing in mind the considerable differences that exist between developing countries and even between cities in the same country, it is unlikely that all the favorable conditions for viable bus services described in this paper can be applied universally. However, there is little doubt that each step made in the direction suggested is likely to result in progressive improvements both to viability and standards of service.

In addition to providing guidance for improving viability and standards, the paper includes a set of performance indicators which should enable both city authorities and bus operators to monitor the performance of their services and to detect unsatisfactory trends and to identify areas that require attention.

In view of the range of urban problems facing the developing countries, Bus Services: Reducing Costs, Raising Standards is but one of the Urban Transport series being prepared by this department to provide guidance on a number of technical issues in the urban transport sector.

Rene Costa
Acting Director
Water Supply & Urban Development Department
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INTRODUCTION

Why are some bus services financially viable while others accrue huge losses? Why are service standards high in some cases and low in others? What are acceptable standards of service? In an attempt to answer these questions, the World Bank has examined a large number and wide variety of bus services throughout the developing world. The purpose of this technical paper is to set out the circumstances found to be likely to result in viable bus services and lead to reduced costs and raised standards.

Purpose of this Volume

The paper should assist city authorities, and both public and private operators, interested in improving the financial and operational performances of their bus services. To assist city authorities, the paper describes the central and local government policies and provisions that usually apply where bus services are found to be financially viable and of acceptable standards. For bus operators, the paper sets out the practices that lead to reduced costs, increased revenue, and better services. The circumstances that generally result in losses and poor services also are described.

In addition, the paper sets out the key performance indicators that can be used to evaluate bus services and suggests ranges of values that could be achieved by reasonably well-run bus services. The standards of service quality that the public can reasonably expect also are discussed. Such an evaluation should be useful not only to operators, but also to investors or aid agencies that seek to assess the performance of a bus undertaking being considered for financial assistance.

In the present climate of very rapid growth in the demand for public transport and strictly limited resources, the availability of viable bus services is vitally important to the efficiency of cities and the well being
of their citizens. In most developing countries, buses are the major mode of urban transport and often the only one affordable to the urban poor. They can provide a very efficient means of moving large numbers of people with considerable flexibility, in order to meet demand throughout the city.

Yet despite their vital role, bus services in many places fall short of demand; systems are frequently severely overstretched, uncomfortable, and unreliable. Very often this is because they are restrained by regulations and inefficient practices, which in turn lead to high costs and losses. As a result, heavy subsidies are usually required.

Although subsidies may be introduced to maintain a desirable level of service at certain fares, experience shows that subsidies are inclined to inhibit investment and expansion, resulting in reduced standards. This is because demand inevitably increases faster than budget revenues, so that subsidies cannot go on expanding. As a result, subsidized services fall short of demand. (The implications of subsidies for public transport are fully discussed in Urban Transport: A World Bank Policy Study).

On the other hand, there are numerous examples throughout the world of bus services that are self-supporting. Because they show a surplus of revenue over costs, such services attract investment for improvement and expansion. As a result, they are better able to cope with growing demands for both quality and quantity than subsidized services that represent an ever-increasing drain on city budgets.

Summary 1/

Bus services in developing countries are characterized by a wide variety of methods of ownership and operation, levels of control, regulations,
and competition. An examination of these factors reveals that for financial viability and a reasonable standard of service, certain conditions are generally present in varying degrees.

Much of the information gathered on bus services suggests that the form of ownership and degree of competition are major factors in the financial viability of bus services (Chapter 2). Generally, privately owned bus services are found to cost much less than publicly owned services (Ankara, Calcutta, Jakarta, etc.). Under competition, private operators, and to a lesser extent public operators, tend to become more responsive to customers' needs and more innovative in finding ways to cut costs. The alleged disadvantages of competition (unfair competitors, erosion of viability, congestion at bus stops, low safety standards) seldom are found to be real problems when they arise, such problems can usually be overcome with a minimum of intervention. The neglect of unprofitable routes, often cited as a disadvantage of relying on private operators, is, in practice, a much smaller problem than expected and can be easily avoided (Istanbul, Bangkok, Kingston, Buenos Aires, etc.). Although public corporations generally find it difficult to be viable, there are some that operate along commercial lines and are able to be financially self-supporting when fares are set at reasonable levels (Bombay, Madras, Coimbatore).

Experience with the size of bus undertakings indicates that small undertakings, particularly those operated by owner-drivers, are very much more cost effective than large operations. However, this may also be a reflection of the form of ownership. There is little evidence of economies of scale from large bus undertakings, and the merging of a number of small bus services into large corporations has, instead, resulted in diseconomies and substantial financial losses (Buenos Aires, Bangkok, Colombo).

The choice of vehicles for bus services has a direct bearing on the level of service and cost effectiveness. As described in Chapter 3, small vehicles are generally less economical than larger ones in their use of road space and energy. In developing countries, however, small vehicles can often
be cost effective because of low labor costs and less stringent driving and vehicle permit requirements. In low-density areas, small vehicles can remain financially viable while providing frequent service, despite low levels of demand (Jakarta, Nairobi, Istanbul). Large buses are generally most suitable on routes where demand is high enough to sustain frequent service and full utilization. In most cities a mixture of large, medium, and small buses is most likely to provide cost effective services; such a mixture usually occurs where operators are free to choose which vehicle to use. Also, better services are provided for the public when passengers are given the opportunity to make choices in comfort, reliability, frequency, and price. Experience indicates that many people are willing to pay for better services. As incomes rise, improved services can help to retain high levels of patronage, thereby avoiding a swing from public transport to private cars. At the same time, the public transport system needs to include low-cost bus services for those who are willing to sacrifice comfort for reliability and lower fares. The provision of systems that cater to various levels of demand between these two extremes is most likely to meet the needs of the public and result in greater opportunities for financial viability (Hong Kong).

Bus services that are self regulated by cooperatives and route associations made up of private operators generally are found to provide levels of service beneficial to the public. (Chapter 4) Disruptive free-foralls and cut-throat practices are avoided, but a strong element of competition is retained. Despite low fares, these systems generally are financially viable and respond well to growing demand (Daejeon, Montevideo, Bogota, etc.). However, unhealthy practices, such as price fixing, may arise, and government authorities may need to take countermeasures.

The role of public authorities, both national and local, in the provision of satisfactory bus services is examined in Chapter 5. From experience around the world, it is clear that bus services work most efficiently with a minimum of government control. In particular, where operators have some measure of flexibility to set fares in response to market forces and determine routes, frequencies, and size of buses, the chances of
financial viability and public satisfaction are greatly enhanced (Colombo). But undue regulation of fares is likely to result in inadequate services (Medellin, Delhi, Lagos). Nevertheless, governments are able to play a vital role in creating an environment within which bus operations can be financially viable while providing satisfactory services at acceptable fares. In particular, governments can provide valuable assistance to bus operators by improving and paving bus routes providing priority measures for bus services and enforcing traffic regulations and road safety and environmental standards (Porto Alegre, Bangkok, Abidjan).

Most developing cities face very heavy demand for bus services and a lack of resources. Thus it is vital that whatever resources are available are used to the best advantage, if the public is not to suffer from poor and costly services. For this reason it is important to know how well—or badly—bus services are performing, so that deficiencies can be readily identified and improvements effected. Chapter 6 describes a set of operational performance and quality standards that can be used in the initial evaluation of bus services and as a system for regular monitoring in order to detect and correct adverse trends.

Included in Annex I are draft terms of reference to provide guidance for a bus services evaluation and improvement study and, in Annex II, for a bus services government policy and action study. In order to provide an indication of the comparative performance of bus services achieved in a variety of circumstances throughout the developing world, the data collected by the World Bank have been tabulated in Annex III. Brief case studies of bus services that illustrate the conditions that influence viability and standards are contained in Annex IV.
CHAPTER 2

OWNERSHIP

Privately owned bus services, with very few exceptions, are found to cost very considerably less than publicly owned services and hence have a much greater chance of being viable. (Table 1: Comparison of Costs) The quality of service that private operators provide generally is as good, if not better, than their public counterparts. With competition, both cost effectiveness and quality of services are enhanced.

Both the operational and financial performance of public bus corporations can be improved if they operate on commercial lines with a measure of independence.

Cost of Services

An examination of a large number of bus services in developing countries reveals that generally the cost per unit of output (passenger-kilometer) for privately owned services is roughly half that of publicly owned services. Even when private and public buses are operating in the same city under similar conditions, this difference in cost prevails.

There are several reasons why private bus operations are generally more cost effective than public corporations.

Staffing Levels. One of the primary reasons for the high cost of publicly owned services is that they are frequently overstaffed. It is not uncommon to find public bus corporations with staffing ratios (staff per operating bus) in excess of eight, and very often between 10 and 15 or even higher. On the other hand, private operations have staffing ratios of about five or even as low as two or three in the case of owner-drivers or small family enterprises.
Table 1: Comparison of Costs

(Private and Public Bus Services operating in the same city: 1985 Data)

<table>
<thead>
<tr>
<th>City</th>
<th>Ownership</th>
<th>Type of Buses</th>
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<th>Fleet Utilization</th>
<th>Staff/Bus Ratio</th>
<th>Fare for 5 Km US$</th>
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<td>65</td>
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<td>0.08(G)</td>
<td>1.5</td>
<td>0.80</td>
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<td></td>
<td>Public</td>
<td>Large SD/Military</td>
<td>141</td>
<td>78</td>
<td>8.0</td>
<td>0.08(G)</td>
<td>0.7</td>
<td>1.00</td>
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<td></td>
<td>Private</td>
<td>Converted trucks</td>
<td>720</td>
<td>80</td>
<td>4.5</td>
<td>0.06(G)</td>
<td>0.6</td>
<td>1.10</td>
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<td>Large SD</td>
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<td>87</td>
<td>5.7</td>
<td>0.01(F)</td>
<td>1.6</td>
<td>0.12</td>
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<tr>
<td></td>
<td>Private</td>
<td>Large SD</td>
<td>--</td>
<td>-</td>
<td>-</td>
<td>0.09(F)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sao Paulo</td>
<td>Public</td>
<td>Large SD, Art</td>
<td>3,280</td>
<td>82</td>
<td>7.6</td>
<td>0.26(F)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Private</td>
<td>Large SD</td>
<td>5,850</td>
<td>90</td>
<td>5.1</td>
<td>0.26(F)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

"Staff/Bus Ratio" is in respect of operating buses
SD = Single Deck Buses      F = Flat Fare
DD = Double Deck Buses      G = Graduated Fares (i.e., related to distance)
Art = Articulated Buses

Source: World Bank surveys and studies.
The high staffing ratios of public corporations often arise because redundant staff cannot be laid off or retired, due either to government regulations or union influence. This can be a cause of very considerable losses, particularly when bus services are reduced and staffing ratios thus increase. Also, public corporations often have excessive layers of management and use elaborate administrative procedures employing large clerical and accounting staffs. Such arrangements add considerably to overhead and may impair rather than enhance, productivity.

Rates of Pay. Employees of public corporations generally earn higher rates of pay and receive more fringe benefits than their counterparts in private enterprises. In cases where staff of private enterprises receive higher take-home pay, it is usually because they work longer hours, are more productive, and may share in the profits.

Private enterprises tend to choose small buses that involve less stringent requirements for driving permits than larger buses—the choice of public corporations. As a result, drivers of small buses are more readily available and can be paid less, thus improving the viability of private enterprises.

Productivity. Of considerable influence on the level of viability is the extent to which buses are put to productive use. A particular characteristic of private bus enterprises is that they are highly motivated to keep their vehicles fully operational. Repairs and maintenance are dealt with expeditiously, usually being undertaken overnight or during off-peak periods; minor repairs one of ten made by drivers on the spot. Driver absenteeism, if any, is minimal. As a result, private operators achieve a high level of utilization of their buses: it is not uncommon to find at least 80-90 percent of private bus fleets in operation during peak periods. On the other hand, with a few notable exceptions (mainly in India) public bus corporations are rarely able to outshine more than 60-70 percent of their bus fleets in peak periods. In addition, the number of public buses in service during the day is often substantially reduced because of a high rate of breakdowns.
When compared to private buses, the lower proportion of public buses in service can be attributed to a lack of incentives, a high level of absenteeism, poor maintenance, and a shortage of spares. Clearly, buses that are out of service represent a substantial loss of earnings and a waste of capital resources. With much higher staffing ratios, staff productivity is naturally much lower in public corporations than in private enterprises. Measured in terms of passenger-kilometers per staff member, per day, staff productivity for the average public corporation, at 500-600, is roughly half that of private enterprises, at 1,100-1,300.

Revenue Losses. Many public corporations are plagued by a loss of revenue due to faults or irregularities in the fare collection system, adding seriously to their other losses. Apart from the lost opportunities to collect more revenue by better routing, scheduling, and standards of service, direct revenue losses—often termed revenue leakages—are because:

- passengers evade payment of fares; e.g., they avoid the collector, travel on the outside of buses, or simply refuse to pay;

- bus crews are tardy in the collection of fares, either because it is arduous or difficult, as in the case of large crowded buses. Also, they may not be prepared to tackle fare evaders;

- the penalties are insufficient to deter evasion;

- fares collected are stolen by bus crews or other staff.

The issuing of tickets or tokens and the use of secure fare boxes and turnstiles, designed to overcome these losses, have a measure of success. (Box 1: Revenue Collection). But where there is collusion between passengers, collectors, and inspectors, even sophisticated systems are far from being completely secure. The use of turnstiles with automatic fare collection may avoid some of these problems, but the technology involved, its cost, and passenger boarding delays may be serious disadvantages in many developing countries.
In Brazil many public and private buses utilize turnstyles with built-in counters. The turnstyles are operated by the collector, who is able to block the entry of passengers into the main body of the bus until they have paid their fares. To reduce boarding delays, the rear entry platform is large enough to accommodate about twenty passengers waiting to go through the turnstyle. This enables the buses to move off while fares are still being collected. Since the number of passengers going through the turnstyles is recorded, and it is very difficult to climb over the turnstyles, fare evasion and revenue leakage are reduced. Passengers permitted to travel free of charge (company staff and policemen) enter through the front door, controlled by the driver, which provides an opportunity for abuse.

A novel system to reduce revenue losses has been introduced in Lima, Peru. In this system bus tickets are also raffle tickets. Raffles are held monthly and winners receive handsome prizes. Passengers now insist on being given tickets, which they carefully retain. Apart from an increase in the number of passengers paying the correct fare, the records of fare collection have become more reliable and the opportunities for fraud have been reduced. Crews selling winning tickets also receive a prize, which provides them with the incentive to cooperate with the scheme. Since the system has been introduced, there has been a very sharp increase in revenue, which more than covers the comparatively small outlay on the raffles.

Revenue leakage is much less of a problem in the private sector, particularly in the case of owner-drivers or small family businesses. Other private owners avoid the problem in a number of ways. For example, they may hire out their buses for fixed amounts or may require their crews to hand in a predetermined amount each day. In either case, the crews retain any surplus revenue as their renumeration. The amount due to the owner can be readily adjusted to reflect increased costs, improved overall revenue, and variations between routes, so that both the owners and crews obtain a reasonable return. While this type of arrangement works reasonably well in the private sector, a number of difficulties arise in the public sector. In particular, the public sector generally lacks the necessary flexibility and there may be considerable resistance to the adjustment of the basic amount due from bus crews. Because of this, in a number of cases, corporations have been running at a considerable loss, while crews with union protection are receiving excessive rewards.
Revenue leakage of 10-15 percent is not uncommon; leakage has been estimated to be as high as 30 percent in some cases. But even at comparatively small levels, revenue leakage can spell the difference between making a profit and incurring a loss.

The comparative viability of private and publicly owned bus services are well illustrated in Calcutta (Box 2: Private and Public Bus Operators).

**Quality of Services and Safety**

While there may be overwhelming evidence to show that bus services under private ownership invariably are self supporting, sometimes there is considerable concern that this is achieved at the expense of quality and safety. Also, in comparison with public operators, it is said that private operators are inclined to cause undue traffic congestion and provide unfair competition.

These impressions arise mainly because of the highly motivated and sometimes aggressive behavior of private operators. But even though they may appear chaotic at times, given the opportunity, private operators provide services that are very efficient and responsive to the needs of the public. In fact, from a number of studies comparing services in the same cities (Calcutta, Istanbul, Bangkok, Jakarta), the quality of private bus services generally seems as good, if not better, than those under public ownership charging similar fares. In a large number of cities, private operators provide a higher standard of service, as is evident from the higher fares they are able to command in comparison with their public counterparts. Also there is little concrete evidence to support the concern that privately owned bus services are less safe than those that are publicly owned.
BOX 2: Private and Public Bus Operators

Calcutta provides one opportunity to make a direct comparison between privately owned and publicly owned bus services operating under similar conditions.

Public buses are operated by the Calcutta State Transport Corporation (CSTC). The fleet of some 1,100 buses comprises 700 single-deck buses that can carry about 90 passengers each and 400 double-deck buses capable of carrying up to 190 passengers each. Usually, less than 700 of the buses are in operation, mainly for want of repair and maintenance and sometimes because of a lack of drivers. Since CSTC has a staff of about 14,500, the staffing ratio per operational bus is 20.7. CSTC has also been plagued by fare evasion estimated at more than 15 percent of revenue. As a result of low productivity and fare evasion, the system requires a subsidy in the region of $1 million a month. Revenues cover only about half of the system's operating costs.

Private buses in Calcutta number about 3,150. These buses are operated mainly by small companies or individual owners grouped into a number of route associations. Most of the private buses are similar in size to the single-deck buses operated by CSTC. Fares for private and public bus services are the same. Despite these similarities, private operators have been able to survive financially without any subsidy. Their success is attributed to very high productivity, which is reflected in low staffing ratios and high fleet availability. The drivers of private buses receive a percentage of revenue, which gives them a strong incentive to combat fare evasion. As a result, fare losses are extremely low. Private bus operations are estimated to cost roughly half as much as those of the CSTC and are more than covered by revenues.

Although the quality of both private and public bus service in Calcutta leaves much to be desired, the private operators are able to provide more reliable and frequent service during peak periods. This is because the route associations regulate services and apply fines when buses run behind schedule. The private companies, which hold almost two-thirds of the market, play a major role in meeting the demand for transport in Calcutta and thus substantially reduce the financial burden on the government.

Nevertheless, in developing countries traffic accident rates are excessively high for all types of vehicles, including both public and private buses. In a number of cities there is particular concern about the safety of
paratransit vehicles. As a result, there is a pressing need to tighten up the enforcement of vehicle inspections, insurance requirements, and road safety measures.

The traffic congestion attributed to private operators is, in many cities, part of a more general traffic problem and not solely the fault of private operators. However, the tendency for private operators to aggravate the situation does exist in some cities. This can be overcome by appropriate traffic arrangements for buses and by proper enforcement of regulations. Restrictions to avoid indiscriminate loading and unloading of bus passengers at busy intersections, and the reservation of space for this purpose, can be very effective without damaging the financial viability of operators. In particular, the provision of adequate off-street terminals and interchange facilities makes it easier to enforce measures designed to reduce congestion.

Providing there is adequate traffic management and enforcement, free competition between operators is likely to enhance both the quality of service and cost effectiveness. This is because with competition, operators are more inclined to be responsive to the needs of passengers in order to increase their share of the market. At the same time, they will strive for efficiency and cost saving. Thus the public benefits from better and cheaper services. In the absence of adequate competition, it is possible for private operators to be highly profitable by using their monopoly to maximize revenue and reducing costs by providing substandard services: with a monopoly there is little incentive to respond to the needs of passengers.

One of the disadvantages often attributed to private operators is that they shun unprofitable routes. In the first place, when services are provided by private operators in free competition, costs are likely to be substantially lower than for public services; hence the number of unprofitable routes will be comparatively few. Where authorities consider it necessary to provide services on such routes, private operators can be given the

2/ Paratransit: small passenger transport vehicles operating informally on a fare-paying basis - eg. converted pickups, motor rickshaws, etc.
opportunity to bid for operation of the routes at specified standards, capacities, and fares. Operators bid on the amount of money to be paid or received by them, depending on the extent to which they expect the routes to be profitable or unprofitable. Competitive bidding arrangements give private operators an incentive to keep costs down. Alternatively, private operators are employed to operate routes on a contract basis. (Box 3: Unprofitable Bus Routes). When these approaches have been adopted for providing services previously run by the public sector, subsidies have invariably been reduced substantially, and in some cases such arrangements have provided a source of city revenue.

**Public Bus Corporations: Improving Viability**

Most public bus corporations experience large losses and rely heavily on subsidies. (Table 2: Public Bus Corporations: Deficits) Very few are able to cover basic operating costs, and even fewer are able to make a profit.

### Table 2: Public Bus Corporations: Deficits

<table>
<thead>
<tr>
<th>City</th>
<th>Year</th>
<th>Deficit (US$ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abidjan (SOTRA)</td>
<td>1985</td>
<td>27.0</td>
</tr>
<tr>
<td>Accra (OSA)</td>
<td>1984</td>
<td>0.25</td>
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<tr>
<td>Ankara (EGO)</td>
<td>1984</td>
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<td>Bangkok (BMTA)</td>
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<td>42.0</td>
</tr>
<tr>
<td>Bombay (BEST)</td>
<td>1984</td>
<td>21.3</td>
</tr>
<tr>
<td>Cairo (CTA)</td>
<td>1985</td>
<td>69.0</td>
</tr>
<tr>
<td>Calcutta (CSTC)</td>
<td>1985</td>
<td>11.8</td>
</tr>
<tr>
<td>Casablanca (RATC)</td>
<td>1982</td>
<td>2.7</td>
</tr>
<tr>
<td>Delhi (DTC)</td>
<td>1984</td>
<td>94.5</td>
</tr>
<tr>
<td>Istanbul (IETT)</td>
<td>1984</td>
<td>5.3</td>
</tr>
<tr>
<td>Jakarta (PPD)</td>
<td>1985</td>
<td>33.0</td>
</tr>
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<td>Karachi (KTC)</td>
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<td>Khartoum (KPPTC)</td>
<td>1985</td>
<td>0.4</td>
</tr>
<tr>
<td>Madras (PTC)</td>
<td>1986</td>
<td>2.0</td>
</tr>
<tr>
<td>Mexico City (R100)</td>
<td>1985</td>
<td>164.8</td>
</tr>
<tr>
<td>Sao Paulo (CMTC)</td>
<td>1985</td>
<td>76.0</td>
</tr>
<tr>
<td>Tunis (SNT)</td>
<td>1985</td>
<td>22.0</td>
</tr>
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</table>

BOX 3: Unprofitable Bus Routes

In a number of developing countries city authorities have successfully dealt with very unprofitable routes by employing private operators on contract.

The public bus corporation responsible for bus services in Istanbul has found most routes to be unprofitable. To overcome substantial losses and because of its inability to meet growing demand, the corporation employs private operators on contract to meet a large part of its commitments. Not only do the private operators make a profit on these "unprofitable" routes at the same fares that the corporation charges, but they also pay 10 percent of their revenue to the municipality. Similarly, in Bangkok most of the public corporation's routes are unprofitable. Bangkok Mass Transit Authority (BMTA), with losses of $40 million* in 1985, has turned increasingly to the private sector to run routes on a contract basis. Under the contract, the private operators, using their own bus or buses leased from BMTA, supply services at specified performance levels and fares. Even at the low standard fares that apply to all services in Bangkok, they are able to make a profit. In addition, BMTA receives over $12 million per annum in payments from contracted private operators.

In Kingston, Jamaica, after the Jamaica Omnibus Service was taken over by the government, productivity dropped and costs rose to the extent that by 1983 the service was costing the government over $1 million every month in deficit financing. All routes were unprofitable. At this point the government leased the assets of the service to the private sector, which once again turned "unprofitable" routes into "profitable" ones and produced a small amount of revenue for the government.

In a number of cities, Buenos Aires, Daejeon and Santiago for example, the problems of unprofitable routes are overcome by operators organized into cooperatives, who take turns in operating all routes so that they share the load of those that are unprofitable (see Box 7).

* All figures are for the equivalent of U.S. dollars.

Corporations that are financially viable usually are found to operate with a measure of independence and pursue commercial practices, including:

Accountability for performance at all levels of management. To achieve effective accountability there is a need to:
- clearly define the responsibilities of each manager, including the managing director;
- set down and monitor the achievements expected of each manager; and
- publish the performance results and call upon management to answer for any shortfalls.

In the absence of shareholders, top management should be answerable to some form of committee or commission independent of the corporation. Several cities in India provide good examples of well managed bus corporations; the Cheran Transit Corporation in Coimbatore (Box 4: Successful Public Bus Corporations) displays most of the desirable criteria for viable bus services.

**Incentives** to reduce costs and improve services. These involve:

- the setting of performance measures in all sections of the organization; and
- bonus payments to staff who improve their performance or meet predetermined standards.

Payments need to be clearly linked to readily identifiable and quantifiable achievements; for example, revenue gains and savings that result from higher bus utilization and revenue collection, reduced fuel consumption, fewer breakdowns and accidents, etc.

**Cost controls** covering operation, maintenance, administration, and routes. These systems should be designed to:

- determine the cost of the various functions and units of the organization so that adverse trends can be detected and corrected;
- identify profitable and unprofitable routes and the true cost of services provided to meet social objectives; and
measure cost performance and compare it with similar services, including those provided by private operators.

Armed with this information the corporation is able to establish whether or not it is getting value for money, make adjustments to increase revenue and reduce costs, and assess options for providing services.

Rational policies on subsidies, routes, fares, and staffing. (Policy issues are discussed in detail in "Urban Transport: A World Bank Policy Study") In brief, corporations should ensure that:

- subsidies, if unavoidable, are clearly defined and the social and economic benefits have been accurately assessed and outweigh all the costs. Subsidies need to be reassessed from time-to-time to ensure that they remain valid;
- routes and services respond to the needs of the public, are cost effective, and can be readily adjusted to meet changing demand;
- fares are clearly related to total costs, preferably on a route-by-route and distance basis; and
- staff is rewarded on the basis of performance and staffing levels are related to the workload (the corporation needs to have and to exercise authority to hire and replace staff).

BOX 4: Successful Public Bus Corporations

Of the few publicly owned bus corporations that are financially viable and able to provide satisfactory services, the Chetan Transit Corporation (CTC) in Coimbatore, India, is particularly worthy of note. CTC was created in 1972 when the state government nationalized private transport undertakings. It is a semiautonomous authority with a high degree of financial and operational independence, but fare increases require the approval of the state government.

CTC does not have an exclusive franchise but operates in direct competition with private buses. The corporation operates some 1,100 large single-deck buses, with a very high level of efficiency: over 95 percent of the fleet is put into service on a regular basis.
Each city bus covers an average distance of 321 kilometers and carries 1,100 passengers each day. CTC currently has a staff of 7,580. The staff ratio, at 7.3 per operating bus, is comparatively low for public bus corporations and is a very important factor contributing to CTC's efficiency. Despite very low fares ($0.04 for a 5 kilometer trip), CTC is able to make a profit, ($750,000 in 1984/5), which enables it to expand its fleet in line with demand.

Much of the success of CTC must be attributed to its dynamic and accountable management and its degree of independence. Also, the corporation pursues prudent commercial policies and undertakes comprehensive monitoring and costing of services. An important reason for its high productivity is the payment of bonuses to staff, based on revenue gains and savings that result from higher bus utilisation and better fare collection. Bus drivers also are awarded an annual bonus for accident-free driving.

Bus Companies in Mixed Ownership

In a number of cities the bus companies are owned partly by public authorities and partly by private enterprises. Typically, a company in this category operates under a contract with a ministry of government in which the obligations of both parties are clearly defined. Usually the main obligations of the government are to approve timely fare increases in line with rising costs and to provide a subsidy up to an agreed maximum. This subsidy is designed to cover concessionary fares and a share of capital costs. On its part, the company is required to operate a specified quantity of buses and to meet agreed performance targets.

In some cases, a large share of the company is held by an overseas bus manufacturer or supplier. There are several examples of this arrangement in Africa, where the company may benefit greatly from overseas technical support and training. (Box 5: Mixed Ownership Bus Companies). Also, since the government has a share in the company, it is in its own interest to raise fares when this becomes necessary and thus keep the subsidy down. However, services tend to be very costly, and although the subsidies are generally less than those for services in purely public ownership, they are still
excessive. Since the company is tied to a particular manufacturer, there may be a risk of lack of freedom in the choice of buses and spares. As a result, purchase prices may not be competitive and the benefits of flexibility may be lost.

**BOX 5: Mixed Ownership Bus Companies**

Public transport services in Dakar are provided by "SOTRAC," a mixed-ownership public bus company; "car rapides", privately owned minibuses; and taxis. Sixty-four percent of SOTRAC is owned by the state, 27 percent by an overseas bus manufacturer, and the remainder by local private interests. The board of SOTRAC reports to the Land Transport Directorate of the Ministry of Equipment. The relationship between the Ministry and SOTRAC has been formalized by a three-year "contract plan" which clearly sets out the obligations and agreements reached between the state and the operator. The main obligations of the state are to ensure regular fare revisions in line with rises in costs and to provide a subsidy up to a fixed maximum ($3.5 million in 1986) to compensate for concessionary fares (students, children) and to help cover investments. In turn, the operator must meet certain productivity and financial targets, which are constantly monitored during the period of the contract. The public bus operator currently owns 458 buses, of which 85-90 percent are put into service each day. The company employs 2,868 staff or about seven staff per operating bus.

Conventional bus services in Abidjan are provided by SOTRA, a public enterprise of which 60 percent of the shares are owned by the state and 40 percent by an overseas bus manufacturer. As in Dakar, a three-year "contract plan" formalizes the relationship between SOTRA and the Ministry of Public Works and Communications, which sets fares and monitors performance. Substantial increases in productivity have been recorded since the beginning of the contract, and annual subsidies from the government have been fixed at a maximum of FCFA 8 billion ($16.8 million). SOTRA currently operates 869 buses, of which 85-90 percent are utilized every day. The company employs 6,000 staff, or 5.9 staff per operating bus.

In both cities, the contracting approach and mixed ownership have given some beneficial results. Productivity has risen and financial performance has improved. However, although somewhat reduced, the high cost of services and the need for hefty subsidies is a major source of concern. These problems have been exacerbated by delays with fare increases and subsidy payments.
Size of Undertakings (Company or Corporation Size)

With few exceptions, large bus undertakings lack financial viability. They are often centrally controlled public corporations and involve complex and unwieldy organizations that are difficult to manage.

Where large undertakings are profitable, usually they are found to be well structured and divided into several manageable units. Each unit is likely to comprise a fleet of about 100-to-200 buses and to cover a particular region of the city. Often each region has a manager delegated with full responsibility for day-to-day running of services, who is supported by his own team of technical and administrative staff. Certain functions, such as training, purchase of spares and buses, and major overhauls, may benefit from being centralized. But in successful undertakings, unit managers generally have a fair degree of autonomy and sufficient authority to effectively deal with bus operations in their region.

As a rule, small bus undertakings are found to be more profitable than large undertakings. More often than not, this is due to the influence of the form of ownership and style of management. Most small bus undertakings are privately owned, which for various reasons already discussed, increases their chances of being financially viable. A contributing factor is that being small, they are comparatively simple to manage and control. As a result, overheads are likely to be very low and revenue leakage insignificant. Although small undertakings may be deprived of certain economies of scale, this is unlikely to be a serious disadvantage and can be overcome when operators group together to provide mutually beneficial services and facilities. However, there is little evidence to support suggestions that benefits derive from merging a number of small bus services into a large undertaking, in fact in practice, as illustrated in Box 6, this approach generally is very costly.
In the expectation of achieving economies of scale and better services, several city authorities have consolidated many small bus undertakings into single, large corporations. Invariably the process has achieved the reverse results – costs have risen steeply and services have deteriorated.

Typical are the measures taken in Buenos Aires. A national enterprise was set up in 1951 to take over the many small bus services in the city. Services deteriorated from the outset, and by 1959 the system was losing $120,000 a day. By 1962, the financial situation was so serious and the quality of service so poor that the enterprise was dissolved, and bus services were turned over to a large number of small private companies.

In Seoul, Korea, there are some 90 bus companies ranging in size from 30-to-200 buses. A detailed cost analysis carried out in 1985 by the Korean Advanced Institute of Science and Technology found no correlation between costs and company size. The study concluded that there was little, if anything, to be gained from amalgamating the companies into larger units.

In 1975, Bangkok's 24 private bus companies and two public companies were consolidated into a single large company that became the Bangkok Mass Transit Authority (BMTA). The objectives of the merger were to rationalize routes, schedules, and fare structures; to generate economies of scale; and to provide better service to the public. Results have been disappointing; in particular, costs have risen and the organization loses over $40 million every year.

A similar process has taken place in Sri Lanka, where the Central Transport Board (CTB), which took over all bus services, became overwhelmed by its own size as it attempted unsuccessfully to cope with sustained growth in demand. Subsequently, it became necessary to encourage the private sector, comprising many small undertakings, to enter the market and put an end to CTB's monopoly.

In contrast, there are a number of large undertakings that go against the trend; for example, in Hongkong, Bombay, Madras, and Coimbatore (see also Box 3). But in each case, operations are divided into manageable units of 200-300 buses, and each unit head is delegated with full responsibility for day-to-day running of services and staff management.
CHAPTER 3

VARIETY OF VEHICLES AND SERVICES

Bus services are more likely to be cost effective and satisfactory for passengers when:

- a variety of buses and services are employed to meet the different levels of demand for quantity and quality found throughout urban areas;
- the buses used are production-line models or low-cost conversions readily maintained by operators and local technicians;
- operators have freedom of choice in the type and size of buses used.

Size and Demand

In order to be cost effective, buses need to be well utilized throughout their period of operation; that is, high load factors need to be sustained. At the same time, to provide satisfactory service buses need to be reasonably frequent (roughly five-to-ten minute headways in urban areas). Thus, on routes of low demand buses need to be small if they are to be both well utilized and frequent. Buses that are too large for the route have two alternatives: to operate partly empty, maintaining frequency, or to operate less frequently with a load that ensures financial viability; the latter, of course, results in excessive waiting by passengers. For example, in meeting a low demand of 240 passengers/hour, minibuses, each with a capacity of 20 passengers, would be fully utilized at a frequency of five minutes. A standard bus, capacity 80 passengers, at a five minute frequency would be only one-quarter full; to be fully utilized the standard bus frequency would have to be reduced to 20 minute intervals.
In considering the size of buses, there is also a need to take into account operating conditions. Small vehicles, in particular paratransit vehicles, often are the only form of transport able to penetrate the labyrinth of narrow streets sometimes found in the old parts of cities and in squatter areas. In addition, small vehicles can be operated at higher speeds, especially on congested streets, allowing for a quicker turnaround. Because of the benefits of more frequent service and, in some cases, door-to-door service, small vehicles may command higher fares. Experience shows that these characteristics of small buses add significantly to their popularity and chances of financial viability.

On high-demand routes, and at times when high load factors are assured, large-capacity buses at high frequency can be very cost effective. Small buses also may prove to be effective on high-demand routes, but the very high frequencies involved may well create substantial external costs, in particular, congestion and pollution. Large buses clearly are most advantageous when the full benefit of their economical use of road space and energy per passenger can be utilized. In exclusive busways, for example, large-capacity buses can carry in excess of 30,000 passengers per hour in one direction. Under the same conditions, it is unlikely that minibuses could cope with one third of that amount.

Levels of demand vary from time-to-time and from place-to-place along routes. It would be impractical to meet all the changes in bus size and frequency that would be necessary to provide optimum levels of services throughout. Hence, in practice, operators usually provide only two or three changes in service along any particular route to adjust for peak and off-peak conditions. Operators, who may aim to provide an acceptable frequency for their off-peak as well as peak passengers, recognize that some light loading during off-peak hours is compensated for by heavy loading during the peak period.

Although a city's needs will depend on its particular circumstances, some combination of large, medium, and small vehicles will usually provide the
best bus service. (Box 7: Size of Buses and Level of Demand). A mixed fleet allows for more convenient, frequent, and better utilized services throughout the day on both low- and high-demand routes and is more adaptable to changing circumstances.

**BOX 7: Size of Buses and Level of Demand**

Public transport in Jakarta is provided by 2,000 publicly owned and 500 privately owned large buses with a capacity of 80-120 passengers each, some 3,350 privately owned 20-seater minibuses, and 2,000 private 10-seater microbuses. These buses carry 3.3 million passengers daily -- 1.8 million in large buses, 1.3 million in minibuses, and 0.2 million in microbuses.

Large buses are concentrated along the main commuter corridors and achieve high load factors at high frequency. Most minibuses and microbuses provide frequent feeder services to the main bus routes and are well suited for the lower level of demand and the poor road conditions found in the secondary road network. Some minibuses and microbuses operate along the main corridors in Jakarta and provide a useful supplement to regular buses at peak periods.

A similar relationship exists between large and small buses in Nairobi. Some 300 large buses, operated by a franchised, privately owned company, Kenya Bus Service (KBS), carry an average 400,000 passengers per day. Also operating in and around the city are 1,300-to-1,500 matatus. These are small buses and converted pick-ups with a capacity of between 12-to-25 passengers each. In total, matatus carry about 260,000 passengers each day. Both the large buses and the matatus ply the main commuter routes and serve the city center. But matatus also provide very useful and cheap services ($0.10 per 5 kilometers) between low-income areas and industrial areas located on the outskirts of the city and along routes that cannot be operated by KBS at a profit.

Another good example of bus sizes well adjusted to demand is provided by Istanbul. Here, some 2,400 high-capacity buses, including articulated buses with a capacity of over 200 passengers each, ply along corridors of heavy demand. On a number of routes they operate in exclusive rights-of-way dealing with particularly high volumes of passengers. Large buses, in total, carry over 2 million passengers each day. In contrast, in comparatively low-density and hilly areas in the suburbs of Istanbul, minibuses come into their own and provide frequent service at low fares to 1.5 million passengers each day. Minibuses are heavily utilized and provide popular services for their passengers, as well as providing owners with a good financial return.
Size, Type, and Maintenance

For costs to be kept low, so that bus services can be financially viable, attention needs to be given to both the capital costs and running costs of the buses. Experience shows that production-line buses (i.e., mass-produced vehicles) and local conversions based on production-line vehicles or chassis are generally substantially cheaper to purchase and maintain than limited-production, or custom-built, buses. (Table 3: Capital Cost of Urban Buses (1986).

Table 3: Capital Cost of Urban Buses (1986)

<table>
<thead>
<tr>
<th>Type of Bus</th>
<th>Capacity</th>
<th>Purchase Price Excluding Tax (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seated</td>
<td>Total</td>
</tr>
<tr>
<td>Minibus</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Small bus</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Standard bus</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>Large single-deck bus</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Large double-deck bus</td>
<td>80</td>
<td>120</td>
</tr>
<tr>
<td>Super-large double-deck bus</td>
<td>80</td>
<td>170</td>
</tr>
<tr>
<td>Articulated bus</td>
<td>55</td>
<td>120</td>
</tr>
<tr>
<td>Super-articulated bus</td>
<td>55</td>
<td>190</td>
</tr>
</tbody>
</table>

[Wide variations in price can be expected, particularly where buses are locally assembled or locally manufactured]


Operating costs, in particular the cost of maintenance, are greatly influenced by the choice of vehicle. Proper maintenance is vitally important since buses often travel 60,000-to-70,000 kilometers per year. Buses that are
not properly maintained will suffer from substantially reduced output and operational life, thus reducing their cost effectiveness. In addition, high external costs may be involved; poor maintenance causes air pollution and excessive noise and leads to frequent breakdowns and traffic holdups. Experience shows that production-line vehicles, in particular minibuses and small buses, require only basic skills for maintenance, which often can be undertaken by the driver with a little assistance. Larger buses, especially those that are custom built, often involve sophisticated and nonstandard equipment (for example, retarders, articulation systems, remote control doors, relay circuitry etc.). As a result, maintenance may require specifically trained staff and special facilities, adding considerably to the costs.

A major factor in the cost of maintenance and bus output is the spare parts situation. Often the components of production-line vehicles are common to a wide variety of models, both buses and trucks, cars and minibuses. As a result, spares are more likely to be readily available and often can be purchased off the shelf at the local spares distributor or a service garage. Under these circumstances, the spares are likely to be much cheaper to purchase than those that need to be specially ordered. Also, buses are less likely to be off the road for long periods waiting for spares -- a frequent ingredient found in heavily loss making bus services. Where the vehicles are cannibalized because of a lack of spares, the resulting loss of productivity is particularly damaging to any chances of viability.

**Freedom of Choice**

Because of the operator's intimate knowledge of road conditions, levels of demand, and operating costs, buses freely chosen by operators are far more likely to be cost effective and appropriate than vehicles specified by inflexible government regulation.

Where operators are free to choose, it is not uncommon to find a variety of types and sizes of buses, minibuses, and paratransit vehicles and a variety of services. Moreover, when not restricted in their choice, operators
are able to respond quickly to changing circumstances and to retain a commercial advantage as well as to provide a service more suited to users' demands.

While there are many examples of operators choosing large buses that have proven to be cost-effective, their inclination is generally towards the smaller vehicles. Even in a city where small vehicles are banned from the city center, large numbers of small buses and paratransit vehicles often proliferate throughout the remainder of the city.

Apart from better utilization, lower capital cost, and ease of maintenance (mentioned previously), the tendency towards small vehicles stems from a number of other factors, for example:

(a) drivers of small buses often have to meet less stringent requirements for driving permits than do drivers of large buses and thus can be paid less; inspection requirements for small buses may also be less costly than for large buses;

(b) although small buses result in a higher ratio of drivers to passengers, this may not be a significant disadvantage in developing countries where labor costs are low;

(c) fares are easier to collect on small buses than on large buses, and the chances of revenue leakage are much reduced.

However, it is clear that for viability, operators should be free to choose from a range of large, medium or small buses based on their preferences and commercial judgement.

Variety of Services

Given freedom in the choice of buses, operators are able to respond more closely to the preferences of passengers, which are likely to range from vehicles offering basic conditions at low fares to more comfortable vehicles at higher fares. Where incomes are rising and more people are able to buy
cars, the transport system will need to include more attractive bus services if bus patronage is to be retained. Certainly, a growing proportion of demand will be for bus services that guarantee passengers a seat and are air conditioned or heated. Many passengers are willing to pay extra for such levels of comfort.

In addition to different levels of comfort, mode of operation may also be varied to capture different segments of the market. For example, as well as providing regular bus and minibus services, it is likely to be profitable to provide at premium fares:

- express bus service with limited stops;
- shuttle bus service between designated locations, such as a particular residential development and the Central Business District (CBD);
- shared paratransit services with routes determined by individual passengers;
- personalized, door-to-door paratransit services.

Where operators are discouraged from, or not allowed to provide quality services at premium fares, a valuable slice of the market is lost, which will inevitably result in a rapid growth in car use. As a result, road congestion and delays will increase and the viability and quality of bus services will be eroded.

Although there is likely to be a growing need in most cities for better quality bus services, bus systems will, at the same time, need to continue to include frequent, reliable, and low-cost bus services for those (likely to be a majority) who are willing to sacrifice some comfort for lower fares.

Demands for various levels of services are likely to fall between these two extremes, and where operators are able to tailor their services to meet these demands, the chances of financial viability and service to the
public are greatly increased. Hong Kong (Box 8: Variety of Services) provides an excellent example of variety in the provision of bus services.

**BOX 8: Variety of Services**

In Hong Kong, buses account for by far the largest number of trips. The Kowloon Motor Bus Company operates 200 routes in Kowloon and the New Territories, carrying about 3 million passengers in 2,700 double-deck buses. The China Motor Bus Company operates 102 routes, mainly on Hong Kong Island, carrying about 0.8 million passengers daily on 1,000 double-deck buses. The two companies also compete on fifteen routes that run through the cross-harbor tunnel. Most of the buses have a capacity of 120 passengers and generally operate throughout the day at high frequencies and high load factors. Both companies are making increasing use of super-large, double-deck buses that were developed specifically for Hong Kong and can carry up to 170 passengers. These are used on routes where demand is heavy enough to run almost fully loaded buses frequently throughout most of the day. Fares, which are set by government, range between $0.10 and $0.20.

At the other end of the scale are 4,350 "public light buses" (PLBs). These are fourteen-seat minibuses, mostly individually owned and free to operate almost anywhere at whatever fare they decide to charge. These PLBs compete directly with bus and tram services and carry more than 1.5 million passengers daily. Passengers are guaranteed a seat and pay fares that may be as much as double those charged on the large, franchised buses, particularly during peak periods. Some minibuses are air conditioned.

About 1,100 PLBs, termed "maxicabs," have been franchised to service routes that are not suitable for double-deck buses, either because demand is not sufficient to sustain high-frequency service or because the routes are too hilly or too tortuous for large buses. Maxicabs operate on fixed routes and at fixed fares that are slightly higher than those of the large, franchised buses.

To meet the needs of people living in new residential developments where service was inadequate, premium residential coach services were introduced in 1982. These services are run by private operators under contract to the developers of the residential areas or to associations of residents. Although these services are regulated to avoid conflicts with the franchises of the main bus companies, the fares are not fixed by the government. Most of the residential coach services use medium-
size buses, usually air-conditioned, that have a capacity to seat about fifty passengers. The privately owned residential coach services and similar services for transporting factory workers and schoolchildren utilize about 2,500 buses and 2,200 minibuses.

Hong Kong now has a total bus fleet of over 12,000 vehicles, ranging in size from the 14-seat minibuses to the 170-passenger double-deck buses. This comprehensive bus fleet is able to meet a wide variety of demands for transport at different levels of quantity and quality of service.

A concern that is sometimes raised is that freedom of choice of types and sizes of buses will result in an excessive number of small vehicles. It is said that although these may be highly profitable to their operators, they involve very high external costs due to road congestion, traffic accidents, and pollution. These faults, if they do arise, usually can be overcome more cost effectively by strengthening traffic regulation and enforcement than by specifying buses that are not based on the commercial judgment of operators. Where conditions clearly favor large buses but these are not chosen by operators, some other factors, such as, official regulations, will almost certainly have come into play and need to be rectified.

**Drawbacks of Standardization**

Authorities in some cities have pressed for the standardization of bus types for a number of reasons. It is said that in addition to reducing external costs, standardization will lower costs through:

(a) improved maintenance and output, by reducing the variety of tasks involved with the operation of a fleet of different vehicles;

(b) reduced quantity and variety of spares inventories and economies of scale through bulk purchasing; and similarly

(c) economies of scale through the bulk purchasing of buses.
While it is true that these benefits of standardization may arise, experience shows that they often fall short of expectations and may be counteracted by serious disadvantages. It is quite clear that buses of one particular design are unlikely to be cost effective in meeting all the different levels of demand for quantity and quality throughout a city. Another serious disadvantage is that standardization is likely to create a monopoly, or a partial monopoly, in the supply of buses and components. Although the initial orders may be based on competitive bids, once a system is locked into a particular type of bus the opportunities for subsequent competition and cost saving will be substantially reduced. This is particularly so when rigid specifications are applied, since these often favor a particular manufacturer. Certainly, innovation in meeting changing circumstances will be stifled by rigid specifications.

A certain degree of standardization may be beneficial when this is not imposed by regulation, but rather occurs because particular models become popular with operators. Nevertheless, it is important to retain the opportunity to switch to other models in the event that they become more competitive, and this is more likely to occur where operators have freedom of choice.
CHAPTER 4

COOPERATION BETWEEN OPERATORS

Cooperation between bus operators can lead to improved financial viability and more satisfactory bus services.

In a number of cities cooperation among private operators has resulted in the provision of more cost-effective and reliable services, benefiting both the operators and the traveling public. In most cases at their own initiative, operators have formed route associations (operators unions or cooperatives, as they are sometimes called). In addition to providing miscellaneous services, the organizations exercise informal supervision and control that provides an effective compromise between a complete free-for-all, at one extreme, and undue government regulation at the other. (Table 4: Bus Unions, Cooperatives and Route Associations). In this way, the disruptive and dangerous practices often attributed to free market conditions can be avoided without discouraging the private sector or reducing healthy competition. In some cases, however, cooperation has led to restrictive practices and price fixing, to the disadvantage of the public.

Function of Route Associations

Although route associations may take a variety of different forms, generally their purposes are similar: to provide mutual assistance and a forum for discussing with public authorities fares, routes, facilities, and policy issues; negotiating contracts and wages with labor unions; and pooling resources. Within the framework of mutual assistance, the associations often provide services to their members that may benefit from economies of scale and reduce costs including:

- the management of terminals and dispatching vehicles;
- the purchase of vehicles and spares;
- the provision of servicing and maintenance facilities;
- common insurance, legal advice, and assistance;
- the training of drivers and mechanics;
- market research and public relations.

The benefit of associations providing a point of contact between city authorities and operators, applies particularly when there are large numbers of individual operators and there is a need for consultation.

**BOX 9: Route Associations**

Daejeon, in the Republic of Korea, provides a good example of a successful public transport system managed by an association of private bus owners. A unique feature of the system is the route sharing introduced in 1980 to overcome the problem of unprofitable routes. The city is divided into four geographical areas, each served by 100 buses supplied by the various bus companies. Each fleet of 100 buses is rotated weekly to serve a different section of the city. There are 60 bus routes in the city, 20 of which operate at the request of city authorities. These 20 routes lose money, but each company serves the routes in turn, and their losses are equalized. The operators make a reasonable profit, while the users benefit from good bus service at acceptable fares.

The public transport system in Buenos Aires is also run by individual private operators within a framework of control exercised by 300 route associations (empresas). Some 15,000 buses, called "colectivos," account for 75 percent of public transport trips in the city. The buses, with a capacity of 60 passengers each, are usually operated by owner-drivers. Each empresa is empowered to serve only two or three routes and comprises between 30 and 300 buses. Routes frequently overlap those of other empresas. Although the government sets fares and minimum frequencies of operation, the empresas select and employ individual operators by contract, set schedules, and provide administrative services. They also assist with maintenance, although this is often undertaken by owner-drivers. An important function of the empresas is to assure fair distribution of income among operators, usually in accordance with vehicle mileage.

The empresas compete vigorously among themselves for patronage. Since fares are fixed, the empresas emphasize quality and frequency of service, to the benefit of 10 million passengers who use the colectivos daily.
In several cities the route associations allocate bus routes and schedule services, and they may collect and share out revenue. (Box 9: Route Associations). This function is undertaken in order to overcome the problem of providing services on routes that are commercially unattractive but which nonetheless need bus service. The aim is a more equitable distribution of income among operators so that those providing a less rewarding but valuable service to the public are not penalized. Also, these arrangements prevent complete disorder in downtown areas in cases where operators would otherwise concentrate only on the busiest routes, to the detriment of all bus operators and other road users.

**Competition**

It is important that in any of these arrangements competition between operators is maintained. This has been achieved in a number of cities. Certainly, where individual operators are able to set their own fares, competition will prevail. But even where fares are fixed, operators are able to compete for patronage by emphasizing fast and frequent service, as well as convenience and comfort where these qualities are demanded by the public.

**Disadvantages of Cooperation**

One of the disadvantages of cooperation between operators is that they may conspire to maximize profits by introducing restrictive practices that eliminate competition or suppress supply. A particular disadvantage for the public arises when established operators, through their associations, are allowed to control access to the market and the number of buses operating on particular routes. Under these circumstances, a private monopoly is created with the result that the quantity and quality of services suffer, excessive fares may be charged, and there is inadequate response to the needs of the public.
<table>
<thead>
<tr>
<th>CITY</th>
<th>SYSTEM</th>
<th>TYPE OF ORGANIZATION</th>
<th>NEGOTIATIONS WITH AUTHORITIES AND UNIONS</th>
<th>SCHEDULING</th>
<th>SERVICING AND OTHER FACILITIES</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCRA</td>
<td>665 large buses</td>
<td>Private Road</td>
<td>Yes (fares)</td>
<td>Vehicles are dispatched from terminals</td>
<td>-training -setting up a servicing facility</td>
<td>The union allocates routes to individual operators</td>
</tr>
<tr>
<td></td>
<td>1460 minibuses</td>
<td>Transport Union</td>
<td>Yes (fares, routes)</td>
<td>No</td>
<td>No</td>
<td>The association makes sure that each operator has a fair share of the market</td>
</tr>
<tr>
<td></td>
<td>1500 converted trucks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AKARA</td>
<td>400 private buses</td>
<td>Union of private bus owners</td>
<td>Yes (fares, routes)</td>
<td>Vehicles are dispatched from terminals (a fee is collected for each departure)</td>
<td>No</td>
<td>The association makes sure that each operator has a fair share of the market</td>
</tr>
<tr>
<td></td>
<td>18 route associations</td>
<td></td>
<td></td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>BANJAR</td>
<td>6900 private buses and &quot;busetas&quot; (minibuses)</td>
<td>56 &quot;membranes&quot; (route associations) and 2 umbrella unions</td>
<td>Salaries, routes, fares are negotiated by umbrella unions</td>
<td>Vehicles are dispatched from terminals, and operators take turns in operating times</td>
<td>-routine maintenance -fuel service station -insurance -legal counseling</td>
<td>Crays are chosen by the owner, but employed by the enterprise</td>
</tr>
<tr>
<td></td>
<td>300 &quot;membranes&quot; associations which operate one or several routes; and one national umbrella union (FATAP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUENOS AIRES</td>
<td>15000 collectivos (small buses) with 5000 owners</td>
<td>700 &quot;membranes,&quot; associations which operate one or several routes; and one national umbrella union (FATAP)</td>
<td>Salaries, routes, fares are negotiated by FATAP</td>
<td>Complete scheduling and route interchanging every week</td>
<td>-basic servicing -insurance -legal and administrative issues -revolving fund for bus purchases and major repairs</td>
<td>Each owner has a contract and a current account with the enterprise -Crays are employed by the enterprise, though chosen by the owner</td>
</tr>
<tr>
<td></td>
<td>5000 converted trucks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAIRO</td>
<td>11,000 microbuses and shared taxis</td>
<td>Union of shared taxi operators</td>
<td>Yes (fares, routes, terminals)</td>
<td>Vehicles are dispatched from terminals</td>
<td>No</td>
<td>The union collects an annual fee plus a commission at terminals at terminals for each trip made</td>
</tr>
<tr>
<td></td>
<td>2,200 private buses and 950 minibuses</td>
<td>Route committees plus two umbrella unions of bus (minibus) owners</td>
<td>Unions negotiate salaries, fares and routes</td>
<td>Vehicles are scheduled and dispatched from terminals</td>
<td>No</td>
<td>A fine is paid by operators who run behind schedule</td>
</tr>
<tr>
<td>CALCUTTA</td>
<td>490 buses operated by 14 companies</td>
<td>One cooperative (25 employees)</td>
<td>No</td>
<td>Th. city is divided in four areas, each served by a group of 3 or 4 companies. These groups rotate every week, and the individual routes operated by each company within a week also rotate</td>
<td>No</td>
<td>The system has equalized income among members and made it possible to serve unprofitable routes</td>
</tr>
<tr>
<td>DACCA</td>
<td>1,200 buses operated by 31 companies</td>
<td>One cooperative</td>
<td>No</td>
<td>No (no route interchanging)</td>
<td>No</td>
<td>The only role of the cooperative is to allocate routes to each company in a way to equalize profits</td>
</tr>
<tr>
<td>DAEGU</td>
<td>1,000 buses operated by 29 companies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INCHON</td>
<td>630 buses operated by 7 companies</td>
<td>One cooperative</td>
<td>No</td>
<td>A new assignment of buses to routes is operated every day</td>
<td>No</td>
<td>Each bus operates all 26 routes in a month by rotation</td>
</tr>
<tr>
<td>ISTANBUL</td>
<td>450 private buses</td>
<td>Route associations</td>
<td>Yes (fares, routes, licensing)</td>
<td>Vehicles are dispatched from terminals</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>JAKARTA</td>
<td>3,400 minibuses</td>
<td>2 minibuses associations (Metrosmil, Kopoje) and one umbrella association</td>
<td>Yes (fares, routes, licensing)</td>
<td>Vehicles are dispatched from terminals; owners pay a monthly fee to the association</td>
<td>No</td>
<td>The associations allocate routes to individual operators</td>
</tr>
<tr>
<td>KHARTOUM</td>
<td>2,200 Ahia buses (converted trucks)</td>
<td>Union of Ahia Bus Transport</td>
<td>Yes (fares, routes)</td>
<td>Vehicles are dispatched from terminals</td>
<td>Three workshops</td>
<td>The union includes both city and inter city operators</td>
</tr>
<tr>
<td>MONTEVIDEO</td>
<td>1,540 buses and 80 trolleybuses</td>
<td>Seven private cooperatives (organized as route associations)</td>
<td>Yes (fares, routes, frequencies)</td>
<td>Complete scheduling and organization or service</td>
<td>-Maintenance plants and workshops -insurance and legal matters -revolving fund for bus purchases and repairs</td>
<td>The cooperative collects revenues from operators. Owners are paid on a per-km basis with bonuses or penalties according to the actual revenue collected</td>
</tr>
<tr>
<td>NAHAUZI</td>
<td>1,200 minibuses</td>
<td>Route associations and two umbrella unions</td>
<td>Yes (fares, routes)</td>
<td>Vehicles are dispatched from terminals</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>SANTIAGO</td>
<td>5,600 &quot;microbuses&quot; and 2,700 minibuses</td>
<td>80-100 route associations operating 2 to 5 routes each</td>
<td>Yes (registration or vehicles)</td>
<td>Bus scheduling and route interchanging every week</td>
<td>-insurance -legal counseling</td>
<td>The association collects a daily tax. Crays are employed by the owners</td>
</tr>
</tbody>
</table>

Source: World Bank survey and field mission reports.
These problems are more likely to be avoided or reduced where governments are prepared to display strong political will to ensure that their policies are introduced and upheld. Dealing with wayward associations or unions may be far from easy, but attempts to do so stand more chance of success if careful steps are taken to obtain the support of the public. In the first place, it should be made clear that restrictive practices and price fixing are illegal. This can be achieved by introducing and publicizing anti-trust legislation. While direct enforcement may have only limited effect, the existence of appropriate laws clarifies the rights of the public and strengthens the hand of government in enlisting public support. The public can be given the opportunity to show its support and to express its views on bus services through public hearings and by setting up appropriate channels for airing complaints, including consumer organizations.

Also, there is a need to ensure that the government's own procedures are not unwittingly assisting the private sector to pursue harmful practices. For example, in some cities applications to operate buses are routed through, or have to be endorsed by, operators' associations or unions. Clearly this gives these organizations the opportunity to restrict entry, which may be contrary to government policy. In other cases, the ability of unions to adversely effect bus services has been unintentionally strengthened by government restrictions on the number of unions and types of bus services that can be operated. Anomalies of this sort can be avoided by carefully reviewing procedures to ensure compatibility with government policy.
CHAPTER 5

THE ROLE OF GOVERNMENT IN PUBLIC TRANSPORT

Although governments and city authorities are rarely successful in running bus services themselves, they can do much to create conditions that allow operators to provide viable bus services that are able to meet growing demands for both quality and quantity.

Regulation

Bus services, as a rule, work more efficiently with a minimum of government regulation. (Box 10: Minimal Regulation). This is not to suggest that a complete free-for-all is the solution. For example, to permit novices to drive large, double-decker buses clearly would be folly. To allow dozens of minibuses freedom to load and unload at will, would be similarly unwise; they would almost certainly concentrate on major intersections and create serious traffic congestion. Nevertheless, there is much scope in many cities to improve bus services by the relaxation of regulations. This applies particularly to regulations that affect access to the market, fares, levels of service, and choice of vehicles.

Access to the Market. To ensure the ready availability of satisfactory services, access to the market should not be unduly restricted. In other words, new operators who meet reasonable safety standards and comply to traffic regulations, should be allowed to enter the bus business and run any number of buses. Similarly, existing operators should be free to expand their services. Where access to the market is restricted— and this may result from the activities of unions or associations, as well as government regulation and franchises— a monopolistic situation arises. When this occurs, operators may be encouraged to maximise returns by providing infrequent and overloaded services. Further regulation in an attempt to overcome such a situation (e.g., regulated levels of service and fares) inevitably falls short of expectations and, in any case, tends to turn profits into losses.
Where free access to the market is maintained, healthy competition is stimulated and operators are more likely to respond to the needs of the public.

Fares. Freedom to set fares, coupled with free access to the market, is likely to result in the provision of bus services that meet the needs of the public at competitive prices. At the same time, operators are able to make a reasonable return, thereby encouraging the supply of bus services and investment in expansion. As a result, demand is more likely to be met. The element of competition in this arrangement greatly reduces the chances of excessive fares being charged and encourages efficiency.

In addition, freedom to set fares at different levels enables operators to provide a variety of bus services—from cheap basic services to quality services at premium fares. Thus, the wide range of preferences often displayed by different segments of the community can be met.

On the other hand, regulated fares have many adverse effects and few advantages. For example, fares are often regulated at low levels in the belief that they will benefit the community, in particular, the urban poor. Clearly, if they are pitched below cost, then private operators have the choice of going out of business, demanding subsidies or reducing standards of service. Certainly, public operators will survive only with heavy subsidies. Experience shows that because subsidies cannot keep up with demand, investments in services inevitably are curtailed, standards deteriorate, and expansion is stunted. Since the poor cannot turn to more expensive modes, they may well be further deprived. The urban poor are likely to be better served by effective steps to improve financial viability and efficiency than by keeping fares artificially low.
BOX 10: Minimal Regulation

The fear that unregulated fares will result in operators making excessive profits and overcharging the public seldom has any foundation in practice. This applies particularly where there is also easy access into the bus business and an element of competition. In Nairobi, Kenya, for example, fares are not controlled and there are few restrictions on obtaining a license to operate a matatu (minibus). Fares, at $0.02 per kilometers, are amongst the lowest in the world for this type of bus.

In Nigerian cities such as Enugu and Onitsha, where similar conditions prevail, bus operators charge a comparable low flat fare of $0.07 - 0.10 per trip.

The benefits of deregulation of bus services are well illustrated in Colombo, Sri Lanka. Private bus operators select their own routes, set their own fares, and determine hours of operation.

The private transport sector in Colombo has benefited greatly from the liberalization of national economic policies in the late 1970s. First, the easing of import restrictions and tax incentives stimulated purchases of new vehicles. Then, in 1979, the government put an end to the Central Transport Board's (CTB) monopoly on public transport services.

These actions evoked a strong response from private bus operators, who imported more than 6,000 buses between 1979 and 1981. Some 11,000 private buses now operate throughout Sri Lanka, about 3,500 of them in the Colombo metropolitan region. The capacity of these private buses ranges from 15-to-60 passengers. Meanwhile, CTB operates 5,800 buses in the metropolitan region, each one able to carry between 100 and 120 passengers. Private bus services have so far managed to capture a high proportion of the market, despite competing with the heavily subsidized and well-established CTB bus services.

Although the private bus operators are permitted to set their own fares, the latter are greatly influenced by CTB fares, which are held artificially low (about $0.015 a kilometer). As a result, some private operators have found it difficult to compete, while others have resorted to overloading and other malpractices. Although stringent regulations exist with regard to safety, insurance and vehicle inspection, enforcement is seriously lacking. In addition, a few unprofitable routes have been shunned by private operators and are served by CTB buses, which have become chronically overloaded. The government is considering special arrangements to overcome these problems.

The overall effect of deregulation has been a substantial increase in capacity, particularly at peak periods, and more frequent bus service. CTB's operations and large subsidy are being reduced as the private sector increases its share of the market.
By regulation, governments often apply flat fares to all bus trips throughout the city, regardless of distance. In other words, the same fare applies to both long and short journeys. In some cases flat fares are justified on the basis of assisting those— in particular, once again, the urban poor—who may live on the periphery of the city and thus have to make longer journeys. But, with flat fares it pays operators to make the shortest trips possible in order to maximize returns. In particular, they avoid lengthy trips into the outskirts of the city. (Box 11: Problems of Regulated Fares). Apart from a consequent low level of service to such areas, the preference of operators to run short routes may create the need for many passengers to take several buses in order to reach their destination.

In many countries, fare regulation is long established, and because of the political and social climate sudden deregulation might not be appropriate. However, if the provision and expansion of acceptable services are not to be inhibited, it is important that such regulation take into account the need for fare structures to:

(a) move towards full cost recovery;
(b) be related to costs (distance, standards of comfort, etc.) and encourage different types and standards of service;
(c) be revised promptly to take into account changing conditions, in particular, cost and patronage.

BOX 11: Problems of Regulated Fares

Medellin, Colombia, provides an example of the type of problem that can arise when fares are unduly regulated. In Colombia, flat fares apply in all urban areas. Since fares are unrelated to distance, it pays operators to operate short routes and to shun long routes. In Medellin, high-density residential areas are located north of the CBD and the industrial areas are located in the south. The road system between these two modes bypasses the CBD and is more than adequate to meet demand. However, most bus services terminate at the halfway point, in the highly congested CBD. Thus, a large number of commuter trips, approximately 1 million, have to interchange in the CBD. During lengthy morning and evening peak periods, conditions in the CBD at
the bus interchange locations are extremely chaotic and congested. As a result, commuters are greatly inconvenienced. If fares were less regulated and based on distance, operators would be inclined to carry passengers from north to south without having to interchange. Buses could thus avoid the CBD, and operating costs would be greatly reduced by improved journey speeds. It might even be possible to provide these more convenient trips at reduced fares. However, until a rational fare policy is adopted, little can be done by the local authorities to effect these improvements.

Very serious problems arise where fares are regulated at artificially low levels. In Delhi, India, the Delhi Transportation Corporation (DTC) shows fairly good indicators of performance compared with many other bus corporations. However, because fares (less than $0.03 for 5 kilometers in 1984) are held well below costs, the corporation incurs very substantial losses ($90 million in 1984).

Consequently, it suffers continuous financial difficulties and, in particular, is unable to raise funds for expansion to meet demands. As a result, buses have become overloaded, standards generally have deteriorated and the corporation, which otherwise performs well, faces severe public criticism.

In Lagos, Nigeria, not only are fares held artificially low but costs are pushed up by regulations that restrict the importation of spares and cheap buses. (This is done to protect the country's vehicle assembly industry: the price of locally produced buses is roughly twice the price of similar imported buses). As a consequence, operators circumvent the fare regulations either by shortening routes or by dividing routes into two stages and applying full fare to each. Worse still, because operators are unable to afford spares and replacement buses, the bus fleets are rapidly declining. Demand, on the other hand, is greatly increasing. Because of short routes and insufficient buses, many of the 5 million daily bus passengers have to interchange several times in crowded conditions, which are made all the more chaotic by a lack of basic interchange facilities. Since, in effect, most passengers are paying well above the legal fare, fares could be rationalized without undue public reaction. If this were to be coupled with relaxed restrictions on the purchase of spares and buses, service could be greatly improved without additional cost to the users.

To avoid fare increases from becoming major political issues and a source of widespread conflict with the public, fare structures, if regulated, should not be applied with rigid uniformity to the state or nation as a
whole. In particular, serious public opposition is almost inevitable when large and widespread fare increases become necessary after years of stagnation.

Some city authorities (in Montevideo, Uruguay, for example) have reduced the chances of controversy over fare increases by linking fares to a bus operating cost index and by making small fare adjustments as a matter of routine. The use of such an index makes it easier to justify fare increases and, together with small, regular increases, greatly improves the chances of gaining public acceptance.

Levels of Service. Provided entry to the market and fares are free from undue regulation, there is little to be gained by regulating levels of service— that is, frequency, hours of operation, allocation of buses to routes, or choice of vehicles. Furthermore, such regulation is difficult and expensive to enforce, especially in terms of staff resources. In addition, it inhibits the benefits of competition and the sound commercial judgement usually displayed by operators.

On the other hand, there may be a need to provide services that are required to meet certain social or development objectives, but which are neglected by operators. As discussed [in Chapter 2], this can best be overcome by contracting the private sector to provide routes through competitive bidding. Alternatively, encouraging informal regulation by operators themselves may provide a solution as discussed [in Chapter 4]. The benefits of allowing freedom in the choice of vehicles is dealt with at length in Chapter 3.

Responsibilities of Government

There are certain features of bus operations that call for government intervention or regulation and cannot be left to market forces or to operators themselves to control. In addition, there are a number of measures that governments can take to improve the chances of bus services being financially viable and capable of meeting the needs of the public.
Safety. There is a need to ensure that bus passengers are carried safely and that danger to other road users is avoided. This can be achieved through a system of driver licensing and testing.

Both initial and periodic testing needs to be undertaken, and drivers should be required to attain standards appropriate to the size and type of vehicles they are to be permitted to drive. Satisfactory licensing systems recognize that drivers of large, high-capacity buses will need higher driving standards and more experience than, for example, minibus drivers. However, if the provision of services is not to be unduly inhibited and access to the market not unintentionally restricted, then it is important to avoid excessive standards for any category of driving permit.

Similarly, vehicles need to be subjected to initial and periodic testing to ensure that they are roadworthy and can safely carry the permitted number of passengers, with an adequate safety margin for inevitable overloading. Once again, excessive standards should be avoided and care should be taken that the regulations do not unfairly favor any particular type, model, or make of vehicle.

Environmental Impact. In providing conditions that lead to financial viability and satisfactory standards, for bus operators, there is likely to be a tendency for large concentrations of buses along major corridors and at terminals. If high levels of pollution are to be avoided, then it will be necessary to establish and enforce appropriate exhaust emission standards for buses (this applies equally to other vehicles, in particular private cars and trucks). Such standards need to be incorporated into regulations governing vehicle specifications and examined at the same time as vehicles are tested for roadworthiness and passenger safety. The air pollution and noise created by buses also need to be taken into account in the location of terminals and depots.

Traffic Control. High concentrations of buses, if uncontrolled, are likely to aggravate the congested traffic conditions that exist in most
cities. As discussed (in Chapter 2), this can be overcome by establishing and enforcing traffic regulations that avoid indiscriminate loading and unloading of bus passengers along busy routes and intersections. It is important for the viability of bus services that such restrictions be coupled with the reservation of space for buses to handle passengers both on and off the street. This space should be at locations that are convenient for passengers but do not impede other road users.

Cooperatives. The benefits of informal regulation by operators have been described in Chapter 4. Governments can help by encouraging operators to set up cooperatives or route associations and by ensuring that the legal framework exists for such organizations to be established and to function effectively. They need to have authority to coordinate the activities of operators who wish to be involved, to purchase spares and vehicles, undertake training, and to operate depots and terminals. Regulations also need to recognize that the cooperatives may represent operators in their dealings with government and city authorities.

The Road Network. A vital element for successful bus systems is the availability of well maintained road networks. Poorly paved or maintained roads add very significantly to bus operating costs and journey times. Hence, they have a direct impact on viability and standards of service. As a result, it is important that city authorities ensure that bus routes are paved and improved to standards suitable for frequent bus movements. Also, the network needs to be extended to provide access for buses into new and growing development areas. Of considerable importance is that the system of bus routes as a whole needs to be kept in a good state of repair.

Traffic Management. To assist with the efficient operation of bus services, there is a need to avoid congestion and improve the overall flow of traffic by providing effective traffic management and control. This usually involves traffic signs and signals, channellized intersections, facilities for pedestrians, parking and street trading controls, and minor road improvements. Also, in order to make the most effective use of available road space
there are clear advantages in introducing some form of demand management— for example, restraints on the use of private cars.

**Priority for Buses.** City authorities can make substantial improvements to both the viability and standards of bus services by providing priority for buses in the form of "bus only" lanes or exclusive rights-of-way. Buses may also be given priority by special phases at traffic lights and exclusive turning movements at intersections. This has been undertaken in many cities and has resulted in bus services being speeded up considerably. In addition to improving service to the public, these measures have reduced operating cost and, in some cases, have made it possible to reduce fares.

**Terminals and Depots.** While the existence of several different operators in a city may have significant benefits, the provision of a convenient network of routes for their passengers is often inhibited by the lack of suitable locations for terminals and interchange facilities. City authorities can assist by allocating suitable sites for this purpose and by constructing or coordinating the construction of the necessary facilities. These are sometimes provided on direct repayment or leased to associations of operators. Alternatively, individual operators may pay a monthly or daily fee, or pay each time they use the facilities. Depots, together with maintenance and servicing facilities, can be made available in the same way. The collective provision of these services may produce certain economies of scale, provided overhead does not become excessive.

**Financing Bus Purchases.** Operators in many countries have difficulties purchasing buses and spares because of import restrictions and a lack of foreign exchange or financing facilities. Governments can help by providing suitable banking services designed to make it easier for legitimate bus operators to obtain loans and foreign exchange for the purchase of buses and spares. The use of special funds disbursed through commercial banks and the relaxation of import restrictions and exchange regulations in several countries (Mexico, Sri Lanka, and others) has had a marked effect on the availability of buses and the standard of services.
BOX 12: Government Facilities to Assist Bus Operations

In Brazil, considerable improvements in bus operations have been achieved in five metropolitan areas (Salvador do Bahia, Curitiba, Recife, Belo Horizonte, and Porto Alegre). Physical measures included the introduction of exclusive bus lanes, the construction of bus terminals, and the paving of bus routes in low-income areas. These improvements have achieved significant cost savings, which in Curitiba and Recife have been passed on to passengers in the form of fare reductions.

The exclusive busways provided in Porto Alegre have met the demand for high passenger flows in the central business district. The right-of-way has been made exclusive by way of curbs or low, reflecting markers, and a bus convoy system has been introduced. In this system, at the beginning of a corridor buses are coordinated in a fixed sequence according to route, forming convoys of up to six buses. The buses, which may belong to different companies, travel together, stop simultaneously, board their passengers, and depart in a queue or convoy. The combined use of the bus expressway and bus convoys has achieved peak-hour, one-way passenger flows of 28,000 passengers on 260 buses, at a speed of 19 kilometers per hour, in the most heavily traveled corridor. On one expressway, two transfer terminals were built, permitting passengers to transfer between the smaller buses serving feeder lines and larger, articulated buses serving the bus-expressway. This transfer arrangement has resulted in 20 percent higher bus speeds and corresponding fuel savings.

The government of the Cote d'Ivoire has adopted a comprehensive approach to improving the transport system in Abidjan. It consists of:

- various traffic improvements, including the creation of one-way streets, the installation of integrated traffic signals, signs, and road markings in the central business district, and the extension of traffic management programs throughout the city;
- measures to improve the movements of pedestrians and buses in high-density, low-income communities;
- the improvement of pedestrian facilities, including construction of footbridges;
- the construction of a bus-way and reserved bus lanes in the central business district;
- a high-speed express bus network, made possible by the construction of new road links;
- the upgrading of bus terminals and bus stops and construction of a bus depot;
- the construction of primary roads to improve public transport access to low-income areas.
Before the project began, key sections of the city's road network were seriously overloaded, and downtown congestion lasted for as much as twelve hours each day. Considerable all round improvement has occurred as a result of the project. The running times for buses crossing the central business district have been halved, and the elimination of congestion caused by the loading and unloading of buses has benefited other traffic. These improvements have been achieved even though rush-hour traffic has increased by roughly 20 to 30 percent.

By far the majority of bus services in Mexico City are run by private operators who are ready to expand and improve their fleets to meet growing demands. However, many have been held back by the high cost and lack of choice of new buses available. Also, they have faced difficulties in raising sufficient capital to purchase new buses. To overcome this situation, the states of Mexico and Nuevo Leon, with the assistance of the World Bank, have established a line of credit for financing the purchase of buses by private operators. Loans are administered by BANOBRAS (National Bank of Public Works and Services) and are at interest rates close to the average cost of lending in Mexico. Import restrictions have been relaxed to encourage competition in the supply of new buses. At the same time, bids are for small batches of buses, providing a wide choice of vehicles based on specifications agreed upon by the private operators themselves.

Taken together, the infrastructure and facilities provided by governments can have a very significant impact on the quality and viability of bus services. (Box 12: Government Facilities to Assist Bus Operations) In most cases, considerable savings in operating costs can be achieved and passed on to users in the form of reduced fares.
CHAPTER 6

PERFORMANCE EVALUATION AND STANDARDS OF SERVICE

In most cities in developing countries, bus services are faced with very heavy demand, steep rises in both capital and operating costs, and a lack of resources. Thus there is a pressing need to ensure that whatever resources are available for bus services are put to the most effective and efficient use possible.

For this purpose there is a need to evaluate the operational performance of bus services and the standard of service being provided to the public. This can be undertaken by the use of certain performance indicators.

The key performance indicators and quality standards suggested in this technical paper are designed to highlight quickly any deficiencies of bus services and to indicate where attention can best be directed in order to effect early improvements. Used as a system of monthly monitoring, these performance indicators will detect changes in operating trends and provide an early warning of the need for remedial action.

The particular indicators suggested have been chosen because (a) they assist in providing a basic assessment of bus operators' performance, and (b) they are based on data that are likely to be readily available and should not involve the need for extensive field surveys.

A more comprehensive range of performance indicators does exist, however, and may prove to be of considerable value where there is a need or desire to evaluate or monitor bus services in much greater depth. A detailed discussion covering a wide variety of performance measures and their uses, is contained in Urban Public Transport: Evaluation of Performance published by the Organization for Economic Cooperation and Development (OECD) in 1980.

A summary of the performance indicators suggested, together with the range of values likely to be applicable to a reasonably well-run bus company, is presented in Annex I (see Attachment).
**Key Operating Performance Indicators**

**Passenger Volumes.** A significant indicator of productivity is the number of passengers carried in relation to the capacity of the system. Measured in terms of the average number of passengers per operating bus per day, a reasonably well-managed bus company should produce results in the following range:

<table>
<thead>
<tr>
<th>Type of Bus</th>
<th>Crush Capacity</th>
<th>Passengers per Bus per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-deck bus</td>
<td>80</td>
<td>1,000 - 1,200</td>
</tr>
<tr>
<td>Single-deck bus</td>
<td>100</td>
<td>1,200 - 1,500</td>
</tr>
<tr>
<td>Single- or double-deck bus</td>
<td>120</td>
<td>1,500 - 1,800</td>
</tr>
<tr>
<td>Articulated or double-deck buses</td>
<td>160</td>
<td>2,000 - 2,400</td>
</tr>
</tbody>
</table>

Several factors will have a direct bearing on these results. Systems that achieve high vehicle-kilometers, as discussed below, usually carry more passengers. Similarly, figures for passengers per bus will tend to be high with the rapid turnover that results from a high proportion of short passenger trips. Where supply is unable to cope with heavy demand, overloading can be expected and passengers per bus will tend towards or even exceed the top end of the scale. Therefore, this indicator should not be considered in isolation.

Fairly typical is the Karachi public corporation, where operational buses average 1,135 passengers per day. Extreme examples are provided by Addis Ababa, where high-capacity buses facing heavy demand average nearly 2,500 passengers each per day, and Paris, where underutilized buses carry only 715 passenger per day.

**Fleet Utilization.** The proportion of a bus fleet that can be put into service each day has a direct bearing on the productivity of the system. It is indicative of the effectiveness of bus maintenance, spares and procurement, and stock keeping as well as staff recruitment and management. Fleet utilization, expressed as a percentage of total fleet, is usually calculated by dividing total buses running during the morning or evening peak period by
the total fleet size (excluding any buses that are beyond repair). With adequate maintenance and staff management, it should be possible to achieve fleet utilization of between 80-90 percent. Fleet utilization may fall well short of this range because of a lack of maintenance facilities or skills, problems over the supply of spare parts, tires, or fuel, or where there are labor or union problems. Such problems can be seen in the public corporations in Accra, (fleet utilization 24 percent) and Calcutta (64 percent). On the other hand, very high utilization can be achieved, for example, 95 percent by private operators in Seoul, when repairs and maintenance are carried out by adequately equipped, skilled mechanics working on buses overnight or during off-peak periods.

**Vehicle-kilometers.** A further indication of the productivity of a bus fleet is the total distance traveled by buses in service, i.e., vehicle-kilometers. This is usually expressed in terms of average kilometers per operating bus per day. (Vehicle-hours of operation provide another measure, but details of operating hours for each bus usually are not readily available.) Vehicle-distance can be measured and verified from a number of sources, such as tachometer readings, route distances and trips, and fuel consumption.

For a reasonably run bus service the average kilometers per bus per day should be in the region of 210-to-260. The results, however, will be greatly influenced by traffic and road conditions, hours of operation, breakdowns, the number of stops, and the turnaround time. Examples that fall well outside this range are provided by the public corporation buses in Calcutta, at 120 kilometers per bus per day, and the private bus services in Seoul at 340. In Calcutta, both traffic and road conditions along the corporations' bus routes are poor, and staff incentives are inadequate. In Seoul, in addition to comparatively good traffic and road conditions, productivity is enhanced by highly motivated operators.

**Breakdowns in Service.** An indication of maintenance and driving standards is the proportion of buses that break down in service and require either assistance from a mobile repair unit or attention at the depot. A reasonably well maintained fleet would expect to have breakdowns at a rate of no more
than 8-to-10 percent of buses in operation each day. In addition to poor quality of maintenance and driving skills, traffic congestion, bad road conditions, and tropical climatic conditions are particularly inclined to give rise to breakdowns and need to be taken into account when assessing this measure of performance.

**Fuel Consumption.** Fuel consumption will depend on size and load of vehicles, engine type, and the gradients and traffic conditions encountered on route. Maintenance and driving standards will have a considerable influence as well. Measured in terms of liters per 100 vehicle kilometers, fuel consumption of a well run system should fall within the following limits:

- **Minibuses:** 20-to-25 liters per 100 kilometers
- **Regular buses:** 25-to-50 liters per 100 kilometers

Typical results are found in Khartoum, where the fuel consumption of buses carrying up to 100 passengers is 44 liters per 100 kilometers. For 20-seat minibuses, consumption is 27 liters per 100 kilometers. In Khartoum, traffic conditions are moderate and the terrain is generally flat.

**Staff Ratios.** The size of the staff employed to put buses into regular service provides a clear indication of the efficiency of bus services. The following ranges should be expected:

- total staff employed per operating bus 3 - 8
- administrative staff employed per operating bus 0.3 - 0.4
- maintenance staff 0.5 - 1.5

In practice, results vary considerably from one country to another (and from one operator to another). A number of factors may have a strong influence on the staffing ratios. Staff ratios toward the top of the range can be expected in countries where labor costs are low and operations are likely to be labor intensive; for example, manual cleaning as opposed to mechanical cleaning will increase the amount of labor employed. Excessively high total staffing ratios, as in the case of Cairo (18) and Calcutta (20), occur where labor laws or union regulations inflate the bus operation and make
it difficult to relate manning scales to the size of the operation. In particular, it may not be possible to reduce staff when services are curtailed. On the other hand, very low total staff figures are found in small, privately owned operations, such as those in Kuala Lumpur (3) where owner-drivers undertake maintenance and administrative tasks, as well as driving at least one shift. Some operators make considerable use of outside contractors for tasks such as maintenance, which may not be reflected in staff numbers. Thus the resulting low staff ratio may give a false impression of efficiency.

**Accidents.** The level of accidents will provide some indication of the standard of driving and maintenance, but will be greatly influenced by traffic conditions, in particular the volume of pedestrians. A comparison should therefore be made with the traffic accident rate for other vehicles operating in the same area. In a well-run bus company operating under moderate conditions, accidents per 100,000 bus kilometers are likely to be in the region of 1.5 to 3.

**Dead Mileage.** Dead mileage (sometimes called light mileage) is the term applied to the length of journeys that are not revenue earning. In other words, journeys that are made when buses are not in service and passengers are not being carried. This usually depends on the location of overnight parking and maintenance depots in relation to the start and finish points of the bus services. Dead mileage for a reasonably efficient system would be in the region of 0.6 to 1.0 percent of total vehicle mileage.

**Cost of Bus Services.** The costs of bus services are mainly dependent on local labor and fuel costs, but are greatly influenced by the efficiency of operation and management and by traffic and road conditions. The total cost of bus services (operating costs, depreciation, and interest) in mixed traffic and bus-only lanes should be in the region of US$2 - 5 per passenger-kilometer, and in segregated busways, involving appreciable infrastructure costs, US$5 - 8 per passenger-kilometer.

The lower end of these scales are likely to apply to owner-operated bus services, and the upper end to public corporations. Significantly lower
costs have been recorded, and although they may indicate highly efficient operations, the results often are due to excessive overloading or other deficiencies in the supply of services (the case, for example, with Nairobi's minibuses, and Bombay's corporation buses).

Operating Ratio. In order to be self sufficient and avoid the need for subsidies, revenue should cover costs and show a small surplus to stimulate investment and growth. To meet these requirements, the operating ratio (total revenue divided by operating costs, including depreciation) should be in the region of 1.05:1-to-1.08:1.

Quality of Service Indicators

Acceptable levels of service will differ very considerably from one country to another, and will be greatly influenced by income levels; the value placed on time, geographic and climatic conditions, availability of alternative modes, traditional standards, public attitudes and ethnic characteristics. Clearly there is no set of standards that could be universally applied to the quality of bus services in any particular city. Nevertheless, there are a number of attributes that services possess that can be measured. Values have been placed on these by various authorities to provide indications of the quality of service in their cities. Using these with caution and having due regard for the influence of other factors will provide a rough measure of comparative levels of service.

Waiting Time. A major factor in the overall quality of service is the time passengers have to wait at bus stops for buses. This is often judged to be the primary indicator of service quality perceived by passengers. In Caracas, the findings of a study establishes the following levels of quality for waiting time:

<table>
<thead>
<tr>
<th>Waiting Time</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 3 minutes</td>
<td>good</td>
</tr>
<tr>
<td>4 - 11 minutes</td>
<td>regular</td>
</tr>
<tr>
<td>12 - 19 minutes</td>
<td>bad</td>
</tr>
<tr>
<td>over 20 minutes</td>
<td>very bad</td>
</tr>
</tbody>
</table>

London Transport criteria for acceptable waiting time has been expressed in terms of frequency; that is, "if passengers are unable to board
the first bus to arrive, they should be able to board the following bus without fail." For high-frequency services this represents an average waiting time of about four minutes (which, incidentally rarely is achieved; average waiting time for high-frequency services often is in the region of 5 to 8 minutes). As part of an examination of bus services in Delhi, the Overseas Unit of Transport and Road Research Laboratory (TRRL) has concluded that 15- to-20 minutes might be the reasonable maximum waiting time for bus passengers. However, on a number of routes, average waiting time was above 20 minutes and passengers clearly were deprived of adequate service. Taking into consideration the different factors and conditions that may prevail, it is suggested that to achieve a reasonable level of service in developing countries the average waiting time should be in the region of 5-to-10 minutes, with a maximum waiting of 10-to-20 minutes. The lower end of these ranges would apply to fairly short journeys with high-frequency services and the upper limit would apply to long journeys and low-frequency services.

Walking Distance to Bus Stops. The distance that passengers have to walk to and from bus stops are indications of the coverage provided by bus services. Generally, in reasonably well-served urban areas, passengers should expect to find a bus stop within 300-to-500 meters of their home or work place. Distances in excess of 500 meters may be acceptable in low-density areas, but the maximum distance that passengers have to walk to and from a bus stop should not exceed 1,000 meters. (Considering on the one hand the delays caused by too closely spaced stops and, on the other hand, the inconvenience of widely spaced stops, the optimum spacing of bus stops along routes in dense urban areas is likely to be in the region of 300-to-400 meters.)

Interchanges Between Routes and Services. The need to change buses (or to other modes) adds to the time spent waiting and to the inconvenience experienced by passengers. It may also add to passengers direct cost, e.g., when a second fare is levied. In a well-designed transport system the majority of commuters should not need to interchange during their journeys to or from work. In a large city many commuters might be expected to interchange once (e.g. travel on two bus routes) but less than 10 percent of passengers should be required to interchange more than once.
Journey Times. Passengers should not be expected to spend more than two-to-three hours each day travelling to and from work (including walking to and from bus stops, waiting time, interchanging, and bus trip times). Excessive journey times may be a reflection of inadequate bus supply or poor scheduling and routing. But other external factors may have a much greater influence and need to be taken into account when assessing the performance of bus services. In particular, the remoteness of residential areas to work places and poor traffic and road conditions. For example, in Mexico City where these conditions prevail, a third of all commuters spend between two and four hours each day travelling to or from work.

Considering only the bus element of the journey, the journey time will depend on the journey speed or commercial speed of the buses (i.e., the average speed taking into account running speeds, delays in traffic, and stopping on route to enable passengers to board or alight). In dense areas in mixed traffic, this should be a minimum of 10-to-12 kilometers per hour (kph) and in bus-only lanes, 15-to-18 kph. In medium-to low-density areas, journey speeds of approximately 25 kph should be expected.

In Tunis, the journey speeds for buses are 14 kph for urban services, 19 kph for short suburban services, and 30 kph for long suburban services. In the urban area of Bogota, journey speeds for buses average 25-to-30 kph but drop to seven kph for a short busy section of the Central Business District. In Cairo, where traffic conditions are particularly bad bus journey speeds can vary between three and 13 kph.

Different journey speeds can be expected in the peak and off-peak periods. In Kuala Lumpur, journey speeds have been recorded at 15 kph during the peak period and 25 kph in the off-peak. Once again, the actual results will be dependent more on traffic and road conditions than on the efficiency of the bus service.

Travel Expenditure. Travel expenditure probably is perceived, particularly by low-income groups, as the most important criterion in their choice of mode and may lead many to choose to walk. The extent to which a bus service is affordable is dependent on the income level of the users. In developing
countries, a reasonable level of household expenditure on bus travel should not exceed 10 percent of household income. Groups with comparatively high disposable income may elect to spend a larger proportion of their incomes on travel, in return for a higher quality service, in particular that provided by the use of private cars and taxis. In industrial countries, households without cars may spend in the region of 3-to-5 percent of their income on commuting. In developing countries, at the other extreme, studies have found that certain very low-income groups may spend in excess of 30 percent of their income on travel (Nairobi, Sao Paulo), while levels of expenditures in the region of 15 percent are not uncommon (e.g., Kingston, Jamaica, Calcutta, etc.).

Despite the very serious difficulties facing bus operators throughout the world, there are many that are able to achieve, and in some cases exceed, the levels of performance and standards suggested in this technical paper (e.g. Hong Kong, Buenos Aires, Coimbatore, Seoul). Certainly, the lower ends of the ranges indicated for standards of service should be achievable by most reasonable well run bus services and are the very least that the public are entitled to expect. However, as incomes rise there will be a growing demand for better quality transport and if bus services are to retain their passengers, standards will need to be improved.

Experience shows that although conditions vary considerably from city to city, generally, given the incentive and a degree of freedom, operators are able to satisfy the expectations of the public and continue to be financially viable.
ANNEX I

BUS SERVICES: EVALUATION AND IMPROVEMENT STUDY

Draft Terms of Reference

[Note: These draft terms of reference have been written with a single bus company in mind. They can be applied to either publicly owned or privately owned undertakings and can be adapted for the evaluation and improvement of services provided by a group of operators such as a cooperative or route association.]

Background

[Here insert a brief description of the city, providing details of its population, area, modal split of person trips, vehicle fleet, and other basic transport data. Give brief details of the bus company to be examined together with an outline of the principal problems. These might include poor service provision, inadequate maintenance, heavy financial losses, etc. List any earlier studies that may be relevant to this study.]

Study Objectives

The main objective of this study is to:
- improve the viability and quality of services provided by the bus company.

This objective will be achieved by the following means:

- assess the approximate current and future demand for the company's services.
- determine the operational, financial, and service deficiencies of the bus company and their causes.
- identify the measures that need to be taken to overcome the current deficiencies and to cope with future demand, with regard to the quantity, quality, and variety of services.
- present the findings in a form that assists company authorities to reach decisions on the measures that need to be taken. This should include an action plan for immediate steps to be taken and terms of reference for any subsequent feasibility or design studies that may be necessary.

Scope

Geographic. The study should cover the current area served by the bus company and any additional areas that the company may, in the future, be called upon or wish to service [any areas of particular concern that may require close examination should be identified here]
Technological. Bus types and sizes that could prove to be viable and suitable are to be considered.

Institutional. The study should consider any institutional changes, including organization and management, likely to lead to improved viability and standards of service [in the case of public corporations the study should consider the opportunities for participation of the private sector, such as contracting out services, maintenance, etc.]

Problems to Be Addressed

Existing bus services are suffering from [insert here details of known deficiencies and possible causes; for example, high costs, revenue leakage, overcrowding, excessive travel time, low productivity due to excessive labor, lack of buses, street conditions, lack of incentives, etc.] The final report must demonstrate how the measures proposed will address these problems in a cost-effective fashion.

Available Data Sources

Wherever possible, the study should be based on available statistics and past surveys of the bus service and travel characteristics. The gathering of new field data, if necessary, should be kept to a minimum.
Study Approach

Since the study requires only the identification of measures to improve the viability and standard of services, it should rely on readily available data, experience, and simplified evaluation methods.

[In the case of a large undertaking, the level of service evaluation should be selective and concentrate on a number of representative routes and areas. An examination of all routes and the service area as a whole may not be necessary.]

Study Methodology

General Description of the Company. Provide details of the type and structure of ownership of the company, the size of its operations, and labor force, its organizational structure, area of operation, patronage, and objectives.

Operational Environment. The study should include a brief description of the conditions under which the bus company operates. This should include:

- the degree of government control over access to the market; fares; routes; zones of operation; frequencies; schedules; choice of vehicles; staff appointments, dismissals and retirement; taxes; royalties; licensing; inspections; and import duties.*
- the degree of control or influence of cooperatives and unions;
- an indication of public and political attitudes that may affect the operation and viability of the bus company;*
- details of competition from other operators and transport systems;
- the traffic conditions along routes and at stops, terminals, and interchange points.

[items marked * can be deleted if a "Bus Services: Government Policy and Action Study" is also undertaken]

Study Period. The study should be based on the situation in the current year and should include five- and ten-year forecasts.

Assessment of Demand. Estimate the current demand for the company's services and forecast the likely demand five and ten years hence. Detailed travel surveys should not be undertaken. Instead, future demand in each of the study years should be estimated by projecting current passenger flows based on simple growth factors such as projected urban population growth, level of motorization, and, if available, details of past trends in transport demand. Allowance should be made for unsatisfied demand and for demand for the company's services likely to be generated by new development in and around the company's service area. If projections available from previous studies are to be used, the validity of the data should be checked.
The study should take into account projected changes in income levels and the likely demand for services of different standards.

**Operational Performance.** Evaluate the operating performance of the bus company using appropriate key performance measures, such as passenger volumes, fleet utilization, vehicle-kilometers, breakdowns in service, fuel consumption, staff ratios, accident rates, and dead mileage. These should be measured against a range of values usually expected from a reasonably well-run bus company (see Attachment). Any deficiencies identified should be examined in order to determine the causes.

**Financial Performance.** Evaluate the financial performance of the bus company as a whole. In particular, the study should examine the extent to which total costs (capital costs, interest, and depreciation, as well as operating costs) are recovered from users or other sources of revenue. The cost of services, in terms of cost per passenger-kilometer and revenue-cost ratio, should be compared with the results expected from a reasonably well-run bus company (see Attachment). Any deficiencies identified should be examined in order to determine the causes.

**Standard of Service.** Evaluate the standard of service provided to the public using key measures, such as passenger waiting time, walking distance to bus stops, the need to interchange between routes and services, passenger journey times, and passenger travel expenditure and affordability. These should be measured against a range of values usually accepted as a reasonable level of service to the public (see Attachment). Any deficiencies identified should be examined in order to determine the causes.
Measures to Effect Improvements. The study should set out the steps that need to be taken in order to overcome significant deficiencies and weaknesses identified during the evaluation of the bus company.

Recommendations for improvements should cover the following areas, as appropriate:

- Organization size and structure: including responsibility and accountability of managers
- Personnel management: training, hire and fire procedures, pay and benefits, discipline and incentives
- Routes and services: quality, quantity, variety
- Passenger facilities: stops, terminals, interchange facilities
- Bus facilities: depots, parking, priority measures
- Choice and numbers of vehicles
- Procurement of vehicles, spares, and materials
- Maintenance procedures
- Fares, fare collection, and security
- Information and accounting systems; cost control, route costing
- Role of government: policy, regulation and control, facilities, and assistance [this item should be excluded if a separate study of government policy is to be undertaken]

Where recommendations involve additional resources, some indication of cost should be provided. However, detailed costing is not necessary since it would be covered in any subsequent feasibility or design study.
Schedule and Reporting

An interim report in ___ copies will be submitted within ___ weeks of instructions to proceed with the study. The interim report will outline the deficiencies identified by the evaluation of operational and financial performance and the standards of service and will provide a preliminary indication of possible measures to improve the bus company's viability and standards of service.

A draft final report will be submitted in ___ copies within ___ weeks of instructions to proceed with the study. The draft final report will present the findings of the study, recommendations to improve the bus company's viability and standards of service, and the data upon which the findings are based.

The draft final report will also contain an action plan for immediate steps to be taken and draft terms of reference for a subsequent feasibility study or design study that may be considered necessary for the implementation of any of the recommendations.

The final report in ___ copies will be submitted within ___ weeks of receiving the client's comments on the draft final report.
Staffing

It is envisaged that this study will require about ___ man-months of professional work. It will be the consultant's responsibility to mobilize a team that can do justice to the requirements of the study. Expertise should be provided on the following subjects:

- public transport planning
- bus operations and management
- bus maintenance and servicing
- financial analysis and costing

Government Responsibilities

The government undertakes to give the consultants access to all available data relevant to this study. This will include the following data sources:

- [here insert a description of the data sources, including reports, statistical series, etc.]

The government will also provide office space, secretarial and drafting help, transportation, and office equipment necessary to conduct the study quickly and efficiently. Moreover, it will assign ____________ to the study on a fulltime basis to provide liaison between the consultants and various government departments.
Other Sections [Include here standard clauses on:

- Method of payment
- Reference to a standard form of agreement
- Exclusion of agents of manufacturers of transit equipment from the study
- Procedures for immigration, work permits, housing, importation of equipment, tax liabilities, etc.
- Procedure for settlement of disputes.]
Attachment. Performance Evaluation and Standards of Service
(for explanations see Chapter 6)

(A) Operational Performance Indicators

1. Passenger Volumes

Average number of passengers per operating bus per day

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<tr>
<th>Type of Bus</th>
<th>Crush Capacity</th>
<th>Passengers per Bus per Day</th>
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<tr>
<td>Single-deck</td>
<td>80</td>
<td>1,000-1,200</td>
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<tr>
<td>Single-deck</td>
<td>100</td>
<td>1,200-1,500</td>
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<tr>
<td>Single- or double-deck</td>
<td>120</td>
<td>1,500-1,800</td>
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<tr>
<td>Articulated or double-deck</td>
<td>160</td>
<td>2,000-2,400</td>
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2. Fleet Utilization

Buses in service during the peak, as a percentage of the total fleet: 80-90

3. Distance Traveled by Buses

Average kilometers per bus per day: 210-260

4. Breakdowns in Service

As a percentage of buses in operation: 8-10

5. Fuel Consumption

Liters per 100 kilometers: Minibuses 20-25, Buses 25-50

6. Staff Ratios

Staff per operating bus:
- Total staff: 3-8
- Administrative: 0.3-0.4
- Maintenance staff: 0.5-1.5

7. Accident Rate

Accidents per 100,000 bus kilometers: 1.5-3
8. **Dead Mileage**

Percentage length of bus journeys not earning revenue: 0.6–1.0

9. **Cost of Bus Services**

Total cost (operating cost, depreciation and interest) per passenger-kilometer:
- Mixed traffic: USC2-5
- Segregated busways: 5–8

10. **Operating Ratio**

Total revenue divided by operating costs, including depreciation: 1.05:1–1.08:1

{(B) Quality of Service Indicators}

1. **Waiting Time**

   Passenger waiting time at bus stops
   - Average: 5–10 minutes
   - Maximum: 10–20 minutes

2. **Walking Distance to Bus Stops**

   - Dense urban areas: 300–500 m
   - Low-density urban areas: 500–1000 m

3. **Interchanges between Routes and Services**

   The number of times a passenger has to change buses or other modes on a journey to or from work:
   - Average: 0–1
   - Maximum: (less than 10% of commuters) 2

4. **Journey Times**

   Hours traveling each day to and from work:
   - Average: 1.0–1.5
   - Maximum: 2–3
   
   Journey speeds of buses:
   - Dense areas in mixed traffic: 10–12 kph
   - Bus-only lanes: 15–18 kph
   - Low-density areas: 25 kph

5. **Travel Expenditure**

   Household expenditure on travel as a percentage of household income: 10
ANNEX II

BUS SERVICES: GOVERNMENT POLICY AND ACTION STUDY

Draft Terms of Reference

[These terms of reference were written with a city government in mind, and it is assumed that the city government is responsible for the control and regulation of bus services and traffic and the upkeep of the road network. With minor modification, these terms of reference could cover national or state policies where applicable— that is, where "city" is mentioned replace with "and/or state and nation" as the case may be.]

Background

[Here, insert basic details of the city's current urban transport situation. Outline current government policies and functions regarding bus services and any serious problems being experienced. List any earlier studies that may be relevant to this study.]

Study Objectives

The main objective of this study is to assist with the formulation of government policies and actions that will lead to improvements in the viability, efficiency, and quality of bus services in order to meet the needs of the public.
Specifically, the objectives of the study are to:

- review the existing role of government in the provision and regulation of public and private bus services and assess its influence on the viability and standard of bus services;
- identify the role of unions or transport associations and assess their influence on service provision;
- identify the steps that should be taken by government in order to improve the viability and standard of bus services;
- present the findings and recommendations in a form that assists the government authorities to reach decisions on the measures that need to be taken. This should include a short-term action plan and terms of references for any subsequent feasibility or design studies that may be needed.

Scope

The study should cover government policy and actions regarding bus services provided by both the public and private sector, including paratransit and informal bus services.
Problems to Be Addressed

Existing bus services are suffering from [insert details of known difficulties and possible causes; for example, heavy losses, high costs, inadequate quantity and quality of services, lack of investment in bus services, etc. due to; for example, lack of competition and incentives, union activity, lack of foreign exchange, etc.] The final report must demonstrate how the recommended measures and action plan would address these problems.

Available Data Sources

Wherever possible, the study should be based on available statistics and past surveys of bus services and travel characteristics in the city. The gathering of new field data, if requested, is to be kept to a minimum.

Study Approach

The study should focus on government policy and actions and should cover the institutional arrangements for the regulation of bus services. Since the study requires only the identification of policy and actions by government to improve the viability and standard of bus services, detailed field work and surveys should not be necessary. The study should thus rely on readily available data, experience, and simplified evaluation methods.
In cases where there are a large number of bus and paratransit operations, the examination of policy impact should be selective, concentrating on a limited number of representative operators. In these circumstances, only a general view of the bus system as a whole is required.

Study Methodology

Existing Situation. The study team will gather all relevant data on bus services in the city in order to provide an overview of the existing situation. [A suggested list of basic data that would be useful to the study is set out in the Attachment].

Future Demand. The study should provide a broad indication of future demand for public transport services in the city over a five- and ten-year period. The study should take into account possible changes in motorization levels and the potential demand for bus services of different standards. The impact of these demands on fleet expansion, depots, and workshops should be assessed.

Financial Analysis. Evaluate funding requirements for public transport provision after five- and ten-year periods and identify likely fund sources.
Policy Issues and Actions. The study should focus on the major issues and consider the policies and actions that are likely to lead to an improvement in the supply of viable and efficient public transport services that can best meet the needs of the public.

In particular, the study will examine the opportunities and make recommendations for:

- improving or relaxing regulations regarding access to the market, fares, levels of service, and choice of vehicles;
- improving institutional arrangements for the planning, regulation, and monitoring of the public transport sector;
- greater involvement of the private sector in the provision of bus services;
- encouraging variety in the nature and quality of services at different fare levels to cater to passengers in different income groups;
- establishing cooperatives or route associations that are to the benefit of the public as well as the operators;
- strengthening regulations and enforcement to ensure adequate safety and environmental standards and proper traffic control measures;
- improving road maintenance and paving bus routes, hence reducing bus operating costs and improving access;
providing effective traffic management and control and priority for buses in the form of "bus only" lanes and exclusive rights-of-way;

- allocating suitable sites for bus depots, terminals, and interchange points and considering their commercial operation;
- establishing suitable banking services to enable operators to obtain loans and foreign exchange for the purchase of buses and spares.

Where recommendations involve significant resources, some indication of cost should be provided. However, detailed costing is not necessary since it would be carried out in any subsequent feasibility or design study.

**Schedule and Reporting**

An interim report in ____ copies will be submitted within weeks of instructions to proceed with the study. The interim report will outline the impact of current policy on bus services and provide a preliminary indication of the opportunities for government action to improve the viability and standards of bus services.

The draft final report will be submitted in ____ copies within ____ weeks of instructions to proceed with the study. The draft final report will present the findings of the study, recommendations for government policy to improve the viability and standards of bus services, and the data upon which the findings are based.
The draft final report will also contain an action plan for immediate steps to be taken and draft terms of reference for a subsequent feasibility study or design study that may be considered necessary for the implementation of any of the recommendations.

The final report in ___ copies will be submitted within ___ weeks of receiving the client's comments on the draft final report.

Staffing

It is envisaged that this study will require about ___ man-months of professional work. It will be the consultant's responsibility to mobilize a team that can do justice to the requirements of the study. Expertise should be provided on the following subjects:

- public transport planning
- bus operations, management, and policy
- traffic engineering

Government Responsibilities

The government undertakes to give the consultants access to all available data that are relevant to this study. This will include the following data sources:

- [insert a description of the data sources, including reports, statistical series, etc.]
The government will also provide office space, secretarial and drafting help, transportation, and office equipment necessary to conduct the study quickly and efficiently. Moreover, it will assign ___________ to the study on a fulltime basis to provide liaison between the consultants and various government departments.

Other Sections [Include here standard clauses on:

- Method of payment
- Reference to a standard form of agreement
- Exclusion of agents of manufacturers of transit equipment from the study
- Procedures for immigration, work permits, housing, importation of equipment, tax liabilities, etc.
- Procedure for settlement of disputes.]
Attachment. Public Transport Studies: Basic Data

City Data

(a) City population and area
(b) Vehicle fleet (private cars, motorcycles, buses, paratransit, trucks)
(c) Modal split of motorized trips
(d) Brief description of road network, length, proportion paved, level of traffic management and congestion, and road maintenance.

Public Transport Data

(City passenger transport only, excluding intercity passenger services and freight services)

(a) Brief description of operators; bus and paratransit. [rail details should be included where an urban rail system exists]
(b) Ownership details, and details of cooperatives and associations.
(c) Details of each main type of service, route lengths, fleet size, crush capacity of vehicles and total passengers per day.
(d) Performance and financial details of public operators and typical private operators:
- availability (outshedding of vehicles as a percentage of total fleet, excluding vehicles scrapped or cannibalized);
- average kilometers and passengers per vehicle per day;
- total passengers carried per day;
- total staff (indicate if certain tasks, maintenance for example, are not carried out by operator's staff);
- operating costs, revenues, subsidies, fare schedules;
- vehicle costs;
- capital costs in the case of rail services, if existing.

(e) Brief description of facilities for public transport: terminals, busways and shelters, depots, public transport priority measures, paving of bus routes, vehicle inspections, and drivers examination.
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<tr>
<th>City</th>
<th>1985 Population (Million)</th>
<th>Type of Vehicle</th>
<th>Capacity of Vehicle</th>
<th>Annual Cost of Vehicle</th>
<th>Ownership</th>
<th>Name or Type of Undertaking</th>
<th>Fleet Size</th>
<th>Fleet Utilization</th>
<th>Staff per Day</th>
<th>Km/day per Day</th>
<th>Passengers per Day</th>
<th>Total Pass. per Day (Million)</th>
<th>Fare for Pass. (Rs)</th>
<th>Cost per Pass. (Rs)</th>
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<td>SOTRA</td>
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<td>Minibuses</td>
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<td>560</td>
<td>0.23(20%)</td>
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<td>Regular buses</td>
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**Annex III. BUS SERVICES: DATA SUMMARY**
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<th>Capital Cost (000)</th>
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<th>Per Operating Vehicle</th>
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<th>Cost per Passenger (US$)</th>
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* F = Flat Rate; G = Graduated

Source: World Bank, various studies and field mission reports.
ANNEX IV

BRIEF CASE STUDIES OF BUS SERVICES

Jakarta, Indonesia

The Jakarta metropolitan region, with a population of about 15 million in 1986, is growing at an annual rate of 4.1 percent. The city sprawls over a large amount of territory, with no defined city center; business and housing development occurs along main roads, and small communities (kampungs) are squeezed in between. An estimated 40 percent of the road network is operating under unacceptably congested conditions.

Public transport is provided almost exclusively by bus and minibus operators, who together carried over 4.5 million passengers per day in 1985. The single publicly owned transport company, PPD, utilizes conventional single-decker and double-decker buses; the private sector operates a wide variety of vehicles, including single-deckers, minibuses, and microbuses. Only one private firm, Mayasari Bakti, is licensed to operate single-decker buses. The municipal agency responsible for transportation regulates licensing (which is very simple for operators of small buses), fares, frequencies, and routes, and is supposed to evaluate whether existing patterns satisfy demand. Lack of staff and funds has meant that, in practice, there is little regulation or coordination.

PPD owns 77 percent of the large buses in Jakarta; it employs over 16,500 people and carries between 1-1.3 million passengers daily. But neither productivity levels, profitability, nor the quality of its service is satisfactory. Only about 60 percent of its buses are in operation every day, in part because its fleet (especially the double-deckers) is overly sophisticated given the difficult operating conditions and lack of facilities and trained maintenance personnel. Long lines, overcrowding, and unreliable frequency all characterize the PPD bus routes.

High operating costs are a particularly serious problem for PPD. The fare system is based on a flat rate, which allows many passengers to travel up to 25 kilometers for less than $0.14, while others must purchase transfers for far shorter trips. Drivers and conductors turn over a predetermined portion of the total revenue collected to PPD and divide the rest among themselves. Although the system has some advantages (for example, it provides an incentive to maximize fare collection), they are outweighed by its disadvantages: drivers worsen congestion by stopping in unauthorized places to pick up passengers, layover times at terminals are lengthened as drivers wait for more passengers, and PPD loses a substantial amount of revenue because unions have successfully prevented the company from raising its share of income. In 1986, PPD was only able to cover 50 percent of its full costs and 76 percent of operating costs; it incurred losses of about $33 million.
As a result of its ongoing losses, PPD has not been able to keep up with the city's growing demand for public transport, and the private sector was serving about 60-65 percent of the market in 1986. The private companies charge the same fares as PPD but are able to make a profit. The sector consists of Mayasari Bakti, operating stage buses, two major minibus owners associations, and a microbus cooperative.

Mayasari Bakti operates at half the staffing ratio of PPD, its drivers collect a daily salary plus a bonus linked to revenue collection, and its fleet has an utilization rate of 76 percent. Cost and revenue figures are not available, but evidence suggests that the company is highly profitable. The major minibus association, PT Metro Mini, has an utilization rate of 80 percent and generally covers short feeder routes to the larger buses. It also provides supplemental transport on main routes during peak periods. Although the minibuses charge the same rate as PPD, successful owners generally achieve a 4-to-5 percent monthly return on their investment. The 2,000 microbuses operating in Jakarta service only feeder lines and secondary routes, and their flexibility and low fares make them popular with the public.

Overall, the private transport sector's costs per passenger/kilometer range between 50-65 percent of PPD's. For larger buses, the private sector's higher fleet utilization and lower staffing ratios have resulted in higher productivity, and its revenue collection system generally brings a higher proportion of the total fares back to the company, while providing incentives to collect more fares. The flat fare system, meanwhile, works well for micro- and minibuses, whose passengers travel for short distances, but has a negative impact on the profitability of the PPD, which services longer routes.

Ankara, Turkey

The capital of Turkey has a rapidly growing population (5 percent per annum), 68 percent of which uses public transport—chiefly buses and "jitneys," or privately owned minibuses. The use of private cars is growing very rapidly, in part due to deficiencies in the public transport system, and is aggravating already serious traffic conditions.

The publicly owned bus fleet, under the direction of EGO (a municipal agency that is also responsible for electricity and gas provision), carries about 35 percent of the city's bus riders and has an utilization rate of about 65 percent for its 900 buses, most of which are more than ten years old. The age of the fleet results in frequent breakdowns, which are a major factor in the relatively low utilization rate. As a result of this and other factors, EGO is experiencing growing deficits and has proven unable to meet growing demand.

This led to the introduction of private buses in 1982, when 30 owner-operated buses were allowed to begin operations. The number had grown to 200 by 1986; private buses carry an estimated 13 percent of the
bus riding population and operate on 26 routes. Private bus fleets have a fleet utilization rate of 95 percent. Jitneys, on the other hand, have long been popular in Ankara; some 1,900 such minibuses operate on 39 routes, carrying 37 percent of all mass transit riders.

Private buses and EGO buses charge the same fares, although EGO alone is allowed to offer student discount tickets and monthly passes. Jitneys, however, are permitted to charge slightly higher fares. This makes them less desirable for long trips, but their flexibility enables them to serve routes not covered by the larger buses. Most jitney operations are believed to be profitable, although firm data on costs and operations is not available.

A comparison of EGO and private bus operations indicates that the private companies serve more passengers per operating bus and can seat more passengers at normal and peak hours. But their operating costs per passenger and per passenger/kilometer were less than half of EGO's.

All bus and minibus services are regulated by the Urban Transport Coordination Committee, which establishes fares, routes, frequency, licensing requirements, and sets other regulations.

The public company has charged that private operators engage in numerous unfair practices: they routinely charge less than the mandated fare; they wait at bus stops until the bus is full, worsening congestion; they only operate during peak hours on the most profitable routes; and they frequently do not issue tickets, in order to avoid the 10 percent tax levied by the municipal government. These charges are only partly valid, and more stringent enforcement of regulations could go a long way toward correcting the situation. However, the private buses are to some extent forced into these practices by the advantage provided to EGO through the issuing of student discounts and monthly passes.

Since the underlying need in Ankara is to provide more and better public transport, it might be wise to consider permitting private operators the same advantages held by EGO, or better still, permitting them to charge lower fares, since their high profitability margin would still permit them to operate at a profit.

Cairo, Egypt

The largest city in Africa and the Middle East, Cairo's 1986 population of 10.6 million is expected to grow to 16 million by the year 2000. The demand for public transport is growing as rapidly as the city, but while the number of cars, taxis, and commercial vehicles has kept pace with the rapid population growth, the number of public buses has grown only marginally.

Subsidized petroleum prices that encourage inefficient use of private cars, the absence of effective traffic management and parking
regulations, and poorly maintained roads have contributed toward a severe and continuous congestion of Cairo's road network, especially in the Greater Cairo region.

Cairo's transport system is characterized by a wide variety of vehicles operated by both the public and private sectors. The share of the urban travel market served by formal public transport has declined dramatically, falling from 73 percent in 1972 to about 41 percent in 1983. Aware of the growth in popularity of private transport sources, the Cairo Transport Authority (CTA) introduced a new minibus service in 1986, consisting of 500 20-seater minibuses, designed to provide high quality, comfortable service at premium prices (from three-to-six times normal CTA fares). The authority expects to sharply increase its profitability with the new buses, which operate as a separate unit with their own depot and workshop.

Other transport services are provided by school buses, government staff buses (buses provided by government agencies for their employees), taxis, and microbuses. Both the school buses and government staff buses operate inefficiently, since they remain idle during the bulk of the day and operate with a very low mean load factor. Each government agency maintains its own fleet of staff buses with no interagency coordination, creating considerable waste.

The role of taxis and "shared" taxis (mostly microbuses seating about 10 persons) in Cairo's urban transport sector has grown sharply during the past decade. These vehicles fulfill many functions, including intercity trips, limousine service, regular city trips, long distance travel, and local service in suburban areas. The vast majority are unlicensed and unregulated, but are permitted to function because they help meet demand not being met by regular buses, especially at peak times. They offer quality service in terms of travel time, frequency, comfort, and convenience and usually operate terminal-to-terminal rather than by route, serving a relatively well-off commuter population at higher fares. There are many individual owners and few large private undertakings, with little concentration. Owners hire drivers, who usually receive a monthly salary, plus a commission based on fares collected. There is no conductor. Fares, although regulated in theory, vary considerably, but this seems to be accepted by the public. For short routes, fares are slightly higher than the equivalent CTA bus fares, but for long routes they are considerably higher.

Productivity levels for the "shared taxis," or microbuses, is well below potential. On average, only 3.4 hours per day are spent on route operations, which includes 1.4 hours of waiting time at terminals. The rest of the time microbus operators are involved in other types of services, such as individual taxis, chartered buses, goods transport, etc. Given the severe shortage of transport vehicles in the city, especially during the afternoon peak, much could be done to utilize these taxis more productively.
Nairobi, Kenya

Public transport in Nairobi is provided by a formal bus company operating under franchise, Kenya Bus Services (KBS), and by the operators of small buses and minibuses called matatus.

The bus-matatu competition is producing an efficient service at low fares, good productivity, and no cost to the municipality. However, the public transport supply is still falling short of demand, as evident by long bus queues, severe vehicle overloading at peak hours, and a high proportion of walking trips. About 36 percent of urban travelers ride KBS buses, 30 percent ride matatus, and another 34 percent drive private cars.

KBS (a private, foreign owned company in which the Nairobi City Council holds a 25 percent share) operates about 300 buses, carrying an average of 400,000 passengers daily. Its rate of vehicle utilization, 87.5 percent, is surprisingly high given that the average age of the fleet is seven years. In 1985, the company earned profits of approximately $250,000, despite a rather high staffing ratio of 8.2 employees per bus. However, KBS carries heavy debts and as a result has experienced difficulties in obtaining new funds to invest in fleet expansion and renovation. The company has not significantly expanded its services since 1973.

As the demand for public transport has grown, privately owned matatus with between 12 and 25 seats have stepped in to fill the gap. Some 1,500 such vehicles operate daily in Nairobi. They generally provide services complementary to those offered by KBS; they work feeder routes and secondary roads, while KBS concentrates on main corridors. In 1986, KBS dropped several of its unprofitable routes along secondary roads, leaving them to the matatus, and found that it experienced a 30 percent increase in ridership as a result, since more of its buses were available to passengers on major routes.

Matatus carry some 260,000 passengers daily in Nairobi, and their numbers have increased by 50 percent since 1983. At $0.10 for a 5 kilometer trip their fares are close to KBS fares, and owners usually net on a monthly basis about twice the average income in Nairobi. Like KBS, however, matatu owners face a difficult environment for obtaining credit to purchase new vehicles or replace those that are aging. The average matatu has a working life of only two or three years, due to severe overloading and working conditions.

The existence of matatus has been encouraged by the Nairobi City Council, which permits them to compete freely with KBS. Recently the Council has begun to impose some regulations on matatus, and it now requires them to be licensed. Although the imposition of few restrictions in the past has helped to meet growing demand for public transport, the city has recognized the need to impose regulations governing safety standards, driver training, enforcement of traffic regulations, and insurance coverage, in order to ensure passenger safety and to avoid undue congestion.
Montevideo, Uruguay

Bus service in the capital city of Uruguay, home of over 40 percent of the country's population, is provided entirely by private operators, under regulation by city authorities. The city's road network is in good repair, traffic conditions are generally excellent, and volume is light. The seven private operators provide high quality service, with good route coverage, reasonable fares, and relatively comfortable service.

Of the seven private companies providing public transport services, six are cooperatives of bus owners and one is a cooperative of trolley bus owners. The six bus companies all use standard buses; some 1,420 buses were plying 120 different routes in 1986, with an average fleet utilization of 1,345 buses per weekday. One particular bus company, Compania Uruguaya de Transportes Colectivas (CUTCSA), is by far the largest operator, owning two-thirds of the bus fleet.

The municipal office responsible for organizing and overseeing bus services in the city sets fares, establishes and allocates routes, approves schedules, and is responsible for traffic management and road construction and maintenance. Each bus is issued a permit, thereby allowing the authorities to control the fleet size of each company. Because of a trend toward reduced bus ridership, no new permits have been issued for several years.

The city authorities have created a bus operating cost index and use it to raise fares on a regular basis (about every four months). Fare hikes are usually small and are timed to coincide with general salary increases, in order to avoid social upheaval. The city sells preprinted tickets to the bus companies, which must present a statement of revenues to city authorities at the end of each month. This system also helps the city to decide on fare adjustments. The fare structure is graduated, with a flat fare equivalent to $0.20 for regular passengers and lower fares for students, the elderly, and workers; 8 percent of riders are in a special category that allows them to ride buses free of charge, but bus operators receive no subsidy for the reduced fares. Very few people pay more than 10 percent of their monthly income on transport.

Buses are rarely crowded, even during peak periods. Average commercial speed in the city center ranges between 15 and 20 kilometers per hour, without the use of bus lanes or other similar measures. The seven companies each operate different routes, with a comprehensive network that provides passengers with almost door-to-door service and little need to interchange. CUTCSA also operates luxury buses between the city center and a residential zone for twice the normal fare.

With the exception of CUTCSA, the bus companies are organized as cooperatives, in which there is no individual ownership of property and profits are shared equally among members. In CUTCSA, each bus
belongs to an owner, or group of owners, who are responsible for operating and maintaining that vehicle. CUTCSA organizes service operations and scheduling, operates the ticketing system, and collects revenues from operators at the end of each shift. It also operates a modern maintenance and repair facility, but each owner is free to make his own arrangements for maintenance.

CUTCSA allocates revenues to members on the basis of the number of hours of vehicle operation; bonuses are awarded or penalties applied by comparing the actual revenue collected with the average revenue per vehicle in the company. This system provides owners with a strong incentive to keep their vehicles in good working order, on the one hand, and to pick up passengers and report revenue accurately, on the other.

The average percentage of vehicles on the road daily for the CUTCSA fleet is 98.5 percent. Although most buses in the fleet were put into service 20-to-30 years ago, they are in excellent condition. The company puts 5 percent of revenues into a revolving fund for new bus purchases and major overhauls. Members have a choice of new buses, which are sold to them by CUTCSA at reasonable prices. The staffing ratio is six employees per operating bus.

After operating costs and the 2.9 percent municipal tax were paid, Montevideo's bus companies profit averaged about 5 percent of revenue in 1986. Profitability varies substantially among the seven companies, and even among owners within CUTCSA, which generally enjoyed the highest performance levels. Among the factors contributing to this unusually well organized and efficient system are motivation of the private operators, the attention paid to maintenance, and the coherent institutional setting in which there is a clear relationship between the responsibilities of the municipality and of the enterprises.

Bangkok, Thailand

Bangkok is a booming metropolis that houses nearly six million people; the population is growing at an average annual rate of 3.8 percent. The most prominent feature of the city's transport sector is congestion, which clogs most of the city for most of the day. Although the city is reasonably well served by major radial highways, it lacks suitable secondary roads and access roads, precluding efficient use of the road system as a whole. The shortage of these roads forces local traffic to use the main roads and results in long needless detours, making journey speeds slow and vehicle operating costs high.

Over two-thirds of motorized passenger trips in Bangkok are made by bus or minibus. The major supplier by far is the Bangkok Mass Transit Authority (BMTA), which has a fleet of 4,960 large single-decker buses; one of the world's largest. BMTA is the result of an effort begun in 1973 to consolidate bus services, which then consisted of 24 private and two state-run bus companies. There are some 5,000 minibuses
working in Bangkok, 60 percent of which operate on side roads, while the rest compete directly with BMTA. Many illegal minibuses, believed to number between 5,000-10,000, are in operation. Taxis number about 13,000 and are unmetered. There are more than 8,000 "samlors" or "tuk-tuks" (small three-wheeler passenger vehicles), which are very popular and permitted to operate anywhere, and 4,000 "silors" (small four-wheelers) which operate only on side streets.

With the creation of BMTA, the government hoped to rationalize routes, schedules, and fares; develop modern management practices; provide better service; and reduce congestion through the use of bus lanes. Some improvements have clearly been made, but BMTA is in serious financial difficulties, having lost the equivalent of $58.4 million in 1984 and $43.5 million in 1985. The losses have eroded the company's capital base, and without funds to renew the fleet, buses are aging and deteriorating. No new buses have been bought in the last five years. In 1985, 81 percent of the total fleet operated daily, making an average of 4.51 million passenger trips and carrying about 1,250 passengers per bus.

A key problem facing BMTA is its inability, for political reasons, to raise fares. Previous efforts have sparked such unrest that fare hikes were rescinded, despite the fact that fares in Bangkok are among the world's lowest ($0.07 flat fare charged by BMTA and minibuses). It has been estimated that BMTA would have to add 25 percent to current fares in order to break even. The current imbalance between revenues and operating costs drains the company's resources to the point that BMTA cannot save the minimum required to renew its rolling stock.

Also hindering the company's financial performance is its size. Rather than achieving economies of scale, costs have risen substantially due to the difficulties of managing such a large and complex organization with excessive wage bills, absenteeism, and labor policy constraints.

One solution that is showing some promise is the recent decision by BMTA to make increasing use of private contractors. Some 550 buses are operated either under "joint ventures" or are fully owned and operated by the private sector under BMTA control. BMTA received an average of $23,000 per bus from private operators in 1985. The number of private minibuses licensed to operate in Bangkok has also been increased. Although reliable information on profitability is not available, these private operators clearly earn a profit, despite the fact that they are required to keep to the same low BMTA fare structure. Increased private sector operations could help fill the gap that is bound to occur as BMTA itself becomes increasingly unable to meet growing demand.
Santiago, Chile

Santiago, with a population of about 4.3 million growing at an annual rate of about 2.7 percent, is unusual in that it has a more than adequate supply of public transport. In large measure, this is due to the total deregulation of the sector put into effect by the government between 1978 and 1982.

About 85 percent of Santiago’s population uses public transport. The city offers several modes: a metro system serving about 10 percent of urban passengers daily; 5,600 large "microbuses" (seating capacity 35; crush capacity 80-to-100) that carry about 42 percent of urban passengers; 2,700 "taxibuses" (seating capacity 20; crush capacity 35-to-50) that carry about 23 percent of urban passengers; and over 24,000 regular and shared taxis, serving about 10 percent of public transport users. Only the metro system is state owned and operated. A state owned bus system operating 1,500 vehicles was dissolved in 1980.

Microbuses and taxibuses are one-man operated; most buses are individually owned. Owners are organized into associations that organize routes, oversee terminals, administer a revolving fund for major repairs, and deal with legal and insurance problems. In the absence of other regulatory agencies, these associations have come to exercise a high degree of monopolistic control over bus operations. Average fleet age is on the rise, utilization ratios range between 70 and 80 percent, and each vehicle carries only about 500 passengers per day. Despite claims to the contrary, most operators are believed to earn a good profit.

Until 1978, the public transport system in Santiago was subject to stringent regulation. It was also inefficient; buses were extremely overcrowded and network coverage was poor. Beginning that year gradual steps toward deregulation were taken until now the city has one of the least government regulated bus systems in the world. For passengers, this has meant improved network coverage and an end to overcrowding. Operators have almost complete freedom in the choice of routes and, as a result, many new routes have been added providing services to new urban developments on the city’s periphery. However, restrictions on additional buses apply to the congested inner city area.

Fares (except for reduced student rates and free passage for children and policemen) are set at the discretion of the operator, as are frequencies and vehicle types. Taxi and shared-taxi operators are also free to set their own fares.

The perception that high profits were to be made brought numerous new operators on the scene. The number of new microbuses entering the system during the past eight years increased by almost 50 percent; the number of taxibuses grew by 75 percent. At the same time, microbus fares rose by 150 percent and taxibus fares by 90 percent, in real terms. Shared taxis, on the other hand, have maintained fares at
the same levels. The shared-taxi market is very competitive, leading operators to seek ways to reduce costs and keep fares down.

The rise in bus fares is not simply due to increased operating costs, but also results from the ability of route associations to apply pressure on individual operators to keep fares high. This undesirable feature of bus services in Santiago is in sharp contrast with the benefits of competition among shared taxis.

The response of the poorest segment of the population to bus fare hikes has been greater use of bicycles or walking; it has been calculated that many low-income households spend 17 percent of earnings on transport.

Other negative impacts of the policies in effect have been an increase in congestion and air pollution. Although deregulation has clearly increased the quantity of service offered, some regulation appears to be required to reduce congestion and improve bus safety and emission standards system. Also there is a need to make buses more competitive in setting fares.

India

Calcutta. The Calcutta Metropolitan District, with a population of 11 million, is the largest urban center in India. Traffic conditions are among the most challenging in the world. Average speeds on major thoroughfares are 10-to-12 kilometers per hour, held down by the presence of not only cars, buses, and trucks, but hand-pulled rickshaws, goat herds, and pedestrians unable to make their way along overcrowded sidewalks.

Buses and minibuses carry about 80 percent of total passengers within the metropolitan district; railways, trams, and metro share the remaining 20 percent. There is a serious deficit of public transport, due in part to the ongoing deterioration of services provided by the state-owned bus and tram companies.

The Calcutta State Transport Corporation (CSTC) was established in 1960 to function as a commercial undertaking in the public sector. After several years of relatively successful operations, in 1963 the CSTC began experiencing a decline in financial and operational performance and quality of service. By 1984 the corporation was running a $12 million deficit, requiring ever-greater subsidies to support ever-declining services. A World Bank project involving the purchase of new buses, the upgrading and construction of workshops and depots, and fare increases failed to turn the situation around. CSTC currently operates 1,100 buses, 700 of which are on the road each day (560 buses are used in urban routes and the remaining 140 buses are used in long distance trips). Of these 700 buses, about 200 break down during the course of each day.
Analysts today attribute much of CSTC's trouble to organizational and management problems and low morale throughout the corporation. Labor management problems are rife, as is absenteeism; decisionmaking is overly concentrated; and many key staff appointed lack relevant experience.

About 2,200 regular private buses (1,900 of which are on the road everyday) ply routes throughout the city. They utilize Indian made 34-38 seat vehicles, each usually loaded with 80-to-100 passengers, and carry in total about 3.3 million passengers daily. Some 850 minibuses (out of a total 950), seating 20-30 passengers, operate daily on 72 routes and carry about 800,000 passengers.

Owners and drivers of both types of vehicles are organized into associations; owner-operators are virtually nonexistent. Drivers receive a fixed wage plus a commission based on revenues above a certain threshold, providing an incentive to combat fare evasion and maximize revenues. Minibus fares are generally twice as high as CSTC fares, and minibus owners enjoy a yearly return on investment of about 30-to-36 percent. Precise figures are not available for private buses, but although their total operating costs per passenger kilometer are about half those of CSTC, their profits are lower than those of the minibuses because they charge the same fares as CSTC.

As CSTC service declined and the quantity of privately owned transport increased, the number of vehicles active in the public transport sector has increased. Minibuses were originally conceived to provide comfortable, reliable transport for a higher fare. Growing demand, however, has meant that the minibuses are more and more crowded and now provide service that is essentially identical to other mass transit modes. Chartered buses, of which there are about 550 in operation, now provide the higher quality service once offered by minibuses.

Tamil Nadu State. Two cities in the Indian State of Tamil Nadu have developed profitable and efficient bus companies that offer good quality service at low cost. Both the Pallavan Transport Corporation (PTC), in Madras, and the Cheran Transport Corporation (CTC), in Coimbatore, are incorporated as Public Limited Corporations by the Tamil Nadu State government. In both cases, the government acts to regulate some aspects of bus operations, but leaves most decisions to company managers. The success of these two companies is an indication that public corporations, if managed by competent professionals and operated along commercial lines, can be financially self supporting.

Madras. Pallavan Transport Corporation (PTC) is the only bus company offering service to the nearly 5.5 million inhabitants of Madras. About 46 percent of the population rides buses; the next largest group (28 percent) walks. Traffic flows with relative ease, the road network is good and well connected, but traffic efficiency is inhibited by reckless driving, indiscriminate parking and stopping of vehicles, and overflowing sidewalks.
Although the State government sets fares, other business and operating decisions are made by PTC management. The company runs a fleet of 2,102 large, single-decker buses, with an overall fleet utilization rate of 87 percent, carrying over 3 million passengers daily.

PTC provides efficient service to its riders, with short waiting periods at bus stops. Over 90 percent of riders have less than a ten-minute walk from bus to home or work and over 80 percent can avoid having to transfer. Bus speeds average 16-18 kilometers per hour, and most trips are completed on time. Overcrowding during peak hours is the only major problem facing riders of PTC buses.

Despite low fares (fares are graduated according to distance, beginning at $0.03 for the first two kilometers) and student passes costing less than half the normal fare, PTC broke even in 1986. The total operating cost per passenger kilometer was remarkably low at $0.008, including depreciation and interest.

One important key to PTC's financial success is its attention to maintenance at every level. Routine maintenance and cleaning is undertaken regularly in each depot. All vehicles are taken out of service for one or two days every six months to undergo preventive maintenance. During this time, major components are sent to a reconditioning unit. Engines are fully reconditioned about every two years. The company also maintains workshops specializing in body building and repair and recycling of transmission parts. In addition, an oil reclamation plant recycles 60 percent of the oil used by PTC buses, saving the company about $60,000 annually.

Depots also serve as "cost centers," where performance is checked on a daily basis. Each month the 17 depots are ranked according to operating performance, and financial bonuses are distributed accordingly.

PTC management is considering the introduction of further cost recovery measures, such as route rationalization and bus/crew rescheduling studies; devising a bus operating cost index in order to justify future fare increases; and the development of an improved financial forecasting model that would compare the company's operating and financial performance against productivity targets, in order to ensure that bus operations are efficient.

Coimbatore. The Cheran Transport Corporation was created in 1972 when the state government nationalized all private transport enterprises with more than 100 vehicles. CTC was mandated by the state to provide cheap and efficient bus service while maintaining financial viability. The new company's directors maintained the corporate structure and practice already in place and have concentrated on improving efficiency and development. As a result, CTC has been able to generate a substantial operating surplus while providing good service to its passengers.
Beginning with 300 buses in 1972, the company now operates 1,086 stage buses that each carry about 1,100 passengers daily. CTC operates in competition with 520 private buses that carry about one-third of the city's riders. CTC's fleet utilization ratio averages 95 percent. The company employs 7.3 staff members per operating bus, who receive a salary and a small percentage of daily receipts. Both CTC and private buses charge $0.024 for the first two kilometers, and fares rise with distance. Fares are set by the state government, which otherwise has little involvement with the company. CTC, for example, can borrow from any source, and the board of directors is free to appoint managers based exclusively on professional criteria.

CTC is organized into several branches, or depots, according to a highly decentralized pattern in which branch managers have total responsibility for operations, maintenance, and finance. Areas of responsibility within each branch are clearly defined, and staff performance is monitored closely. The salary structure reflects seniority and performance; bonuses are awarded on the basis of achievement. Because wages are relatively high and beyond the company's control, CTC is gradually reducing staff through attrition in hopes of eventually reducing the staffing ratio to 6.5 employees per operating bus. To this end, the accounting system was recently computerized, eliminating new hiring of clerical personnel, and management is considering a gradual switch to one-man bus operation.

Other variable costs are being reduced in innovative ways. CTC introduced a unique tire retreading process and manufactures its own rubber. It also began in 1983 a body building operation, with a target of 750 bodies for the 1986-87 fiscal year. More than half of the bodies manufactured are sold to other bus companies, generating substantial revenue.

As a result of these practices, CTC earned a net profit of $750,000 during its 1984-85 fiscal year. The operating ratio of total revenue over costs, excluding interest, was 1.05. After distributing 25 percent of the surplus among employees and paying state surtaxes of 16 percent, the company transferred the remainder to a general reserve fund to be reinvested during the following year in fleet expansion.

Khartoum, The Sudan

The Greater Khartoum area of The Sudan is characterized by a rapidly growing population (6.7 percent annually), difficult road and traffic conditions, and a severe shortage of public transport. The situation of public buses, which carry only 2.8 percent of the city's passengers, is particularly serious. Public transport suffers from inefficient organization and the country's general lack of foreign currency to purchase new vehicles and spare parts, as well as from a scarcity of skilled professionals.
The two public bus companies are both currently being run by the Defense Ministry, although they are operated separately to enable the ministry to evaluate each company's performance. The ministry intends to merge the operations eventually. At present, however, despite the shortage of public transport, one of the units is highly overmanned, while the other has to keep some of its buses out of service for lack of drivers, creating an obvious waste of resources.

One of the two units, known as the "Mercedes Unit," began operating in 1974 as a public transport company owned and operated by the Khartoum Province authorities under the supervision of the Ministry of Transport. The company sustained continuous losses, until in 1985 it was taken over by the Ministry of Defense. Only 60 of its original fleet of 450 buses are still operational and, of those, only 40 function on a daily basis. Of 40 new buses bought in 1982, only eight work daily. Difficult operating conditions, combined with the lack of spare parts, have plagued the unit's operations. Moreover, political and union pressures have kept the staffing ratio at the extremely high level of 15-to-20 per operating bus. Fares do not cover operating costs, and the unit lost $400,000 in 1985.

The other public bus company, known as the "Pegaso Unit," was created by the Ministry of Defense in 1982. Its 141 buses are in good working order, with an utilization rate of 78 percent. However, most of the buses are used to transport soldiers and students, and are only available for other passengers during morning off-peak hours. Thus Pegaso buses carry only 0.4 percent of the city's passengers. Although it charges the same fares as the other unit for regular passenger trips, the Pegaso unit's average operating cost per passenger/kilometer is half that of the Mercedes Unit.

A larger percentage of the population (27 percent) rides Ahlia buses, which are privately owned converted trucks or secondhand buses that can carry between 45-70 passengers. About 700 such buses are engaged in urban public transport services, with an availability rate of 80 percent. Provincial authorities determine routes, fix fares, and supervise performance, but otherwise exercise little control over Ahlia bus activities in order to encourage market entrance, given the scarcity of public transport. Both fares and operating costs are lower than those of the publicly owned buses, and it is estimated that each vehicle makes an annual profit of at least $2,500. Privately owned minibuses and converted pickups, known as bakassis, together serve about 25 percent of those seeking public transport. The government is also encouraging expanded minibus service, although the use of bakassis, which are chronically overloaded, poorly maintained, and have a high accident rate, is being discouraged.
Buenos Aires, Argentina

The Buenos Aires public transport system operates in a relatively favorable environment; demand is growing slowly, roads are well maintained, and traffic conditions are comparatively good. The bus system is run by experienced operators who have devised over several decades an efficient organizational structure that permits buses to operate at a profit while providing good service to passengers.

The city's fleet of 15,000 privately owned buses, known as "colectivos," account for 83 percent of public transport trips. Metro and suburban rail systems and taxis share the remainder. No publicly owned buses have been in operation since 1955, when an unprofitable publicly owned system was dissolved. Most buses are locally manufactured 21-seaters with a total capacity of 60 passengers. Average fleet age in 1985 was 5.5 years; about 90 percent of the buses operate daily on weekdays, each carrying between 850 to 1,100 passengers per day -- a very high number given the small size of the buses. The staffing ratio ranges between 2.1 and 3.6, depending on the bus company; all buses are one man operated.

The fleet is organized into 300 "companies" that represent individuals or small groups of owners called "partners." The partners are entirely responsible for operating and maintaining their vehicles, while the company assumes responsibility for scheduling bus services and represents its members in discussion with government agencies. In recent years, innovative cost-cutting techniques were adopted as inflation began rising faster than fares. Some companies own maintenance plants and many manage revolving funds whereby a certain percentage of revenues is put aside for fleet renewal; the company buys the buses and sells them to the partners on credit. Some of the companies have reduced costs by computerizing their management information systems.

In most cases, the owner keeps the fares collected but the company ensures equitable earnings by interchanging routes and schedules on a weekly basis. The system is one in which operating cost risks are borne by the owner, while revenue risks are shared between the owner and the company. On average, operating costs per passenger/kilometer are between $0.20-$0.25; profitability varies among the companies, although this is not usually the case among partners from the same company.

Service levels are good, and most passengers get virtual door-to-door service. Riders in high-income neighborhoods are prepared to pay up to four times the normal fare for luxury bus service. The standard buses are not particularly comfortable, however, and safety has been an ongoing problem, in part due to the one man operation of the buses. The colectivos do not cause congestion on main routes, and they maintain an average speed of 15-20 kilometers per hour in the city.
The companies are regulated by a variety of government authorities, which creates considerable red tape. Fares, for example, are set by the federal government for routes inside the federal district; other routes are governed by provincial or municipal authorities. The lack of coordination has meant slow response to requests for change in routes, frequency, fares, etc. Moreover, fares, which average $0.14 for most trips, have fallen behind inflation levels over the past decade, leading to a general tendency toward decapitalization that could seriously affect the system if it continues. The creation of a single transport authority for Buenos Aires, while retaining the present system of private operation, could help alleviate many of these problems.
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