7

SMALL SCALE URBAN PUBLIC TRANSPORT: LESSONS FROM THE INDONESIAN EXPERIENCE?

H.W. DICK
LECTURER
DEPARTMENT OF ECONOMICS
UNIVERSITY OF NEWCASTLE

ABSTRACT:

Small scale motorised vehicles carrying seven to eleven passengers constitute the backbone of public transport in most larger Indonesian cities. This paper describes the technology of the bemo, the organisation under which it operates, and its role in the public transport systems of East Javanese cities of Malang and Surabaya. The impact of the recent introduction of city buses to Surabaya is discussed. In the light of Indonesian experience, suggestions are made for some simple innovations in Australian public transport systems, in particular for the introduction of unscheduled shared taxis on semi-fixed routes.

SMALL SCALE PUBLIC TRANSPORT

INTRODUCTION

Urban public transport in Indonesian cities can be divided fairly neatly into the categories of 'modern', 'traditional' and 'intermediate' technology. The 'modern' category includes buses and taxis; until very recently these were significant only in Jakarta but since mid-1975 city buses have been introduced successively to Surabaya (East Java), Medan (North Sumatra), Semarang (Central Java) and Tanjung Karang (Lampung) and were planned to be introduced to Bandung (West Java) by mid-1978. The 'traditional' category embraces the ubiquitous two-passenger *becak* (pedicab) and the somewhat larger pony cart. The *becak* is the newer technology, having been adapted from the three-wheeled goods bicycle during the Japanese occupation on the withdrawal of all motorised public transport; in the postwar years it displaced the pony cart as the most common form of public transport in all but the more hilly towns and it continues to be the mainstay of the public transport system in many smaller towns. In larger cities other than Jakarta the prime form of public transport, however, has been the less well-known 'intermediate' technology of the *bemo* (becak motor), basically a small three or four wheeled open-tray goods vehicle enclosed to carry between seven and eleven passengers. These provide frequent but unscheduled services on fixed main routes, usually for a single fare which is invariant with distance.

The role for vehicles of intermediate size and technology is now being narrowed because of the policy of the Directorate-General of Land Communications to modernise the public transport systems of the larger Indonesian cities with buses and taxis replacing *bemo* and *becak*. Modernisation means, in effect, reorganising public transport in Indonesia along the lines of public transport in western cities. It can be argued, however, that such a policy overlooks both the advantages of intermediate and even traditional modes of public transport in Indonesia and the weaknesses of modern public transport systems in western countries.

Little research has yet been carried out on intermediate forms of public transport in the Third World. Kudlick (1969) and Grava (1972) were pioneering studies of the jitney taxis of Caracas and the jeepneys (World War II jeeps converted to shared taxis) of Manila respectively. Jacobs & Fouracre (1976) was a short survey article which noted briefly that countries in the western world might have something to learn from the public transport systems of Third World countries:

> The flexibility that some cities in the Third World have demonstrated in devising intermediate forms of public transport to meet demand provides an example that the industrialised countries could well follow. For example, the system is frequently composed of individually-controlled vehicles carrying more people than a taxi but less than a bus, thus achieving flexibility in routeing and scheduling without sacrificing entirely the efficiencies of large-scale operations.

More recently, Fouracre & Maunder (1977) have identified the role of intermediate vehicles (which they call shared taxis but which resemble the jeepneys of Manila and *bemo* of Indonesia) in the public transport system of Chieng Mai, the second largest city in Thailand.

This paper is a preliminary account of the findings of recent research carried out in two Indonesian cities into the role and mode of operation of *bemo* as an intermediate form of public transport[1]: in Malang (the second largest city in East Java) *bemo* still constitute the backbone of the public transport system while in Surabaya (the provincial capital and second largest city in Indonesia) their role has been changed by the recent introduction of city buses. The first three sections of the paper describe the technology, organisation and role of the *bemo* while the last section considers the implications for improvements in Australian public transport systems.

TECHNOLOGY

Although the first vehicles to be known as *bemo* did not appear in Indonesia until 1961, as early as the prewar years there had been some experience with vehicles of a similar type. In the 1930s several hundred motor cycle engines were imported and fitted to locally constructed wooden bodies to yield the prototype of the contemporary *bemo*, namely a three-wheeled vehicle with a small engine, carrying one passenger alongside the driver and six to eight on parallel benches behind, with entrance

---

1 The research was carried out over 2½ months from the end of December 1977 to the beginning of March 1978 under the sponsorship of LIPI, the Indonesian Institute of Sciences, and with financial support from the Australian Research Grants Committee.

from the rear. Most of these vehicles, known variously as *bemo*, *atak*, *masco* and *masca*, disappeared early in the Japanese occupation when the military commandeered the engines and discarded the bodies. The few score which managed to survive were brought together in Malang during the 1950s and pioneered the two main present-day *bemo* routes. A handful remain in service today but have been relegated to the carriage of goods.

The next development was the Jakarta *opelet*, initially an Opel sedan cut down and rebuilt with a wooden body, like the 1930s vehicles but with four wheels. Morris and Austin were among other makes of small car later taken in hand in large numbers for such conversion. These *opelet* plied fixed routes in Jakarta but were never significant elsewhere, although larger American sedans, similarly modified and known as *superban* (= suburban) or sometimes *opelet*, were quite widely used on routes linking cities with outlying towns.

The *bemo* was an adaption of the Daihatsu three-wheeled, open-tray mini-truck, imported in large numbers in 1961, 1968 and 1971. The only modifications required to equip the standard vehicle for passengers were to enclose the open tray with a sheet metal roof and canvas sides (with transparent plastic windows) on a light steel frame, to install two narrow, slightly padded benches, to provide a rolled-up canvas flap behind for lowering in the case of rain and to wire up a bell as a signal to the driver. In later *bemo* the canvas sides were replaced by sheet metal and the roof was given an overhang of some inches as further protection against the rain. Over the last two or three years a number of older (1961) Malang *bemo* have had their bodies almost entirely rebuilt to make them as long as the newer (1968, 1971) *bemo* and able to carry eight passengers behind at a squeeze. They have also been given a more modern appearance with painting in bright colours, more chromework and the fitting of small windows on either side of the rear entrance. While these reconditioned *bemo* look new, in fact the newest were built in 1971; thereafter no further such vehicles were imported, although the standard vehicle continued to be produced in Japan until 1974.

From the viewpoint of owners and drivers, the prime advantage of *bemo* and the reason why their prices have held up so much better than newer types of vehicle is the simple one-cylinder, two-stroke engine. This can be repaired by any owner or driver with basic mechanical skills without resorting to a qualified mechanic or a workshop at additional expense. As long as spareparts continue to be available and worn parts are replaced as

necessary, there seems to be no obvious limit to the life of these simple engines. Many *bemo* are not, however, well maintained and from this results the noise and smoke which are the two main environmental drawbacks of cities with large numbers of *bemo*.

After 1968 somewhat larger four-wheeled vehicles known officially as pick-ups but colloquially as *bemo* made their appearance in large numbers in Surabaya and Semarang. A two-cylinder two-stroke vehicle was made by Daihatsu, as the next model above the three-wheeled pickup, while a four-stroke version was made by Honda. Although these four-wheeled *bemo* could carry four more passengers than the three-wheeled ones, the higher revenue was largely offset by higher operating costs of employing qualified mechanics for maintenance and repair of their engines. Consequently, at the beginning of 1978 in Surabaya, the secondhand price of a three-wheeled *bemo* was about the same as that of a four-wheeled two-stroke Daihatsu in equivalent condition and almost twice as great as that of a four-stroke Honda.

ORGANISATION

The organisation of *bemo* is best classified as 'unincorporated'. *Bemo* are owned almost entirely by individuals; in Surabaya the four-wheel *bemo* are recorded as belonging to truck companies (*perusahaan truk*) but these are not legally registered firms. Most of the numerous owners have three *bemo* or less and are better described as 'household' rather than 'commercial' investors. The majority of owners comprise civil servants (including teachers and university staff), armed forces personnel (including police), and pensioners from both civil and military service, all of whom find that their monthly salary or pension is insufficient to maintain their desired level of consumption and, often most importantly, to provide their children with a proper education. In addition there are businessmen who buy *bemo* to keep their wives occupied and 'teach them the value of money', Chinese who have not yet taken up Indonesian citizenship and are thereby forbidden to engage in commerce or industry, and farmers whose land on the outskirts of the city has been acquired for residential construction and who buy *bemo* with part of the proceeds as an alternative source of income.

There are several reasons why *bemo* are such an attractive 'household' investment:

1. The capital of between $3000A and $4500A to put a secondhand *bemo* on the road is within the means of many middle class Indonesians through inheritance, the sale of assets, and accumulation from supplementary income-earning activities.

2. Little risk attaches to the capital so invested; accidents occur but the speed at which *bemo* travel is such that damage is usually minor and repairs inexpensive.

3. The investment yields a daily cash rental of between $3 and $5A which, even allowing for operating expenses, is sufficient to cover day-to-day household shopping, leaving the monthly salary or pension to be used for irregular outlays and more expensive items.

4. There is no marketing problem: *bemo* routes are laid down by the government and all holders of a route licence compete on equal terms.

5. When a *bemo* is rented to a driver, little day-to-day management is involved beyond issuing the keys in the morning and collecting the rental and checking the condition of the *bemo* at night.

Once these advantages were appreciated, competition among 'household' investors forced up the secondhand price, thereby depressing the rate of return. Whereas originally the investment in a *bemo* rented out to a driver could be recovered within two years, now it takes at best almost four years. Commercial investors who had bought *bemo* when they were still a new venture took the opportunity to sell out at a capital gain and invest the proceeds more profitably elsewhere. The now remaining commercial owners are for the most part those engaged in buying up and rehabilitating old *bemo* for resale but who may operate a few *bemo* incidentally while awaiting sale.

Only about a quarter of the *bemo* in Malang and Surabaya are in the hands of owner-drivers. The usual practice is for the operation to be entrusted to permanent drivers, whose income is the balance of the revenue after the purchase of petrol and oil and after payment of a fixed daily rental to the owner - who in turn pays all maintenance costs and taxes. The advantages of this system to the owner are that it minimises the problems of control over revenue and shifts the burden of fluctuations onto the driver. The disadvantage is that while maintenance outlays depend upon the care with which the driver looks after the *bemo*, there is an incentive for the driver to force the vehicle as hard as possible in order to maximise his own income. Choice of the driver is there-

fore the crucial management decision. As vacancies are never advertised other than by word of mouth, this is in the first instance a matter of recommendation from other owners and drivers, which needs to be supplemented by driving and mechanical tests. In practice, many owners without much driving or mechanical experience themselves leave it to other drivers to find someone and then employ the person on face value. Since the drivers are concerned to gain employment for their own relatives and friends, this approach is not always in the best interests of the owner. The laxity of some owners in this regard underlines the fact that they are not commercially minded.

ROLE OF THE *BEMO*

Introduction

Although in Malang *bemo* are the only important means of public transport other than *becak* while in Surabaya there are also buses, the basic role of the *bemo* in providing unscheduled but frequent services on fixed routes is the same in both cities. The standard fare, set by the government at Rp35 (approximately 7 Australian cents) in Malang and Rp30 (approximately 6 Australian cents) in Surabaya, is invariant with distance except on very long routes. No stops are laid down. Passengers hail a *bemo* from the footpath and indicate to the driver by bell when they wish to be set down. No standing passengers are carried. If a *bemo* is full, the driver usually indicates to the person hailing by holding up one hand with outstretched fingers. In the middle of a route in peak periods there can often be a substantial wait before a *bemo* passes with a vacant seat.

The precise frequency of service depends both on the route and the time of day. During the morning peak from about 6.30 a.m. (when children begin to go to school) until about 8.30 a.m. (when most office workers have arrived), *bemo* are almost continuously on the road: they stand at the terminals only long enough to set down one load of passengers and take on another - if there is a crowd waiting, people push and shove in a most undignified way to be the first to scramble aboard. Once the rush has passed, *bemo* start to queue at the terminals; on each rank an officer of the Bemo Owners and Drivers Association determines, on a 'first-in-first-out' basis, the order in which *bemo* may load. If drivers do not wish to wait in the queue for a full load, they may leave the terminal empty and either rely upon the touts who work at the more busy points or themselves seek individual passengers along the route. From midday until two o'clock it is again busy

as children return from morning school, as offices close for the day, as shops shut for the siesta and as children enter afternoon school. In Malang most activities are suspended between two and five o'clock and the *bemo* drivers take this opportunity to rest - often at home - before resuming work in the evening when people go out shopping, visiting friends, dining, or patronising entertainments such as the cinema. After seven o'clock it becomes quieter and by eight o'clock all daytime drivers would normally have washed and returned their *bemo* to the owners. Only about a quarter of the *bemo* fleet remains on the roads at night under night-time drivers. In Surabaya, there is a less marked drop in activity after two o'clock; more drivers stay on the road in the mid-afternoon but then return their vehicle as early as six o'clock. By eight o'clock only a few *bemo* routes serving the night markets, centres of entertainment or the port continue in operation. At night it is still the *becak* which come into their own.

Although the nominal hours worked by the day-time *bemo* drivers appear long - twelve hours in Surabaya and 14 hours in Malang - the number of hours on the road is much less than this. Queuing during the offpeak periods is not only the means by which the market adjusts supply but also the opportunity for drivers to rest, eat, drink coffee or just talk amongst themselves. Because of the system of remuneration, they can adjust the hours and intensity with which they work to some target daily income.

Malang

Situated in the highlands about 85 kilometres to the south of Surabaya and with a population of almost ½ million, Malang is the second largest city in East Java. Location in a river valley between the foothills of two high volcanic ranges has constrained the city's growth to the east and west; the main highways lead to the north and south with a third main road following the river to the northwest. The city has spread along these three corridors. Malang has long relied upon the *bemo* and their three-wheeled predecessors because the hilly terrain is difficult for *becak* over more than short distances. At the end of 1977 there were almost 800 three-wheeled *bemo* providing frequent but unscheduled service on four routes from the main market in the centre of the city: the three main routes were along the roads to the north, northwest and south for about 5 kilometres while a shorter (and

newer) route ran for about 2 kilometres to the west(1). From the terminals on the north and south routes there were also less frequent connections to outlying towns several kilometres away. The only other vehicles plying these routes were intercity Colts (Kombi-type vehicles able to carry up to 18 passengers packed in like sardines) which would pick up passengers on the city outskirts for about 1 Australian cent less than the *bemo* fare if returning with excess capacity; this was an irritant rather than a major source of competition for the *bemo*. The other main form of urban public transport was the *becak*, of which there were 6000 licensed and perhaps another 4000 unlicensed; these were more expensive than *bemo* and used in the role of popular taxis to provide feeder services to the *bemo* routes and door-to-door transport. Pony carts fulfilled a similar function on the outskirts, to where they had been banished by order of the local government.

At the end of 1977 a ban was placed upon the introduction of any further secondhand *bemo* to Malang. This was intended to stop an influx of three-wheeled *bemo* which had been caused by their replacement in other cities by newer four-wheeled *bemo* and city buses. Instead, it was laid down that any additions to the *bemo* fleet should be new four-wheeled vehicles known as Daihatsu, in fact built up from a small open-tray pick-up which was that maker's successor to the three-wheeled pick-up which became the *bemo*. Nevertheless, despite the more modern appearance of these vehicles, owners and drivers were suspicious of them on the grounds that the engine was more complicated, the stability unproven, and consumer preference unknown. Initially 40 units were licensed to enter service but, in the face of opposition from existing *bemo*, they were being placed in service on route C, a route lying mostly outside the city and served by an older type of vehicle. How the role of *bemo* will develop in Malang in the future is therefore uncertain. It does seem clear,

---

1 Under the routeing system formalised by the local government with effect from the beginning of 1978, these routes were A, B, D and F. Route C was an alternative route to the south, operated mainly by an older style of *bemo* called *tempo* from a market located about ½ kilometre to the south, while route E to the east was not yet in operation because of opposition from pony cart drivers who viewed the east as their sphere.

however, that while the introduction of buses is regarded as a long-term measure, at present they are seen as likely to be uneconomic because of the short distances involved and the still narrow roads.

Surabaya

The second largest city in Indonesia with a population of almost 2½ million, Surabaya is a major port as well as a commercial and industrial centre on the north coast of East Java. Although located on a perfectly flat plain, the city has nevertheless developed in an elongated way along the main lines of communication between the port and its hinterland. As in Malang, north-south transport routes are therefore more significant than east-west ones.

Until the mid-1960s the basis of Surabaya's public transport system was an electric tramway consisting of one line along the main north-south corridor and a shorter east-west line. This was supplemented by an old railway steamtram, a handful of private buses and a number of three-wheeled *bemo*, while thousands of *becak* provided transport whenever and to wherever required. In 1966 the electric tramway was abolished as no longer viable, technically or economically, and, in effect, replaced the next year by a fleet of 80 small buses imported by the government from East Germany.

After 1968 a large number of both three- and four-wheeled *bemo* flooded into the city and wrought a sudden revolution. The buses were no match for the *bemo* which were able to operate with headways of less than a minute, pick up and set down passengers wherever requested en route, provide every passenger with a seat and free them from the worry of pickpockets. By 1971 the last buses had been withdrawn and the *bemo* were left supreme. In recognition of this state of affairs, the government set about formalising their routeing and issuing route licences.

Between mid-1975 and mid-1976 seventy buses were introduced to Surabaya under the operation of the state land transport enterprise P.N.Damri but on the initiative of the Director-General of Land Communications as the first stage in a programme to modernise the public transport of the main Indonesian cities. Mindful of the inability of the previous city bus fleet to compete with the *bemo*, this time the government created a monopoly for the bus company by reallocating the approximately 500 *bemo* on the main north-south route to elsewhere. Thus, while the public transport system dominated by *bemo* which was in force between 1971 and 1975 emerged from the interplay of

market forces, the present changed role of the *bemo* has been brought about by administrative fiat.

At the beginning of 1978, 1145 four-wheeled *bemo* and 751 three-wheeled *bemo* held route licences and about thirty routes were being regularly operated. More than half of these routes had been opened after the introduction of the city buses. For the first few months after switching routes, most owners and drivers suffered a sharp decline in income but, as consumers got used to the new routes, incomes returned to something like their previous level. Owners who had chosen new routes which failed to become profitable were given the opportunity to switch to more profitable routes. Market forces therefore played a role in the allocation of displaced *bemo* to new routes. The resultant system benefited consumers to the extent that it was more intensive and more extensive. The major inefficiency is that on the main north-south route, which is now a bus monopoly, consumers no longer have the option of taking a *bemo*: while many consumers are happy to travel by bus, there are others who would prefer the greater frequency, the opportunity to board or leave at any point on route and not only at stops about half a kilometre apart, the comfort of being able to sit down, and the safety from the pickpockets (who are in their element in the crowded buses) that a *bemo* used to provide.

Although at the beginning of 1978 the seating capacity of the *bemo* fleet (approximately 17,000 seats) still far outweighed that of the bus fleet (3500 seats or approximately 5000 places if standing passengers are allowed for), by 1980 public transport in Surabaya will be dominated by buses. It is planned that by that time 500 buses will be in operation; the next batch of 115 buses entering service in mid-1978 will increase the fleet to 185. According to the routeing system proposed in the *Surabaya Area Transportation Study* (Freeman Fox, 1977: 15.15), by 1982 there would be required:

355 single-deck 90-passenger buses (or 460 70-passenger buses)
125 minibuses (20 passengers)
690 *bemo* (11 passengers)

These 690 *bemo* would be used on four of the eighteen public transport routes 'still physically incapable of accommodating a full size bus' (Freeman Fox, 1977: 15.18). A further 1000 *bemo* would be necessary to provide

(i) infill services between the main bus routes
and (ii) local area services and bus feeder services.

On this basis, allowing for replacement of the ageing three-wheeled seven-passenger *bemo* with new four-wheeled eleven-passenger vehicles, there would be no reduction in the size of the *bemo* fleet.

Nevertheless, it still deserves to be asked whether the introduction of a large bus fleet represents an efficient allocation of resources. First, whereas a larger *bemo* fleet could, on the basis of past experience, be financed by small business and households, a larger bus fleet would be financed by the central government and thereby divert funds from other development projects. Secondly, the capital cost of introducing buses is substantially increased by the road improvements required on many routes to accommodate them. Thirdly, *bemo* are a more labour intensive technology: since a bus costing about $28,000A employs two people (driver and conductor) for every 70 passengers, while a *bemo* costing about $4000A employs a driver (and often also a conductor) for every 11 passengers, the capital cost of a bus fleet and *bemo* fleet of equivalent capacity would be almost the same but the latter would employ an additional 2000 people, a significant contribution in a country where labour absorption is such a serious problem. Fourthly, as outlined above, *bemo* do have quality of service advantages over buses. In particular, buses would operate at headways six times greater than a fleet of *bemo* of equivalent capacity. Freeman Fox (1977: 15.15) recognise that replacement of the 125 recommended 20-passenger minibuses by 250 11-passenger *bemo* would permit headways to be halved, but nowhere do they vary their headways assumptions to consider the replacement of buses by minibuses or *bemo*. The use of buses is taken as given. Only the use of minibuses is questioned. It is difficult to resist the conclusion that the consultants have been too much swayed by the technologies with which they are familiar and paid too little attention to the potential for intermediate technologies such as the *bemo* which are specific to the Third World.

LESSONS FROM THE INDONESIAN EXPERIENCE

Technology

One of the serious weaknesses of Australian urban public transport systems is the absence of vehicles intermediate in size between a taxi and a bus. Moreover, since taxis are restricted by law to single fare hire, buses are in fact the smallest vehicle available for shared use. Except on main routes at peak hours, it is doubtful whether it is any longer the appropriate technology. With

the rapid rise of car ownership since the Second World War, cities have sprawled so far and the rate of public transport usage has declined to such an extent that the coverage of the bus system is now poor and service infrequent. The rationalisation of services which has been necessary for economic operation of large units has in turn accelerated the declining usage of public transport. The solution is neither to reduce fares (because potential consumers are probably frequency of service rather than price elastic) nor to increase the number of buses (because more frequent service by large units may aggravate the problem of excess capacity), but to introduce smaller vehicles which can operate economically with shorter headways and on low density routes.

A first step in this direction would be to abolish the prohibition on multiple hire taxis. At present taxis operate at very low occupancy rates even in peak periods and this is the major cause of high taxi fares: four passengers sharing a taxi would need to pay each only a quarter of the fare for a single occupant. While this would represent a drastic reduction in fares, such shared taxi fares would still be considerably higher than present bus fares. What is needed is probably a Kombi-type vehicle fitted to carry about ten passengers. This would be much closer in size to a taxi than a bus, a shared taxi rather than a minibus. It would nevertheless be much larger and more comfortably fitted out than the cramped and spartan *bemo* used to carry the equivalent number of passengers in Indonesia.

Such Kombi-type shared taxis could easily be fitted into what has hitherto been misleadingly called a 'dial-a-bus' system. In fact, a bus - even a minibus - is too large to make door-to-door calls around the suburbs: the greater the number of passengers carried the greater is the burden of delay imposed by each diversion and the greater the number of diversions required to achieve economic capacity utilisation. Shared taxis, however, would be ideal for this role, being of small capacity and able to operate with short headways. Their routes could be flexible in specified 'catchment areas' but fixed in the line-haul stage; if economic, transfers to larger buses could be organised for the latter part of journeys on main trunk routes. Such a mode of operation would probably be better suited to Australian conditions of low density suburban housing than the provision of unscheduled service on entirely fixed routes as in more densely populated Indonesian cities where it is seldom more than a short walk from a crowded kampung to a *bemo*

route. Under such a 'dial-a-shared taxi' system of semi-fixed routes, consumers would, of course, still have the options of boarding at terminals or hailing a shared taxi from the kerb but they would not be compelled to find transport to a terminal or wait on the side of the road. In fact, although many consumers would probably need to dial for a shared taxi when the system was new, with experience drivers should be able to adjust their routeing to fit the pattern of demand as closely as possible and thereby make a large proportion of the phone calls unnecessary. The ideal routeing system would emerge through a process of iteration. In the terms of Jacobs & Fouracre (1976), such a system would be 'demand-activated' rather than 'supply-activated' as in the case of existing large-scale, centrally-scheduled public transport.

Organisation

Changes in vehicle technology would, as implied above, need to be accompanied by changes in the organisation under which the vehicles are operated. While a 'dial-a-shared-taxi' system would require some central co-ordination, it does not necessarily follow that vehicle ownership would need to be in the hands of large public or private corporations. On the contrary, as in Indonesia, investment in shared taxis would be an ideal field for small business, a sector which Australian governments claim to be keen to promote but against which they invariably discriminate. The capital required to buy and fit out a shared taxi would probably be no more than many Australians are presently willing to spend on private vehicles, including jeeps, landrovers and Kombi-vans. Indeed, the attractiveness of such investment would be enhanced if the rigid distinction between public and private vehicles were relaxed so that vehicles suitable for use as shared taxis could, without undue tax disincentives, be used for this purpose during working hours but subsequently for recreation. Even if such vehicles were used as shared taxis only on the trip to and from work, this would nevertheless significantly ease the perennial problem of excess public transport capacity in off-peak hours. At present governments urge private vehicle owners to engage in car-pooling to lessen peak hour congestion on the one hand, but maintain regulations under which it is illegal to charge fares or solicit passengers on the other.

The advantage to the public of ownership and operation of shared taxis by small business would be greater sensitivity to consumer demand than at present

exhibited by large bureaucratic organisations exemplified by public transport commissions. The latters' salaried office staff and drivers have absolutely no material incentive to better serve the needs of consumers. Although all drivers of shared taxis would not necessarily be full- or part-time owner/drivers, as long as their remuneration involved some share of the earnings, whether according to some variant of the *bemo* rental system in Indonesia or some system of commission like most taxi drivers, they would have both some self-interest and the autonomy to adjust their services on their own initiative to meet the requirements of consumers. The necessary co-ordination of a large number of small owners and drivers could be provided by membership in some co-operative, possibly under government sponsorship. This central organisation could implement a 'dial-a-shared-taxi' system and specify fares.

An Obvious Opportunity

A shared taxi system would be particularly suitable for public transport to and from universities and colleges of advanced education, which are very often badly served by existing bus systems. Too many students therefore try to drive their own cars and parking problems result. All that would be required to implement a shared taxi system would be for students willing to share their vehicles to erect a sign specifying their route to and from the university; the university could lay down a general routeing and fare structure and, if necessary, authorise vehicles in a similar way to existing systems of parking permits. Such a system would ease traffic congestion, reduce the amount of taxpayers'funds required to erect parking facilities on or near campus, provide students with a supplementary source of income, utilise existing excess capacity among private vehicles and greatly improve public transport. Nevertheless, despite all these benefits, the system would at present be illegal because unlicensed vehicles would be providing public transport services.

CONCLUSION

Drawing upon the example of the role and mode of operation of *bemo* (shared taxis) in Indonesian cities, this paper makes some suggestions for simple innovations in Australian urban public transport systems. In particular, it is argued that there is a need for Kombi-type vehicles carrying about 10 passengers to operate on semi-fixed routes and provide more frequent service of

broader coverage than existing public buses. Subject to some overall co-ordination on routeing and fares, these would be well suited for ownership and operation by small business, which could be expected to be more sensitive to consumer demand than existing large-scale, bureaucratic public transport corporations. It is also suggested that private vehicles should be allowed to engage part-time in public transport as a means of easing the problem of peak period demand.

The main barriers to these innovations are the long-standing regulations which prevent the multiple hiring of taxis and the use of private vehicles for public transport. The purpose of these regulations seems to have been less to protect the interests of consumers than to safeguard the right of state public transport bodies in particular to make heavy losses at taxpayers' expense. While transfer of part of the role of providing public transport services to the private small business sector would be a desirable reallocation of resources, it could confidently be expected that this would be strenuously resisted by state governments, private bus companies and trade unions.

Thus, the scope for improving public transport in Australia is probably much greater than is generally recognised. The main problem is not lack of funds nor the absence of the appropriate technology but restrictions on market forces, imposed for the benefit of vested interests but which, over time, have become such familiar features of the public transport landscape that all parties now accept them as parameters for any new developments.

BIBLIOGRAPHY

Fouracre, P.R., and Maunder, D.A.C. (1977). Public Transport in Chieng Mai, Thailand, Supplementary Report 285, Transport and Road Research Laboratory, Crowthorne, Berkshire.

Freeman Fox and Associates (1977). Surabaya Area Transportation Study: Short and Medium Term Studies, Draft Report, Directorate-General of Land Communications, Surabaya.

Grava, S. (1972). "The Jeepneys of Manila", Traffic Quarterly, pp 465-483.

Jacobs, G.D., and Fouracre, P.R. (1976). "Intermediate Forms of Urban Public Transport in Developing Countries", Traffic Engineering and Control, Vol. 17, pp 98-100.

Kudlick, W. (1969), "Carros por Puesto: The Jitney Taxi System of Caracas, Venezuela", Highway Research Record, No 283.