THE BENEFITS OF MINIBUSES

The Case of Kuala Lumpur

By A. A. Walters*

Debates about the desirability of allowing minibus operation have usually ended either inconclusively or with the general feeling that anything the minibus can do the big bus can do better. Supporters of minibus services have usually seen them as an adjunct to the operations of the large buses. The minis, it is thought, should ply only the lightly trafficked routes where the large buses would operate with too low a frequency. The minis should cater for short distance “feeder” traffic—as collectors and distributors—and should be excluded, by the high costs, from the main line hauls. Thus, it is suggested, only on a few routes will the necessarily high money costs of mini seat-kilometers be offset by a substantial reduction in headways and waiting costs. On many occasions the evidence which has been adduced to support these conclusions has taken the form of calculations by knowledgeable operators of a bus system of the costs they would expect if they were required to operate a minibus system. The figures always show that the costs of a minibus are much higher than those of a big bus—in terms of both seat miles and passenger miles. The presumption is then that, except for certain lightly trafficked routes, the minibus is not appropriate. (It is rather like the exercise which is common among engineering students: it shows that a bumble bee cannot conceivably fly!) Furthermore, it is supposed that in general, for the vast majority of people, the value of the reduction in waiting time occasioned by the use of minibuses is likely to be less than the cost premium involved.

Impressive though these a priori arguments may be, they remain based on preconceptions rather than reality. It would be instructive to confront these propositions with real evidence of the decisions of individuals in the real world. Fortunately, we can now do just this. Minibuses were introduced in sizeable numbers in Kuala Lumpur in 1976. Almost 400 of them were licensed to compete with the existing 520–550 stage buses. Some of the basic characteristics of Kuala Lumpur transport are shown in Table 1.

The rationale for the introduction of minibuses by the Malaysian Government was: first, the need to expand bus transport capacity; secondly, the belief that minibus services would reduce urban congestion by inducing existing and incipient

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motorists to forego their private car trips; thirdly, it was planned to introduce an area road-pricing scheme rather like that which had been in operation in Singapore since 1974, and it was perceived that additional public transport capacity would be required.

The introduction of 400 minibuses was achieved in less than two years, and during this period the price of the alternative forms of transport—buses, taxis and (the costs of) private cars—remained substantially the same. Bus fares were regulated and taxi fares, nominally controlled, did remain more or less the same. Most of the inflation had been eliminated from the Malaysian economy in 1976, and we can assume that there was no substantial change in the cost of private motoring, including the congestion costs in Kuala Lumpur and the cost of parking. The fare on the minibus was also regulated at 40¢ irrespective of distance, whereas the bus fare is graduated according to the length of the trip, and taxi fares similarly depend on the length of the journey.¹

The stage buses are given franchises to operate certain routes, and each operator can only operate on a specified route. The licensing authorities, however, have been fairly responsive to applications for new route authorisations for the existing bus companies. But to a certain extent the entry of minibuses into the market compensated for many rigidities induced by the regulation of the bus operations. In principle, minibuses were also required to operate on certain routes; in practice, however, they ply routes according to their judgment of the profitability of the traffic.

¹As one would expect, the average trip length of minibus passengers is 5.12 miles (8.2 km) compared with 2.44 miles (3.9 km) by stage bus.
Figure 1
Demand for passenger trips
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It is fairly clear that no passenger will value a trip by minibus at a price which exceeds the price of a taxi. This gives us, then, an upper limit to the demand for bus trips. On the introduction of minibuses, however, it is clear that the demand curve for buses will fall and, in particular, the maximum demand price will fall to the region of the regulated fare on the minibus.

These conditions enable us to characterise the introduction of minibuses in Kuala Lumpur in the form of the demand curves shown in Figures 1a and 1b. Suppose that \( p_t \) is the price of a taxi passenger trip (or alternatively of a private car passenger trip). The initial demand curve for buses \( D_b(p_m \geq p_t) \) is drawn on the assumption that there are no minibuses—hence the presumption that the price of a mini trip exceeds the price of a taxi journey. The bus fare is regulated and fixed at \( p_b \)—and we assume that bus trips are produced under conditions of constant cost equal to the fare of \( p_b \). The regulators are “experts” and have managed to fix the fare so that the bus companies earn “normal” and not excess profits. The demand for minibus passenger trips \( D_m(p_b) \) is determined mainly by the price of the substitute bus passenger trip; it is shown in Figure 1b. Again the costs of a minibus passenger trip are assumed constant and equal to \( p_m \).

The number of bus passenger trips when minibuses are banned is \( B_1 \). When minibuses are allowed to operate at a fare of \( p_m \), which is at least as great as the marginal cost, they carry \( M_2 \) passengers. The bus demand declines to \( D_b(p_m) \) and the number of passenger trips to \( B_2 \).

In practice, however, in Kuala Lumpur, regulations are imposed not only on the fares but also on the number of vehicles (each of which must be authorised by an official licence.) The effectiveness of the regulatory legislation, therefore, depends on the extent to which, and the direction in which, the price and quantity controls deviate from what would have been the values in their absence. First consider the case of the stage buses. It is frequently argued by the operators that the regulated fares are below the marginal costs of operation. Although such allegations must be taken with a large pinch of salt, there is evidence that profits were very low in 1972–73 and in 1975–76, even with what are by normal standards high load factors. A flat rate increase of M$0.05 (about U.S.$0.02) on all fares in 1977 was approved in order to make services profitable and induce investment in new buses. The authorities were very concerned about the decline of bus services and the withdrawal of vehicles, even at the new fare. This suggests that, if not actually below costs, the regulated fares were not appreciably above costs for the normal run of services. These arguments suggest, therefore, that the assumption that the regulated fares are near costs is appropriate. Furthermore, the quantity constraints imposed by the licensing authority do not seem to be binding; it is the regulated fare that constrains the supply.

This has not been the case with minibuses since their introduction in 1975. The regulated fare of M$0.40 per trip was well above the marginal cost of providing

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2This emerges from an analysis of the published accounts.

3After the event, the average fare was a little more than M$0.20 (about US$0.08), which implies a simple increase of about 33%. However, this is an inappropriate comparison because the composition of trips changed.

4There is much variation between routes, but this statement is meant to apply to the generality of bus services.
that trip, which is probably about M$0.21–0.25 (Appendix 1). There has been an
insistent pressure for the issue of more licences. (In 1975 alone applications
were received for licences for 2,200 minibuses.) And this is clearly because very substantial
profits, far above normal, are to be earned by operating minibuses. A calculation of
the level of profits, and an attempt to identify 'supernormal' profits, will be found in
Appendix 1.

If the minibus marginal costs exceeded the regulated maximum bus fare, and if
this regulated fare applied to all bus journeys, including those by minibus, no mini-
bus service could operate profitably. Thus there would be no need for regulations
excluding minibus operation; the fare control—exercised over minis as well as
buses—would be adequate to achieve that end.

In Figure 1(b) no obvious account is taken of the rationing constraint. But it is
taken into account implicitly in the demand curve $D_m(p_b)$. The demand curve
$D_m(p_b)$ in Figure 2 represents the demand for minibuses when the quantity of
minibus licences is constrained to a particular figure (400). The demand curve
$D_e(p_b)$ represents the equilibrium demand curve when there is free adjustment of
the quantity of minibuses and of the fares to serve that demand. The former demand
curve $D_m$ lies below the equilibrium demand curve $D_e$ because the licensing
constraint induces operators to crowd their buses and debase the quality of their service
(for example, with numerous standing passengers). And, of course, queueing times
for the minis would be far longer than under the equilibrium free-entry system. If
the minibuses completely adjusted their quality of service so that the demand price
was just equal to the regulated fare, the demand curve $D_m(p_b)$ would pass through
the point given by the regulated fare and the observed number of passengers. Or,
to put this point another way, the regulated fare and the constraint on the number of
minibuses induce the operators to crowd their vehicles and give longer waiting
times than would be the case if entry were free and fare unregulated; and these
lower-quality characteristics are taken into account in the consumers' valuation
of minibus passenger trips, as shown by the regulated fare. In the evaluation of this
paper, the value of introducing minibuses has netted out the disbenefit that arises
from this continuation of both quantity (at 400 minibuses) and price controls (at
M$0.40 per trip).\textsuperscript{5} It is necessary to emphasise, however, that the heavier loadings
on the minibuses, entailed by this queuing and crowding, do contribute substantially
to the excess profits of minibus owners. Thus the net loss due to regulation is not as
large as the apparent loss to passengers.

It is worth while to reflect on the evaluation of alternative regimes. The first is
obviously the case of complete freedom of entry with no regulation of fares. Then the
relevant demand curve is $D_e(p_b)$. Thus, with the assumption that marginal costs
are constant and equal to the price ($p_m$), this free-entry-and-fare industry will result in $M_f$ minibus passenger trips.

The second case occurs if the fare control is removed but the licensed quantity
restrictions remain. Then the free fare will rise above $p_m$ as the number of trips is
reduced below $M_2$. Minibus operators will find it advantageous to increase the

\textsuperscript{5}In other words the rationing process causes a dissipation of the surplus caused by the additional
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fare and reduce their passenger loads. But with the same number of minibuses the reduction in load factors will give rise to an improvement in the quality of the service, so the demand curve will rise above \( D_m(p_b) \). With the restriction on the quantity of minibuses, however, the quality of service will not rise to the level represented by the demand curve \( D_e(p_b) \); the operators will find it advantageous to crowd their vehicles more than would occur under free entry conditions.

The third case occurs if the fare control is retained at \( p_m \) but the quantitative restriction on vehicles is removed. Then the number of minibuses will expand and the load factors will fall until the marginal mini just breaks even at the new low load factors. And these would be lower than those implied by free entry and no fare control. Thus the quality of the service will be extraordinarily high, with many empty seats and very rarely a full bus. The demand curve corresponding to this “high-quality/high-fare” service will lie above the demand curve \( D_e(p_b) \), since the standard of service will be higher than would emerge under free competition.

As one would expect, the flat rate fare on minibuses, in conjunction with the graduated fares on stage buses, gave rise to the longer passenger trips being taken by mini bus. The average trip length by minibus was 8.2 km, more than twice that of the stage bus (3.9 km). Since the average fare on stage buses was M$0.21 and on the minibuses about M$0.40, this implies that the fare per kilometre was roughly the same after the minibuses were introduced.\(^6\)

In principle, one should draw figures such as \( l(a) \) and \( l(b) \) for each length of trip, since the price ratio between bus and mini varies systematically with distance. Where the ratio mini fare/stage bus fare is lowest on long distance trips, one would expect the switch to minis to be very high. On the other hand, for short distances where the mini premium is very large, one would expect stage buses to retain much of their traffic. Owing to lack of data, these refinements have not been pursued in the ensuing calculations of benefits.\(^7\) The figures must be interpreted as containing errors because of this averaging procedure, but it is unlikely that these errors are sufficiently important to qualify the conclusions seriously. But the distribution by trip length between mini and stage bus has important implications for policy, which will be raised in the last section of this paper.

The next task is to fill in some of the numbers on the figures. The regulated price of a minibus trip, whatever the distance, was M$0.40 (\( = p_m \)).\(^8\) With that fare one observes that there are 400 minibuses and that the total number of trips per day is about 200,000. This provides, then, one point on the demand curve for minibuses.

An upper limit to the demand price for a minibus can be obtained by considering the price on the superior alternative, the taxi cab. The equivalent taxi fare for an average minibus trip would be of the order of M$0.80 to M$1.00 per person, assuming three persons (an effective maximum) share the cab. If the fare of a minibus trip were fixed at M$0.80, there would no doubt be still some business for the

\(^6\) It is difficult to be precise about such calculations because of concessionary fares and some split journeys by minibus.

\(^7\) There are no detailed distributions of fare and distance available.

\(^8\) There were reports that some operators tended illegally to "split long trips" into two separate trips and collect M$0.80. However, such practices were not thought to be quantitatively important.
minibuses; but we have assumed that, at that fare, the demand falls to zero, giving an additional point on the demand curve.\footnote{This assumption biases the case against the minibuses, but see below.}

The simplest assumption about the shape of the demand curve is that it is linear and passes through the two points. This is the assumption that is used to evaluate the consumer's evaluation of the minibus service. However, it is worth reflecting on alternative shapes and examining the sort of results one would obtain. One of the commonest hypotheses about the shape of the demand curve is that it has constant elasticity, and we may attempt to draw a curve with such a constant elasticity through the point (M$0.40, 200,000). But what elasticity? As can be readily cal-

\text{figure 2}
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culated, the postulated linear demand curve has an elasticity of (minus) unity at the observed point and the elasticity increases as the fare increases.\textsuperscript{10} An elasticity of unity is probably on the (absolute) low side, and one may examine an alternative hypothesis that the curve has a constant elasticity of (minus) 2 until it reaches the upper limit of the fare of M$0.80; then it becomes horizontal. The constant elasticity curve is shown in Figure 3. It will be noted that it cuts the linear demand curve at about 100,000 trips per day, and finally meets the horizontal line through M$0.80 at 50,000 trips a day. It is clear that the area under the truncated constant elasticity demand curve is about the same as the area under the linear demand curve. The refinements of nonlinearity are probably not worth while—but any reader may choose his own assumptions and recalculate.\textsuperscript{11}

The consumer surplus can now be computed. It is clearly: 200,000 \times (0.80 - 0.40)/2 in M$ on a daily basis, or M$40,000 per day. If this be grossed up on the assumption that there are only 300 effective days per annum (approximately U.S.$5 million), then the total consumer surplus becomes M$12 million per annum.

To find the total benefit of the authorisation of minibuses, the excess or supernormal profits of the operators must be added. This value (Appendix 1) amounts to M$32,000 for each minibus, therefore for 400 minis the total is M$12.8 million a year. The grand total of benefits is therefore: M$24.8 million a year. And we can take it that, approximately, the total benefits are equally divided between the customers and operators.

The total benefits of M$25 million (approximately U.S.$10 million) are large. For a total non-school population of about 600,000, this represents a sizeable annual dividend—about U.S.$17 per head, near one per cent of their average income.

These figures are so large that scepticism is readily evoked. Some correlated figures may therefore be useful. First, it is noted that on recent surveys of minibus and bus travel for journeys to the centre, the ridership is split 35\% on the minis and 65\% on the stage buses, and the minibuses, because of their flexibility, carry many more passengers during the rush hours. Overall, it seems very unlikely that minis carry less than 30\% of all trips. This should be compared with availability of about 520-550 buses and 400 minibuses—or, translated into officially rated passenger capacity (at 58 passengers per bus and 16 per mini), 31,000 and 6,400 respectively. Thus the minibuses have about 17\% of the passenger capacity but carry 30 to 35\% of the passenger trips.

More important is the fact that the average length of the passenger trip by mini (8.2 km) is more than double that by the stage bus (3.9 km). With a split between mini and stage of 30-70, this implies that the minis and stage bus carried the same number of passenger kilometres. This is, of course, for the minimum limit of the estimate of mini passenger trips. If we take the 35-65 split, then the minis carried 53\% and the

\textsuperscript{10}A Transport and Road Research Laboratory study (Oldfield, 1977) used an elasticity with respect to generalised cost of unity (page 7) based on "the rather inadequate evidence available". But the study gave a warning that "recent work" suggested that the elasticity may be rather higher than one (presumably in absolute terms).

\textsuperscript{11}It will be noted that the existing situation in Kuala Lumpur does involve considerable overcrowding of minis. One should standardise the demand curve for the same quality of service. However, this overcrowding is also reflected in the excess profits of operators, and it is difficult to disentangle the separate effects.
Figure 3
Demand for passenger trips by minibus
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stage buses 47% of passenger kilometres. By any criterion, this is a phenomenal performance: 15% of capacity carries more than 50% of the passenger kilometres.\(^{12}\)

Secondly, it might be thought that some account should be taken of the lower ridership on the stage buses and in the taxis. However, this is not a "cost" of the introduction of minibuses unless there is evidence of marked economies of scale to the industry in these activities. All the empirical evidence suggests that there are no economies of scale, in the conventional sense, in either the bus or the taxi business.\(^{13}\)

Furthermore, the increase in frequencies which has resulted from the mixed bus–mini service has undoubtedly increased the demand for public road transport. The passenger, attracted by the higher frequency of service, will take mini or bus, whichever comes first.\(^{14}\) Thus there is no reason to impute any long-term loss to bus companies or taxis for the loss of traffic. It might be adduced, however, that there are some short-term losses as the buses and taxis adjust to their new situation. The assets of both are readily sold on the second-hand market, and there seems to be no reason to add such costs. This is particularly so in the case of the buses; there was obvious evidence of over-age buses, with frequent breakdowns, etc., in 1975. And in 1978 the bus companies were prepared to purchase new buses, partly for replacement purposes.

Thirdly, one may claim that the calculation of the profits in excess of normal accruing to the minibus owners is excessive. There are no reported data in Kuala Lumpur which can establish whether M$12.8 million a year is anywhere near the right figure. However, in Hong Kong it is widely reported that the rate of return on a similar operation (the Public Light Buses) is more than 100%. Furthermore, the very large demand for the limited allowance of minibus licences testifies to their high profitability. It is doubtful, therefore, whether the allowance shown in the figure for super-normal profits is too high. (But readers may refer to Appendix 1 for further calculations.)

Fourthly, there is the problem of externalities. It might be held that the total benefit of M$25 million a year is partly and perhaps wholly offset by external and indirect effects which have not been included in the calculation. The most obvious is road congestion. It is not clear, however, which way one could expect congestion to go. On the one hand the provision of more frequent minibus service would be expected to entice the erstwhile or incipient motorist, thus reducing congestion. And, since minibuses carried nearly as many passenger miles as the large buses, with only half the rated congestion effect, it seems that the net effect on congestion may be expected to be favourable. Unfortunately, it is impossible to collect informa-

\(^{12}\)Of course passenger kilometres are not homogeneous; it takes more resources to transport two passengers for 4 kilometres than one for 8. But still the measure is impressive.

\(^{13}\)In Kuala Lumpur all the evidence suggests that the largest bus company, Sri Jaya, which was inherited from the British, is somewhat less efficient than the other smaller companies. But I would not wish to rely solely on such evidence. See also Lee and Steadman (1970).

\(^{14}\)On some routes where minis and buses operate, there has been some reduction in stage bus frequencies. Consequently, the passenger who has a low value of time may have to wait longer for a stage bus. However, he is less likely to be bypassed by full buses. But, since these passengers apparently wait for a stage bus and decline the offer of the minis, one may presume that their value of time is very low indeed. Furthermore, several minibuses were observed to sell half price (M$0.20) tickets for short journeys.
tion which would confirm or deny this proposition. While it is true that congestion seems superficially to be certainly no worse than during the earlier days, there have been many other changes during this period (emergence from a slump, considerable impending road works, an expansion of the private car fleet, etc.) which have prevented attribution of effects to causes.

Fifthly, there are externalities such as the "creation of jobs"—whatever that much overworked term may be taken to mean. Compared with the standard bus, the minibus is a labour-intensive form of transit and substitutes labour for capital. (Often the minibus operators find it efficient to carry a fare-collector who, one suspects, is usually a member of the family.) Furthermore, the maintenance services of minibuses require less capital and can be performed by "shade tree" mechanics. Thus it seems likely that the minibuses provide more "productive" jobs in the private unregulated sector than the simple stage bus system. It is also important to note that the employment is in the non-unionised sector, whereas the stage bus industry is largely unionised; and, furthermore, the minibuses provide an outlet for entrepreneurship on a small scale. The enterprising man who has a small amount of capital can enter the minibus business. Capital and ownership are spread throughout the population (and in particular the Malay population) rather than being concentrated in few hands. It would be interesting to know the income and employment characteristics of those who use minibuses, but unfortunately no information is available.

It might be noted that it is difficult to disentangle the various elements that have contributed to this surprisingly large benefit of over U.S.$10 million annually. One would suspect that much of it is due to the owner-driver form of incentives, which induces the minibus operator to seek diligently where demand is high and to prune his costs to the unavoidable ones. Some part of the value is probably due to the technology of the smaller bus. But all this is conjecture. One may also speculate on what would be the result of allowing free entry into the minibus business. It is likely that minibuses would take over the majority of trips in Kuala Lumpur. And this would be in spite of the fact that Kuala Lumpur has, by any normal international standards, an efficient and cheap system of stage buses. Furthermore, if new entrants were free to enter the bus business and restrictive regulations were reduced, the share of the minibuses would be rather less.

The conclusion is that the introduction of minibuses produced an extraordinarily large benefit for both operators and passengers—a benefit which they shared more or less equally. The annual benefit is the equivalent of about one percent increase in income for every adult in Kuala Lumpur, or about U.S.$18 per capita. The constraint on the number of minibus licences, combined with the relatively high regulated fare, has given rise to very high load factors and substantial profits for operators. With free entry, the fare would probably fall more than 40%, and it is likely that the minibus would be the predominant form of urban transport.

As one would expect from the flat rate regulated fare on minibuses, they have

\[13\] It will be observed that in the early stages the minibuses were expected to carry approximately half the number of passengers they actually achieved. This forecast was made on the best assumptions of transport experts. But like the bumble bee . . .

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captured many of the long-distance trips and left the stage bus with the shorter trips. This is the opposite of the normal role assigned to minibuses. One would conjecture that the greater frequency of minibuses would be relatively most advantageous on short trips. In other cities, such as Manila (Philippines), the minibuses ("jeepneys") do concentrate at the short end of the urban travel market. But there both buses and minis have the same flat rate fare structure. So it appears that the more appropriate role of minis in carrying short distance passengers is inhibited, or indeed largely precluded, by the fare structure imposed. They have been induced into the long hauls where the relative advantage is less. It is some sort of testimony to the virility and adaptability of the mini business that the minibuses have, nevertheless, much higher net benefits.

An obvious subject for further speculation is the deregulation of both fares and quantity restrictions in the urban transport business. The outline of the results of such a policy change is easy to see, but it is beyond the scope of this paper.

Kuala Lumpur was in no way a sitting duck for the minibuses. The stage buses were relatively frequent, ubiquitous and cheap, and yet marginally profitable. Similarly, the taxi service was not tightly constrained and fares were low. This suggests that the benefits were not due to the special circumstances pertaining in Kuala Lumpur. One may thus expect that similar acts of deregulation in other cities might produce benefits of similar or even greater magnitude. One of the unique features of Kuala Lumpur, however, is the fact that the introduction of minibuses was achieved very quickly in one large operation. Such speed is rare; governments usually like to proceed cautiously. And this often sets up sufficient resistance to stifle further deregulation. Herein is a lesson for reformers.

It is worth summarising the main effects, so far as they are known, of the minibuses of Kuala Lumpur:

(a) The first remarkable feature is the unexpectedly high success of the minibuses. It was anticipated that the flat rate fare of M$0.40 would cover the costs and provide for a "reasonable" profit. In fact the productivity of the minibus operators was far higher—and was achieved to some extent by higher utilisation (that is, more service kilometres per diem), but mainly by higher load factors, which were in turn due to the unexpectedly high passenger preference for the mini service. Compared with the stage buses, the money costs (excluding abnormal profits) per passenger per kilometre were lower for the minibuses on most of the routes and trips on which the minibuses tended to concentrate.

(b) The flat fare of M$0.40 for the minibuses did encourage passengers to use them for the "wrong" long-distance trips, many of which appear to be along heavily trafficked routes. This is not the "feeder" role which traffic planners envisioned for the minibus.

(c) No firm data are available on the extent to which passenger trips by minibus were substituted for private car passenger trips, or on the effect on congestion in the city streets. Superficially it appears that there was certainly no marked increase in congestion in Kuala Lumpur; but these issues remain unfinished business.
(d) Finally, it is unfortunate that one cannot identify that part of the minibus's high performance which was due to the powerful motivation of the owner-driver. One can only conjecture, for example, what would have happened if the existing bus companies had been given authority to expand into 400 minibuses.

APPENDIX 1

The Profits of Minibuses

It is first necessary to give some estimates of the costs of operating minibuses in Kuala Lumpur. The basic sources are the estimates made from brochure material and assumed operating conditions before the minibuses were introduced in 1975. These are listed in Table A1.

Table A1

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<tr>
<th>Operating data:</th>
<th>1975 speeds</th>
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<tr>
<td>1. Days of operation per year</td>
<td>300</td>
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<tr>
<td>2. Hours of operation per day (effective)</td>
<td>8</td>
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<tr>
<td>3. Average speed, mph</td>
<td>15</td>
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<tr>
<td>4. Average occupancy, passengers</td>
<td>7</td>
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<tr>
<td>5. Average passenger trip length, miles</td>
<td>4</td>
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<td>Number of passenger trips carried:</td>
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<td>6. — per day</td>
<td>210</td>
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<td>7. — per year</td>
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<th>Revenues:</th>
<th>M$</th>
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<td>8 Daily revenues ((6) × M$40)</td>
<td>40</td>
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<td>9. Annual revenues ((7) × M$40)</td>
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<th>Expenditures (annual):</th>
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<td>Fixed:</td>
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<tr>
<td>10. Capital cost (purchase price: M$32,000; 5 years at 12%)</td>
<td>8,900</td>
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<td>11. Vehicle insurance</td>
<td>1,400</td>
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<td>12. Licences and road tax</td>
<td>1,200</td>
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<td>13. Driver (M$7 per day plus 80% overhead for EPF etc.)</td>
<td>3,800</td>
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<td>14. Total fixed expenditure</td>
<td>15,300</td>
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<td>15. Fuel (diesel; 33 mpg; M$1 pg)</td>
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<td>16. Maintenance and repairs (M$25 per 1,000 miles)</td>
<td>900</td>
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<td>17. Total variable expenditure</td>
<td>2,000</td>
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<td>18. Total expenditure</td>
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<tbody>
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<td>19. (9)–(18)</td>
<td>7,900</td>
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THE BENEFITS OF MINIBUSES

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In fact we know that the number of passenger trips per day is approximately 500 (420 for 365-day year) compared with the estimate of 210. This increased number of trips was achieved largely by increasing the average load of passengers from the assumed 7 to a figure probably nearer to 14 for the one (8-hour) shift.\textsuperscript{16}

If we suppose that the only change from the data in Table A1 is the doubling of the average load from 7 to 14, the approximate result would be a doubling of revenue—from M$23,200 to M$50,400. Subtracting total expenditure of M$17,300 from this, we obtain a profit of M$33,100.

This represents a more than 100\% rate of profit on the investment of M$32,000. And clearly this is a lower bound, because we have not yet taken into account the additional 80 (500 – 420) passenger trips a day which, on average, minibuses achieve—which would bring in M$9,600 yearly in revenue. If variable costs increased proportionately, i.e., (80/420) × 2,000, this would give an additional cost of M$381—giving an additional net revenue of M$9,219. Thus the best estimate of total annual profit is M$33,100 + 9,219, or approximately M$42,000. This represents a rate of return on capital of over 130\%.

Clearly these rates of profit in a business such as minibus operation far exceed "normal" values. "Normal" profits in regulated urban passenger transport are often calculated at 15 to 18\% of revenues—which would give about 12 to 14\% return on investment. The team that reviewed minibuses thought that the return would be about 31\% of revenues and 25\% on investment—and these rates were clearly regarded as greater than normal.

From all this discussion it appears that excess profits (over and above normal profits) are at least 100\% of capital, or approximately M$32,000 per annum, which implies a normal rate of profit of about 30\% on capital. This is the figure which is used in the evaluation.

It will be noted that this figure is broadly consistent with the rate of profit on one other similar minibus operation—the Public Light Buses in Hong Kong. There it is reported that profit rates are "more than 100 percent" (Barden, 1973). This suggests that, if there are approximately constant costs in the minibus industry, free entry with no fare regulation would result in the competitive fare of about 21 to 25 cents a trip.

It is worth while to reflect briefly on the possible errors in these various figures and on their applicability for a cost-benefit assessment. The first obvious feature is that the costs in table A1 are private costs and include taxes: thus profits are given net of indirect taxes such as licence duty, road tax and the fuel levy. Secondly, it seems very likely that the figure for capital costs has been much overestimated, because the economic life of a minibus is likely to be considerably longer than 5 years.\textsuperscript{17} On the other hand it seems likely, as a referee of this paper has pointed out,

\textsuperscript{16}During the three-hour period 06.30–09.30 a.m., they carried 17.1 passengers and for the peak hour over 18 passengers. Thus if it is assumed, as we know from the data, that minibuses operate intensively during the peak, the 8-hour shift will cover both peaks, with approximately 17 carried during the two 3-hour peaks and 10 during the two off-peak hours.

\textsuperscript{17}For minibuses under similar conditions, such as the colectivos in Buenos Aires, the average age of vehicles on the road was 7 years and it was probably true that the average life of vehicles exceeded 12 years. See Walters (1979).
that the wage cost, although reflecting the current (1975) wage cost of drivers in Kuala Lumpur, is rather too low.

Obviously there is a great deal of uncertainty in such calculations. One rough sort of check is to see whether the Kuala Lumpur data are broadly consistent with those of similar operations in the region. The evidence suggests that the costs per seat mile of the minibuses in Kuala Lumpur are a little higher than the costs per seat mile of the jeepneys in Manila, but distinctly lower than the costs of the slower moving minibuses in Hong Kong. On all this, albeit flimsy, evidence, there does not seem to be a convincing case for believing that the costs have been either under or over estimated. However, from long experience, I am sure that many transport experts will claim that the costs are underestimated—even by the operators themselves. Thus it is worth while to give some rough rules for those who wish to adjust the figures. As a general guide, if the total costs of minibus passenger miles increase by 10%, the profits of operators decrease by about 5%. Thus, if the cost estimates should be increased by a factor of 40%, the profits of operators would decline by about 20%. Since the excess profits of minibuses constitute about half the total benefits, this 40% increase in costs would imply that the total benefits should be reduced by about 10%.

REFERENCES


