BEHAVIOURAL PUBLIC TRANSPORT SUB-MODE CHOICE MODELS: TRANSPORT POLICY ASSESSMENT IN JAKARTA

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INTRODUCTION

Some cities in the developing world are pursuing policies to make smaller-sized, flexible-route, road-based public transport vehicles relatively less important by replacing them with large stagebuses. For example, Jakarta - Indonesia's largest city, with a population, in 1989, of about 8 million in an area of about 650 square kilometres - has three sub-modes (stagebuses, minibuses, microbuses) in direct competition along some routes, and a high percentage of road-based public transport users (51 percent in 1985). Current transport policy, as expressed in the DKI Jakarta Government Master Plan for the Year 2005, and endorsed under DKI Jakarta Regulation Number 5 (1984), plans for a 130 per cent increase in the road-based public transport vehicle fleet. Double decker buses will increase their share from 2 per cent of the fleet in 1982 to nearly 11 per cent in 2005, yet only a modest increase in the number of minibuses (Metromini and Kopaja), and no increases in the number of microbuses (Mikrolet), are planned.

Research by Dardak (1989) was directed at understanding users' preferences in Jakarta to different sizes of buses (the sub-modes of stagebuses with about 50 seats, minibuses with about 30 seats, and microbuses with about 14 seats) and the extent to which journeys now made on foot might in the future be made by public transport. The research methodology embraced: field surveys of public transport operations and levels of service; designing and conducting a questionnaire survey to establish users' reasons for choosing the various sub-modes, extracting socio-economic and journey-to-work travel data from an home interview survey conducted for Bina Marga (the Government road authority) in 1985; developing and calibrating disaggregate, behavioural choice models for sub-modes which are in direct competition for the journey-to-work; and testing the models to show the implications, in a quantitative way, of policy changes.The general question is why transport policy tends to narrow the choice alternatives available to the travelling public when, in some cities of the developed world, policies are aimed at expanding the number of choice alternatives? Dick (1981, p. 80) has highlighted this problem of policy development with reference to stagebuses and microbuses in Surabaya, Indonesia, by underlining how difficult it is for governments to plan urban transport development, and yet how desirable it is to allow the system to evolve in accordance with consumer preferences expressed through market forces.

This paper explains the context of transport policy in Jakarta and applies multinomial logit mathematical models to policy assessment. Direct and cross elasticities calculated from the models, and the implied monetary values for the components of travel time are given. To provide the necessary background, Section 1 describes a case study of the Cililitan-Senen corridor - its route characteristics, adjacent land uses, and the surveys of journey speeds and times and fares, conducted between 1985 and 1987. This 10.5 km route, with a two-hour morning peak, two-way count of 446 stagebuses, 776 minibuses, and 1213 microbuses, is one of the main arterial roads serving the Glodok central area, and one of the major bus routes designated in the DKI Jakarta Master Plan. Section 2 outlines the results of a passenger interview survey undertaken in January and February 1987 that provide insights into user preferences for stagebuses, minibuses, and microbuses. Model specification, computer program development, and model calibration are outlined in Section 3. Emphasis is placed on the usefulness of the calibrated models by commenting on the anticipated effects of different transport policy measures (Section 4).

1. CASE STUDY CORRIDOR

The Cililitan-Senen corridor was selected as a case study because it is only one of three lengthy routes in Jakarta where all forms of public transport are in direct competition. It serves the central area where, in the future, 85 per cent of travel demand is expected to be by public transport. The corridor is located in the eastern part of Jakarta, connecting Cililitan terminal, Kampung Melayu terminal and Pasar Senen terminal. For the purposes of accuracy in data collection about travel times and speeds, the corridor was divided into six sections with a total length of a about 10.5 km but this level of detail is not reported here.

1.1 The Route

The first section is Jalan Dewi Sartika (dual two-lane carriageway), which starts at Cililitan bus terminal in the south and ends at the intersection with the inner toll road. The second section - Jalan Otto Iskandardinata - has a dual, four-lane carriageway with one lane in each direction being utilised for parking purposes. Kampung Melayu terminal is located at the northern end of this section. The third section is made up of two one-way roads. The north direction (Jalan Jatinegara Barat Raya) ends at Jalan Matraman and has four lanes, one of which is a separate lane used by micro buses. The south direction, along Jatinegara Timur, is five lanes. The fourth section starts at Jatinegara Barat - Matraman junction and ends at Pramuka junction and has dual, four lanes separated by a median. Jalan Salemba Raya, which is also dual, four lanes with a median, is the fifth section and ends at Diponegero intersection. The final section, Jalan Kramat Raya, has dual, four-lanes and ends at Kwitang intersection. The kerbside lane in both directions of sections 4, 5 and 6 is physically separated from the other three by a kerb-like barrier.

1.2 Bus Terminals

The function of bus terminals in Jakarta is to provide off-street space for loading and unloading of buses, to turn buses around that have already completed their journey, and to allow passengers to interchange between bus routes. There are three such bus terminals in the study corridor. The Cililitan terminal, located in the south, handles both city buses, that include stagebuses, minibuses, and microbuses, and inter-city buses, which use this terminal as a starting point for regional travel to the south. A small shopping centre surrounds this terminal. Kampung Melayu terminal is about 4.5

km to the north. A large commercial centre is located near to the terminal. At the north end of the corridor, in the central part of Jakarta, the Senen bus terminal is surrounded by a large shopping complex.

1.3 Land Use

The Cililitan-Senen road corridor is straddled by varied, and intensive, land-use developments. Residential densities vary from about 160 persons per hectare in section 5 to about 500 persons per hectare in section 3. In the immediate catchment area of public transport there is substantial housing, whether fronting directly onto the main road or at the rear of other land-use activities. A total population of some 425,000 lives within approximately two kilometres of the road. Retail office and commercial land-uses and educational, community and health facilities are found throughout, but are most intensive in sections 4 and 6. There are an estimated 135,000 jobs in the immediate vicinity of this road corridor.

1.4 Journey Speed and Times

Journey times were estimated from speed measurements along the six sections of the route. These were conducted in early February, 1987. The moving-car observer method was adopted for two-way roads whereas the following-car method was used for the one-way roads. The survey was conducted on weekdays during the morning peak hours (6.30-9.30 am). The speed and journey times by each sub-mode on each of the six sections were tabulated for northbound traffic (with the heaviest flow) and for southbound traffic (against the peak). For comparative purposes, average speeds by direction and section were obtained for all modes. Averaging for all sections, motor cars have the highest overall average speed (17 km/h northbound; 26 km/h southbound). Microbuses are, with stagebuses, marginally the slowest northbound (both 12 km/h). Minibuses average 13 km/h northbound. In the southbound direction, the speeds are 18 km/h (microbus), 17 km/h (minibus), and 13 km/h (stagebus).Microbuses appear to experience lengthy delays northbound in section 3 where their mean speed drops to 7 km/h.

1.5 Fares

During the period from 1985 to February, 1987, the fare on each sub-mode of public transport remained the same. The fare on stagebuses and minibuses are flat, whilst the fares on microbuses depend on distance travelled. Travelling from Cililitan to Senen, as compared with the stagebus, the fares on microbuses is twice as high. However, the fare on buses and microbuses is identical when travelling from Cililitan to Kampung Melayu, or from Kampung Melayu to Senen. Table 1 lists the fares in rupiahs (rups) for different type of service and for each of the three sub-modes. Ordinary fares on stagebuses and minibuses are 150 rups and this is a flat rate irrespective of distance. Microbus fares are a minimum of 150 rups and are distance based.

Table 1
Public Transport Fares in Jakarta, 1985-1987

Sub-Mode	Service Type	Fare	Notes
Stagebus	Ordinary Express (Patas) Student	150 rups flat 250 rups flat 50 rups flat	No tickets No tickets Booked tickets
Minibus	Ordinary Student	150 rups flat 50 rups flat	No tickets Booked tickets
Microbus		150-300 rups* (based on distance)	No tickets

* may vary by microbus driver; (100 rups = approximately US 10 cents)

2. USER PREFERENCES

Passenger interviews were undertaken in January and February, 1987. The interview was conducted during peak times in order to obtain only work-trip journey purposes. Random sampling was adopted in bus terminals and shelters along the corridor. Only those passengers who travel to a destination within the corridor were included in the sample. Passengers were asked to give the main reasons for their choice of the particular public transport sub-mode. Some passengers gave more than one reason. Of the 384 valid responses, 142 took the stagebus, 91 took the minibus and 151 took the microbus. Table 2 gives the number and the percentage distribution of reasons stated.

Table 2
Reasons for Choosing Public Transport Sub-Modes Along Cililitan-Senen Corridor

Reason	Stagebus		Minibus		Microbus	
	No.	%	No.	%	No.	%
Fast	26	(13.8)	9	(8.9)	67	(22.3)
Cheap	79	(42.0)	10	(9.9)	7	(2.3)
Comfortable	0	(0.0)	6	(5.9)	43	(14.3)
Convenient	81	(43.1)	62	(61.4)	102	(33.9)
Seats available	0	(0.0)	12	(11.9)	79	(26.2)
Other	2	(1.1)	2	(2.0)	3	(1.0)
Total	188	(100.0)	101	(100.0)	301	(100.0)

In general, a large portion of stagebus users grouped their reasons under the heading of cheap and convenient while a large portion of microbus users grouped their reasons under the heading convenient, seats available, fast and comfortable. The cheap fare reason by stagebus users can directly be understood as most passengers travel the whole way from the Cililitan area to the Senen area. From the survey (Section 1.4) time differences between stagebus and microbus are small. However, the heading of "fast" in the interview includes total door-to-door travel time, that includes access time and waiting time. From the average headways derived from the bus counting survey, it is clear that the average waiting time of microbuses is significantly shorter compared to that of stagebuses (one sixth of the time).

3. MODE CHOICE ANALYSIS

3.1 Data

Individual person and journey-to-work travel data were extracted from 18 zones within Cililitan-Senen corridor as part of the unpublished Home Interview Survey (HIS) conducted by Pacific Consultants of Japan for Bina Marga and JICA from July to October, 1985. Trips selected had to meet two criteria: the household location had to be within the Cililitan-Senen corridor; the workplace also had to be within the same corridor. A total of 314 home-to-work trip observations were included in the sample for the mode choice analysis. Fifteen of the reported trips did not provide a detailed address, and further trips were eliminated because the trips were made from a major access road where the three sub-modes were not in direct competition. From these 287 valid observations, 51.6 per cent used the microbus, 38.9 per cent the stagebus and 10.1 per cent the minibus.

3.2 Explanatory Variables

The following variables relating to the public transport system and to users, together with their source, were used to develop the mode choice models: (a) travel time in minutes (door-to-door, in-vehicle, access and waiting) - from the home interview survey; (b) travel costs -fieldwork derived fares; (c) distance - large-scale maps; (d) household income - one of five income classes based on a description of house type (no question on income was asked in the HIS); (e) sex - from the home interview survey; (f) social status of individual - one of three social groups "highly skilled", "skilled" and "unskilled" based on 20 occupational groups in the home interview survey; and (g) age - one of five age groupings from the home interview survey.

3.3 Computer Program

A computer program called MULOGIT was written and validated to estimate the parameters of a multinomial logit model by maximising the value of likelihood (Dardak, 1989, pp. 204-212). The program was written in GWBASIC for an IBM PC, or compatible. The program is compiled using a special feature of Quick Basic 4 for large data sets to enhance the capacity of the program that is run using the MS-DOS operating system. Data entry may be from standard software such as GWBASIC, DBASE III, Lotus 123 or Word Star. The program was checked using a data set reported in Hensher and Johnson (1981, p. 329, p. 375), who calibrated a model using BLOGIT, developed by the Australian Road Research Board.

3.4 Multinomial Logit Models

Multinomial logit models - or non-linear, or conditional, logit models - are derived from economic theory of rational choice. Although widely applied in the modelling of mode choice, their application to the selection of competing sub-modes of public transport is more novel. The sub-mode that yields the highest utility to the individual user - where utility provides an index as a combination of attributes of transport service and socio-economic characteristics, where each is weighted by its relative importance (Gregory, 1988, p. 94, p. 103) - becomes the preferred alternative. The choice probability expressions for the three sub-modes are:

$$P_s = \frac{\exp(U_s)}{\exp(U_s) + \exp(U_m) + \exp(U_k)}; \quad P_m = \frac{\exp(U_m)}{\exp(U_s) + \exp(U_m) + \exp(U_k)};$$

$$P_k = \frac{\exp(U_k)}{\exp(U_s) + \exp(U_m) + \exp(U_k)}.$$

where,

P_s = probability of choosing a stagebus; P_m = probability of choosing a minibus; P_k = probability of choosing a microbus; U_s = utility function associated with stagebus; U_m = utility function associated with minibus; and U_k = utility function associated with microbus.

The minibus is defined as the "base mode" where no constant is specified in the utility function. The coefficients of the mode-specific explanatory variables in the utility function are interpreted relative to the minibus submode. Twelve different model specifications were tested (with their coefficients, t-statistics and loglikelihood coefficients) with 14 transport systems variables and 9 socio-economic variables. The three criteria for estimating the importance of the variables were: contribution to the overall goodness of fit of model - all coefficients (except the constants) have an a priori plausible sign and are statistically significantly different from zero; the value of the loglikelihood coefficient correlation; and its predicted success table. The utility functions for the model specification with the highest loglikelihood value and highest percentage predicted share are:

$U_s = 0.097 - 0.79X_1 - 0.067X_2 - 0.017X_3 - 0.013X_4 + 0.175X_5 - 0.858X_6 + 0.204X_7 + 0.248X_8$

$U_m = - 0.262X_1 - 0.116X_2 - 0.013X_4$

$U_k = - 0.995 - 0.806X_1 - 0.09X_2 - 0.062X_3 - 0.013X_4 + 0.428X_5 - 0.086X_6 + 0.192X_7 + 0.419X_8$

$LLH(\beta) = - 218.66$; $LLH(0) = - 315.30$; $\rho^2 = 0.31$.

where,

X_1 = mode-specific waiting time in mins; X_2 = mode-specific in-vehicle time in mins; X_3 = journey distance in kilometres; X_4 = fare in rupiahs; X_5 = mode-specific income of traveller; X_6 = sex of traveller (1 = male; 2 = female); X_7 = age group (1 = less than 24 years; 2 = 25 to 34; 3 = 35 to 44; 4 = 45 to 54; 5 = 55 to 64; 6 = more than 64); and

X_8 = occupation group (1 = unskilled; 2 = skilled; 3 = highly skilled). The overall correct prediction of individual sub-mode choice by this model compared with actual individual choice was 54 per cent.

3.5 Testing Walk Versus Public Transport Mode Choice Models

In the Cililitan-Senen study corridor, walking is an important alternative: nearly 50 per cent of all work trips are made on foot. The development of these models needs to be interpreted with care because the exact addresses of home and work for walking mode travellers were not available other than at the traffic zone level. The following assumptions have been adopted. The choice is a binary one between road-based public transport (stagebus, minibus and microbus) and walking. Walking distances are door-to-door distances. For road-based public transport users they were obtained by summing access distance and in-vehicle distance from the home interview survey. To estimate the alternative travel time by road-based public transport, door-to-door travel time by public transport were plotted against door-to-door distance and an equation was derived using linear regression analysis

$$y = 9.48 + 4.73x \qquad r^2 = 0.61.$$

This equation gives the alternative door-to-door travel times by road-based public transport for observed walkers.

Since the number of individuals in the sample - 970 - is relatively large, with only a dichotomous choice of walking or public transport, the goodness of fit of the multinomial model is very good - a very high loglikelihood coefficient correlation of 0.74. Coefficients for journey time, distance specific to public transport and income specific to public transport have statistically significant t-statistics and all coefficients are plausible. The positive, large coefficient of distance specific to road-based public transport (2.439) can be interpreted as when the distance increases, an individual tends to choose public transport rather than walk. Higher income groups also prefer to use public transport, which is shown by its positive coefficient (0.683). The model shows that females are more likely to travel by public transport, as shown by the positive coefficient of sex-specific public transport (0.153).

The calibrated model is

$$P_b = \frac{\exp(-7.222 + 2.439X_3 + 0.683X_5 + 0.153X_6 - 0.055X_9)}{\exp(-7.222 + 2.439X_3 + 0.683X_5 + 0.153X_6 - 0.055X_9) + \exp(-0.055X_9)}$$

$$P_w = \frac{\exp(-0.055X_9)}{\exp(-7.222 - 0.055X_9 + 2.439X_3 + 0.683X_5 + 0.153X_6) + \exp(-0.055X_9)}$$

$LLH(\beta) = -177.92$; $LLH(0) = -672.36$; $\rho^2 = 0.73$.

where,

P_b = probability of choosing public transport; P_w = probability of walking; X_9 = mode-specific door-to-door travel time in minutes (other explanatory variables have been defined in section 3.4).

Of 661 individuals who were predicted to walk, 609 (or 92.1 per cent) were actual walk travellers. Of 309 individuals who were predicted to use public transport travellers, 259 (83.7 per cent) were actual road-based public transport travellers. The model gave an overall percentage correctly predicted of 89 per cent.

4. TRANSPORT POLICY

4.1 Historical Context

Road-based public transport became pre-eminent in Jakarta in 1957, when buses supplemented trams, which were finally withdrawn from service in 1962. Shortage of buses, and maintenance problems, meant that services could not keep abreast of passenger demand, despite an influx of ex-Asian Games buses in 1962, which were privately operated. The gap was filled by microbuses, called opelets, which operated fixed-route jitney services along the former tram routes. Opelets originated in the 1930s when German- manufactured motor car chasses were converted with small wooden cabins capable of carrying nine passengers. Government transport policy from the late 1960s onwards has been towards modernisation and incorporation, especially the elimination of the becaks (Rimmer, 1986, pp. 160-168). There has been a prohibition on converting cars and trucks into opelets, and these have been replaced by microbuses (mikrolets) - fourteen seater vehicles based on the Mitsubishi Colt.

Mortorised road-based public transport is now under different ownership and control and comprises stagebuses, minibuses, microbuses, taxis and bajaj (carrying two passengers). About three quarters of the 2354 stagebuses are under Perusahann Pengankuta Djakarta (PPD) and the rest are operated by the private company, Mayasari Bakti. A sizeable proportion of the minibuses are owned and operated by the Metro Mini Company. The remaining vehicles are operated in cooperatives, such as Kopaja, Kuantas Bima and Miniarta, where each member owns, typically, two vehicles. Microbuses (mikrolets) are privately owned and their drivers hire the vehicle from an owner, who generally operates one or two units. Bajaj are also privately owned and are hired to drivers.

Public transport policy has been influenced by the World Bank - funded Jakarta Traffic Management Study, sponsored by the Directorate General of Land Transport, Ministry of Transport, Communication and Tourism. The recommendations have been summarised by Mogridge (1983). Small paratransit vehicles are seen as the 'root cause' of Jakarta's traffic problems by reducing the average speeds of other vehicles and by being an inefficient user of road space when compared with stagebuses (Mogridge, 1983, pp. 441-443). The current objectives of the Jakarta Government are: (a) to increase public transport supply, as well as to improve the existing public transport system, to meet the demand; (b) to provide a wider opportunity to users to choose any type of public transport mode available in accordance with their preferences; and (c) to increase the market share of public transport when compared with private transport. Priority will be given to investing the bus fleet so that in the year 2005 it will have expanded from about 5100 in 1982 to 11750 units - an increase of 130 per cent. There is a planned modest increase in the number of minibuses and no growth in the number of microbuses, with stagebuses increasing in importance (Table 3).

Table 3
Bus Fleet Expansion in DKI Jakarta Master Plan for the Year 2005

Type of Bus	1982 Number	1982 (%)	2005 Number	2005 (%)
Double Decker	94	(1.8)	1250	(10.6)
Single Decker	1381	(27.1)	5250	(44.7)
Minibus	1872	(36.7)	3500	(29.8)
Microbus	1756	(34.4)	1750	(14.9)
Total Buses	5103	(100.0)	11750	(100.0)

Source: DKI Jakarta Government, 1984, Table 4.27, p. 32

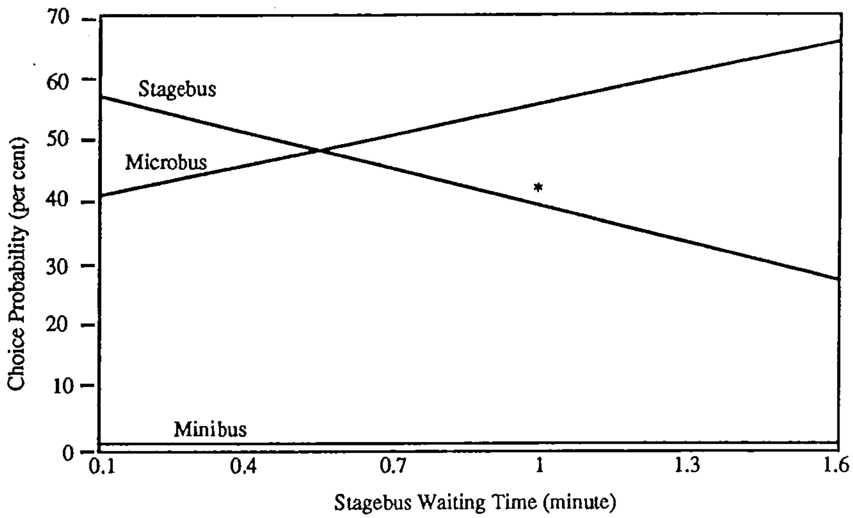
The government's objectives are to increase the market share of public transport and to provide a wider opportunity for the traveller to choose any type of public transport sub-mode available according to their preference. The application of both the modal choice models and the qualitative surveys in our research suggested that there is a contradiction between controlling the numbers and operations of microbuses and espousing free choice to travellers. Passenger surveys show that there are clear differences in quantity and quality of services with unrestricted competition. Higher income groups prefer microbuses because they are more comfortable, have seats available and offer shorter waiting times. The cheaper fare levels, especially for longer distance trips, are important determinants of mode choice for users of stagebuses. The implications are that the modal split on microbuses should not be diminished, as formulated in the DKI Master Plan, but that free competition encouraged.

The justification for this critique of current policy is that the calibrated models outlined in the previous section have been applied to answer questions such as: what improvements to stagebus services are required to make them more attractive to users than microbuses? Or, what are the long-term implications of increases in incomes, a more skilled workforce, or greater separation between homes and workplaces? Dardak (1989, pp. 278-292) plotted 17 graphs to illustrate the relationship between the probability of choosing each sub-mode and each explanatory variable, over a range of plausible values for each variable in turn and holding all other variables constant. These are "aggregate" changes in that values for all explanatory variables are averaged first across all users then inputted to the models. Any aggregation bias could be minimised by data segmentation (see, Hensher and Johnson , 1981) but, from the checks that we have undertaken, the minor differences would not influence the conclusions drawn.

An example of such graphs is given in Figure 1, which shows the percentage change in the share of stagebuses, minibuses and microbuses when stagebus waiting time (and implied service frequency) are changed from the current one minute. Stagebus waiting times must be halved to obtain the same market share as microbuses.

The asterisk indicates the existing wait, and a line drawn parallel to the y-axis of this graph through the asterisk gives the base-case modal split for each sub-mode.

Figure 1
Probability of Choosing Each Sub-Mode and Stagebus Waiting Times, Jakarta



(Note: * Average Stagebus Waiting Time)

The comprehensive analysis (not detailed here) shows that in order for stagebuses to substantially increase their mode share to 60 per cent one of the following transport system conditions must hold: (a) stagebus waiting time reduced from one minute to 6 seconds; or (b) microbus waiting times increased from about 20 seconds to 90 seconds; or (c) stagebus fares less than 100 rupiahs; or (d) microbus fares increased to 250 rupiahs. On the other hand, the following likely trends in socio-economic conditions favour the use of the microbus: higher incomes; a more skilled workforce; and a greater proportion of females in the workforce. There is a further factor: there is a potential market for public transport with those commuters primarily from low-income groups who currently walk to work. Door-to-door speeds (based on access, waiting and in-vehicle time) by public transport are about 6 km/hr and a doubling of speed would attract a 12 per cent share from walking. Walking is highly sensitive to distance and the relative dispersal of homes and workplaces would shift more people into public transport.

Another way of applying the models in policy guidance is to calculate the demand elasticity which measures the relative responsiveness of each sub-mode to changes in each of the attributes. The direct elasticity is the percentage change in the probability of choosing a particular alternative due to a one per cent change in an attribute associated with a second alternative. As the models represent the elasticity of an individual, each equation was evaluated for an individual and then aggregated by weighting each individual elasticity by the individual's estimated probability of choice. Table 4 summarises the direct and cross elasticities for the three sub-modes for waiting time, in-vehicle time and fares. Fare elasticity is relatively high for all sub-modes presumably because for the journeys within the Cililitan-Senen corridor the possible alternatives are attractive substitutes.

Table 4
Direct and Cross Elasticities for Stagebus, Minibus, and Microbus, Jakarta

Variable	Direct Elasticity			Cross Elasticity		
	Stage bus	Mini bus	Micro bus	Stage bus	Mini bus	Micro bus
Waiting time	-0.36	-0.39	-0.10	0.45	0.07	0.13
In-vehicle time	-0.51	-1.09	-0.57	1.03	0.24	0.73
Fare	-0.91	-1.64	-0.85	1.07	0.36	1.24

The implied time value savings in rupiahs for travel to work on public transport have been derived from the coefficients of the mode choice models. The models suggest that waiting time for public transport in Jakarta is about five times as onerous as in-vehicle time. The monetary value of in-vehicle travel time was estimated separately for each mode, and, expressed as a percentage of the hourly wage rate, is 20 per cent for stagebus travellers, 27 per cent for microbus travellers, and 35 per cent for minibus travellers. The average wage rate is about 1480 rupiahs/hour using information from the 1976 National Labour Force survey for the average number of hours worked per week in urban areas of Jakarta (Sigit, 1985), the salary of an average government worker published in Tempo (no. 46/XCII, 1988, p. 18), and the income group of the sample travellers relative to this civil servant wage scale.

5. CONCLUSIONS

This paper has made a contribution to the survey, analysis and mathematical modelling of commuter mode choice and users' preferences where stagebuses, minibuses, and microbuses are in direct competition. A case study of the 10.5 km Cililitan-Senen corridor in Jakarta has demonstrated that it is feasible to measure the relationships amongst users' preferences, operating performance of each sub-mode, and users' choice, and build and calibrate mathematical models that may be applied to assessing transport policy. These models are the first of their kind in Indonesia, although JICA applied them to predict air passenger demand (Yai, 1989). Furthermore, the monetary values of time obtained represents the first of its kind for Indonesian conditions - the only other known study is a before-and-after study of toll charge elasticities (Dardak, 1985). The objectives of public transport policy in Jakarta have been explained, and the contradiction between espousing free choice and controlling the number and operations of microbuses is exposed when user preferences and the results of the mode-choice models are considered.

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