

TRANSPORT AND COMMUNICATION FOR URBAN DEVELOPMENT CAR POOLING IN KUALA LUMPUR PUBLIC PERCEPTION

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INTRODUCTION

In 1992, it was estimated that there were some 600 million cars, vans and trucks throughout the world. About 70% of these were found in the industrialized western countries, 10% in Japan, 12% in the developing countries (including Malaysia) and another 8% in Eastern Europe and the Soviet Union (Lowe, 1990, and Bleviss & Walzer, 1990). World wide some 35 million cars are being produced each year, and a net total of 20 million cars is added to the world's fleet of cars (Viek & Michon, 1992). It was also estimated that if a third of the world's population in the year 2010 would drive cars, there would be two billion motor vehicles altogether. At 50% and 70% worldwide car ownership in 2010, these total numbers of cars would be three and four billion, respectively, for the projected world population of six billion people. Though this seems unbelievable, it is however, not unrealistic.

The level of car ownership in Kuala Lumpur is high not only when compared with other Malaysian cities, but also with that of other developing countries. The number of private cars in the city in 1981 was 61,752. In 1990, this figure rose to 247,677, an increase of over 300% over a nine-year period. Measured in terms of private cars per 1000 population, it was shown that the proportion of car-owning households increased from 60 per 1000 population in 1981 to 160 per 1000 population in 1990. Private car ownership in the city was estimated to reach 263 per 1000 population in the year 2000; or 1 car to every 3.8 people. Given the average household size in the city of approximately 4.2, it appears that there will be slightly more than 1 car to every household in the city in the year 2000.

The rates of increase in car ownership are generally higher for Kuala Lumpur than that of the entire country and Selangor, the state in which Kuala Lumpur is located. Between 1982 and 1984 Kuala Lumpur recorded increases ranging from 25% to 34% compared to 10% in case of the entire country and only 6% to 8% in the case of Selangor.

The increasing growth rates of car ownership consequently, will bring about direct positive effects on both mobility and accessibility. From a ratio of 1 car to every 32 people in 1973, this factor is considerably reduced to 6 and 4 people per car in 1990 and the year 2000, respectively.

The increase in car ownership, inevitably, will have a profound effect on the demand for private travel. A traffic count in 1980 showed that out of a total of 2.3 million person trips entering/leaving the city on a typical weekday, 65% were made by private cars. The remaining 35% were divided between buses 32% and taxis 3%. A similar study conducted in 1990 showed that this proportion increased slightly in favour of the private cars i.e., 67.4% private mode and 32.6% buses. In terms of vehicle carrying passenger movements, the significance of the private mode over that of the public transport mode was even more profound. Ninety-two percent of the total movements observed in 1980 were made by private transport vehicles compared to only 8% of public transport. On the whole, the proportion of cars to the total traffic volume measured along the major commuter corridors into the city varies from 60% to 72%.

With the increase in car ownership, it was estimated that the demand for travel to the central area of the city will increase far beyond the capacity of the road network, even after improvements to existing roads and new road constructions have taken place. Recognizing that individual car mode is approaching diminishing scale efficiencies, a formula is therefore required whereby car usage can be brought to a tolerable level.

Recent developments in car usage are worrying to both policy makers and concerned citizens alike. There is growing concern for noise and atmospheric pollution, traffic congestion, accidents, energy use and conservation, environmental decay, etc., and all these are the result of excessive use of the motor vehicles. The ubiquitous use of

motor vehicles has become formidable threat to the natural environment and to the quality of social and economic life. There is therefore an urgent need to stop, or at the very least, reduce, this trend of growth. The ownership and use of motor vehicles must be significantly reduced in the years to come. There must be a compromise between the desire and the need to travel. The concept of sustainable development as applied to the area of human mobility and transportation can only materialize when motorized transport is limited to serving only the essential needs of society.

Ridesharing as a strategy to overcome the acute urban traffic problem falls under the broad policy measures of Transportation System Management. Ridesharing includes carpooling, vanpooling and shared taxi system. Being a transportation system management option, it is therefore, aimed at optimizing the movement, of people and goods rather than vehicles. The main advantage of this strategy is that it does not alter the level of transportation supply in the urban environment by inducing travellers to use existing vehicles at higher load factors. It is indeed, a measure to reduce demand while maintaining a constant level of supply of facilities. Carpooling is most effective when it comes to maximum utilization of existing resources both fixed and replenishable.

DEFINITION

Car pooling in Britain is defined as a regular arrangement between car owners who take turns to drive their car and give a lift to the other(s)".

Car pooling in Esso Malaysia, Kuala Lumpur, is defined as those who drive to work with at least 1 passenger. Both the driver and the passenger must be employed by Esso. An Esso employee who share rides with a non-Esso employee is not considered as car pooling. Similarly, Esso employees who are husband and wife who commute to work in a single car does not constitute car pooling.

Car pooling in Kuala Lumpur is, conceptually, defined as an effort by drivers of motor cars who agree to take turn to share rides from places of residence to places of employment. As the definition implies, car pooling therefore refers only to the exercises carried out by the owners and drivers of private motor cars. For example, if two persons A and B would like to car pool, they must first be owners and drivers of cars. They will then organize among themselves as to who is to drive on which day or which route to follow, and so forth. Preferably, A and B would alternate driving on a daily or weekly basis, or on any other basis they prefer. There will not be any charges or fees involved.

Excluded from the definition are those who ride share but do not own a motor car; and those who own motor cars ride share regularly but did not share driving. In these two cases, payment of fees are usually involved.

Operationally, car pooling in Kuala Lumpur is simply defined as those cars with at least two passengers, inclusive of the driver.

CAR POOLING - THE AMERICAN EXPERIENCE

In the United States, car pooling was introduced as an emergency measure during the 1973 oil crisis. Although car pooling in the United States was first introduced in the mid- 1960's, it did not get an explosive start until the oil-crisis of 1973-1974. The energy crisis also saw the enactment of the Emergency Highway Energy Conservation Act in January 1974 in order to "... conserve fuel, decrease traffic congestion during rush hours and enhance the use of existing highways and parking facilities.....". The Act sought to ".... encourage the use of car pools in urban areas by means of programmes which included funding of car pool demonstration projects, and the encouragement of local authorities to establish schemes by various means including dissemination of information and technical guidance. The most attractive element of this incentive is the provision of 90% federal grants (up to a maximum of \$1 million per scheme) for the development of matching systems, designation of priority road apace and parking space, publicity and promotion.

The Federal Energy Agency which was formed as a result of the oil crisis also supported "... all forms of ride sharing in order to conserve energy." Further, in 1975, the Urban Mass Transit Act and the Federal Highway Administration called on all urban areas to implement Transportation System Management scheme. Ride sharing is an important element of the scheme. In addition to that, the Clean Air Act which was enforced by Environmental

Protection Agency requires all local authorities to produce Transportation Control Plans - intended to increase ride sharing in carpools, van pools and on public transport by the use of publicity, and by statutory involvement of all large employers.

With the help of demonstration grants and sponsorship, government agencies were able to promote ride sharing as well as investigating the appropriate methodologies and hardware. Some of these exercises were carried out 'in-house' with the help of federal agency staffs e.g. to provide pool matching and brokerage services. Altogether, about 106 car pool projects were set up under the Federal Demonstration programmes. The nationwide advertising campaign helped increase public awareness of the ride sharing concept and also helped prepare the ground for local initiatives.

However, car pooling is not an end in itself. It is a first step toward luring the lone driver into sharing rides. Past studies have shown that personal contact, or some prior affinity or relationship between potential poolers are important. This was undoubtedly the reason why in the United States, single-employer based schemes have generally fared better than multi-employer or community-wide scheme. Coffee break meeting and the appointment of liaison officers within organizations are two strategies for successful carpooling.

The United States experience suggests that ridesharing will only increase significantly if there exist clear incentives to the participants. The most important incentives to ride-sharing appears in practice to be reserved road space and parking space, and the absence of a convenient alternative mode e.g. where there are no public transport services. The reservation of road space for high occupancy vehicles is therefore essential as shown in Houston, Washington and California.

Studies have shown that the concern for energy or pollution issues are not real motivators for individual or employers to participate in ride sharing programmes. Operationally, the objective of the United States ride sharing programme was to reduce the vehicle miles travelled by single occupancy vehicles.

Some lessons that can be learned from the United States experience are as follows. For car pooling to be attractive among commuters:

- There must be a substantial increase in the price of petrol;
- There must be clear incentives e.g. preferential parking spaces;
- If the schemes are to succeed, an efficient and dynamic leadership is necessary;
- Spontaneous formation of a pool is equally important as the official matching service;
- The personal touch is an important element in any car sharing matching service;
- Efforts for ride sharing should be concentrated within recognized groups, rather than spread across the community. New pools were largely formed when participants have a clear affinity with each other;
- The employer of an organization plays an important role in promoting and making the carpool a success;
- Loss of flexibility due to joining a car pool is the most significant drawback of the car pooling programme.

Conditions Favouring Ridesharing in America

Experiences in the United States have shown that, generally, the following conditions favours ridesharing:

1. Favourable Regulatory and Political Setting

- a. The new Federal Clean Air Act of 1990 requires that states with severe and extreme ozone non-attainment areas submit a revised State Implementation Plan (SIP) requiring employers of 100 or more employees in such areas to implement programmes to increase the average passenger occupancy per vehicle in commuting trips between home and workplace during peak travel periods to a level not less than 25% above the average vehicle occupancy. Within 2 years after the SIP submission, employers must submit compliance plans which convincingly demonstrate that compliance is achievable by a fixed date.
- b. For example regulation XV of the South Coast Air Quality Management District requires all employers who have 100 or more employees to submit a trip reduction plan to increase average vehicle ridership. This plan is to be reviewed and approved by SCAQMD, and updated annually.
- c. Transportation Management Plan (TMP) Ordinance #3204 (City of Alexandria, Virginia). In 1987, the

Alexandral City Council determined that traffic congestion resulting from new development had to be mitigated if the city was to maintain its attractiveness as a place to live and work. Thus, in May 1987, the Council passed the TMP Ordinance No.3204. The Ordinance requires developers of new projects (office, retail, residential, and industrial) that meet certain square footage threshold to submit a Special Use Permit (SUP) application that must include a Traffic Impact Study (TIS) and a Transportation Management Plan (TMT). The TMP is a comprehensive, coordinated, and continuously operated programme to encourage the use of single Occupance Vehicles (SOV's), and to reduce the peak hour traffic impacts anticipated to be generated by a development project. The goal of the TMP is to reduce the proportion of SOV's by increasing the use of carpools, vanpools, and mass transit during the peak hour.

2. Availability and Cost of Parking

Availability and cost of parking influence the commuter's decision to drive alone, participate in a car pool, or use transit. Ridesharing and transit programmes often have poor results when parking is plentiful and provided at no charge (or subsidized) to commuters.

3. Time Saving on High Occupancy Vehicle (HOV) Lanes

Long commute distances coupled with congestion are obvious incentives to ridesharing,,especially when time can be saved by carpools on special HOV lanes.

4. Large Employment Centres

Large employment centres -anchor one end of the commute trip, and hence provide better matching prospects for the workers, plus a concentrated marketing target.

5. Regular Working Hours with Flexible Starting and Ending Times

Regular working hours enable employees to come and go with their pools, while flexible starting and ending times help employees make ridesharing arrangements both within and outside their work places.

6. Fuel Shortages or Sudden Price Increases

Fuel shortages or sudden price increases seem to have much more effect on ridesharing applications than gradual price increases.

CAR POOLING - THE MALAYSIAN EXPERIENCE

The term "car pooling" is not new to Kuala Lumpur. Car pooling as a strategy to alleviate traffic congestion was identified as early as 1970's in a number of transportation studies. It was first recommended in the 1974 Urban Transport Policy and Planning Studies and, subsequently, in the following studies:

1. Kuala Lumpur Central Area Traffic improvement Scheme, 1975
2. Kuala Lumpur Transportation Study, 1976
3. Second Kuala Lumpur Urban Transport Project, 1982
4. Review of Second Kuala Lumpur Urban Transport Project, 1982
5. Klang Valley Transport Study, 1987.

However, due to a number of reasons, this strategy was not implemented. Some of the reasons cited were:

1. The problem of congestion was not that serious to warrant such measure.
2. The road system in Kuala Lumpur was not suitable for car pool.

Although the cries for car pooling were repeatedly heard, the idea was not taken up until about March 1992. The

acute transportation problem facing the city together with the political will were the two factors that largely influence its implementation. The government's commitment came about in March 1992 when it was agreed in the Council of Ministers' meeting that:

1. Car pooling is the most cost effective way of reducing traffic congestion, pollution and the consumption of petrol.
2. The government should take the initiative to start car pooling in all its Ministries and agencies in Kuala Lumpur.
3. City Hall would initiate a publicity campaign on the advantages and benefits of car pooling.

Initially it was suggested that, all government officers in the Federal Territory who drives to work shall be registered for the purpose of matching with those who reside close by or who travel on the same route. Following this, a number of committees were set up in the Federal Ministry of Transport. These committees were inter-departmental in nature, and were both technical and administrative.

From the operational point of view, it was felt that a systematic incremental approach should be adopted in implementing car pooling in Kuala Lumpur, beginning with promotional and advertising campaign, route feasibility studies, test project, obtaining institutional support, and so forth. It was rightly realized that the success of this programme depended totally on the support of individuals and institutions. As such, promotional campaigns, advertisement and the re-education of the general public on the advantages and benefits of car pooling are of paramount importance. It was with this realization that a sum of Federal money amounting to approximately \$7 million was spent between June 1992 and July 1993 in electronic advertising alone. Promotion and campaign form the first stage of the car pooling implementation programme in Kuala Lumpur. This was supposed to be followed by the second phase which involves feasibility studies. Consequently, following this period of promotion and campaign, consultants were appointed to undertake route feasibility studies. This ultimately will result in the identification of the most feasible roadways or routes for High Occupancy Vehicle use. The third phase, which is the final phase, involves the implementation of the car pool programme in Kuala Lumpur (Ministry of Transport, 1994).

Credit must be accorded to City Hall for its effort in initiating and promoting car pooling. Its first commitment to the cause was the setting up of the Car Pooling Secretariat for the Federal Territory of Kuala Lumpur. The objectives of this Secretariat were:

1. To coordinate the implementation of car pooling in City Hall, in all Government agencies, private companies as well as the general public in Kuala Lumpur.
2. To inform and educate the general public about the advantages and benefits that can be derived from car pooling.
3. To provide the match-making service.
4. To encourage car pooling among commuters.

This secretariat with an estimated staff of about 18 personnel was placed under the auspices of the Urban Transport Division of City Hall. It was ready to swing into action by the end of 1992. The early moves by City Hall toward car pooling among its staff started with promotional campaigns followed by perception and opinion studies to gauge staff support and to discover the best option for implementation. Unfortunately, the result of the survey was not encouraging. There was little commitment and support for the strategy. Even though action plans were carefully thought out and drawn, the strategy was not implemented (City Hall, Kuala Lumpur, 1994).

A number of significant events, however, took place at about the same time. First, the Council of Ministers suggested that City Hall make use of bill boards in its advertising campaigns. Second, the Honourable Minister of Transport announced on 2 July 1992 that a committee to be chaired by the Minister himself shall undertake the advertising campaign. Indeed, a number of committees were formed within the Ministry of Transport after that, and as a result, numerous advertisements were seen on both the electronic and the mass media. Third, the change in leadership of City Hall in about October 1992, inadvertently, has an effect on the continuity of its planned programmes. Car pooling, unfortunately, is one of them.

The turn of events outlined above saw the activities of car pooling literally being taken over by the Federal

Ministry of Transport. Consequently, the role and function of City Hall as far as car pooling is concerned became unclear. Up to this date, this role was never revised, redefined or addressed. In addition to that, a number of senior City Hall personnels including a few from the Urban Transport Division were called upon to sit in the Ministerial Committees. This somehow, nullified the car pooling activities of City Hall.

Car Pooling - City Hall, Kuala Lumpur

Initial attempts to introduce car pooling in City Hall, Kuala Lumpur saw mixed and unfavourable reactions from the staff. Out of a total of 937 who were matched only 269 (29%) responded by providing feedbacks. The remaining 71% of the staff did not respond. Out of the 269 who responded, 61 (23%) did not agree to car pool. This brought the total number of matches made City Hall staff who did not favour car pool to 729 (78%) of the total. Of those who responded to the match, only 106 (39%) agreed to car pool. The remaining 102 (38%) said they already have passengers in their cars (wives, children and friends). Among the reasons given to reject car pooling were:

1. The car is required for field work.
2. Irregular/return trip.
3. Unfavourable match.
4. Different routes taken to places of employment.

It was felt that the way to get car pooling off the ground was to control the provision and availability of parking spaces. Unlimited supply of spaces encourages driving to work. Limiting their supply will indirectly influence potential drivers to leave their cars behind. With this strategy in mind, a number of alternatives were formulated. These alternatives are outlined below:

1. Only those who car pool (a driver plus a minimum of 1 passenger) will be allocated a parking space. For those who currently enjoy a parking space but do not car pool, these privileges will be taken away unless it can be shown that:

- The drivers already have passengers in their cars, who are City Hall staff.
- There is a need to use the car for field work.
- He/she is senior staff.

2. All employees allocated with parking spaces will be charged a parking fee except those who car pool. Parking charges will be organized in the following manner:

- Full charges for those who do not car pool.
- Reduced charges for those who drives with other employees of City Hall.
- No charges for those who car pool.

3. City Hall staff currently allocated with parking spaces may only use them on certain days only. The schedule is as follows:

- Monday, Wednesday and Friday: Cars with the last figure in the number plate showing odd number.
- Tuesday, Thursday and Saturday: Cars with the last figure in the number plate showing even number.

This control measure ensures that each City Hall employee gets to use the parking space 3 times a week. Alternative arrangement will have to be made for the other 3 days. Car pooling is hopefully, an alternative choice. Operationally, this measure will reduce the number of cars driven by half. Parking demand hence, will be reduced by half.

It is without doubt that car poolers will be guaranteed a parking space each day. In addition to that, the following incentives are being reviewed:

1. Strategic location of parking spaces for car poolers e.g. close to entry/exit points, basement parking, etc.

2. **Guaranteed Ride Home:** This incentive ensures that an employee who car pools will be reimbursed for his/her taxi fare in case of an emergency requiring him/her to rush home or when required to work after normal office hours. To prevent abuse, some control on the number of claims submitted by a pooler is necessary e.g. a maximum of one claim per month, etc. These claims, must also be certified by the head of department.
3. **Insurance Coverage:** Car poolers are allowed to claim for expenses paid in respect of the following car insurance policies:
 - Passenger liability coverage
 - Personal accident.

There is also a possibility that City Hall, upon consultation with the insurance company shall pay for the above premium. In addition to that, car poolers may be subsidized for their initial car insurance policy.

Car pooling - Esso Malaysia, Kuala Lumpur

Car pooling in Esso started in early 1993. The idea for car pool among Esso employees indeed, was highlighted way back before that. As such, car pooling in Esso was not a response to the call by the Federal Authority for car pooling in the city, but rather a pro-active initiative on the part of the Management of Esso. The factors that contributed toward its implementation in Esso though, in part was due to the severe traffic congestion in the city, the prime reason was that associated with parking spaces. There was simply not enough parking spaces for all employees, resulting in some having to find private mud-lot parking in the vicinity. Parking fees within the city area is also expensive i.e. between RM3.00 - RM4.00 per day (1993).

Car pooling in Esso is defined as those who drive to work with at least 1 passenger. Both the driver and the passenger must be employed by Esso. An Esso employee who share rides with a non-Esso employee is considered as car pooling. Similarly, Esso employees who are husband and wife who commute to work in a single car does not constitute car pooling.

Car pooling in Esso come under the auspices of the Human Resource Department. Three staff were appointed to administer the programme. This department kicked off the car pool programme by sending out questionnaires to all employees to gauge employees support. The questionnaire also collected personal data such as, age, sex, work schedule, place of residence, intention to pool etc.,. The data base was then sorted out by places of residence. Altogether, 13 major areas of residence were identified. Each major area of residence serves as a nucleus for pooling. These areas include; Sungai Besi, Ampang, Taman Maluri, Subang Jaya, Shah Alam/Klang, Kajang, Serdang/Bangi, Taman Melawati, Cheras, OUG/Old Klang Road, Kepong/Segambut, etc. An area leader was identified to take charge of each area. Match-making was carried out by area leaders.

From the initial questionnaire survey, between 100 to 150 respondents expressed their interest in the programme. By the end of 1994 i.e. 2 years after its implementation, some 55 cars or 124 employees (about 10% of the total Esso employees) participated in the programme, and the number is gradually increasing with more showing interest in the programme. To encourage more employees to participate, a number of incentives were offered. This includes:

1. Free basement parking. In cases where basement parking is insufficient, employees were reimbursed to a maximum of RM 100.00 per month.
2. Free Liability Insurance Coverage to poolers.
3. Welcome gifts, which includes, safety related items, first aid kit, visors, torch lights, etc.
4. Reimbursable taxi fares for poolers who need to work after hours.
5. Annual lucky draws where 3 prizes valued at about RM3,000.00 were given out.

In Esso, the drop-out rate among poolers is about 10%. Among the reasons given for this are: inconvenience, change in work schedules, and change in places of residence.

RESEARCH OBJECTIVES

Research on the aforementioned car-polling activity was carried out with the following objectives:

1. To assess public acceptance and support of car pooling in Kuala Lumpur, and
2. To suggest alternative implementation strategies for Metropolitan Kuala Lumpur.

RESEARCH METHODOLOGY

Data required in this study was collected primarily by personal questionnaire survey. Two types of data were collected namely, the socioeconomic and travel characteristics data, and the attitude, belief and perception data. The former collected data on ages of head of household and spouse, levels of educational attainment, family size, total household income, vehicular ownership, places of employment, etc. while the latter collected data on what respondents feels about car pool, their awareness, their support, etc. The information gathered in Section I will eventually be linked with those in Section II to provide greater insight and understanding of the problems being investigated.

The study area was defined by the administrative boundary of the City of Kuala Lumpur. As the population of Kuala Lumpur is large, multi-racial and made up of different socioeconomic groups, attempts were made to ensure that the sample taken was very much representative of the population. The stratified random sampling method was therefore used. Stratification was based largely on the racial composition of the population. Attempts were also made to incorporate the diversity in economic background of the population in the sample taken.

The selection of individual units for interview were done at random. Selection was based on 1 in every dwelling units, with the values of depending on the size of the housing estates. Generally, 1 in every 3 dwelling units were selected for interviews.

Ten field assistants were recruited from Universiti Teknologi Malaysia and Institute Technology Mara. These assistants have prior experience in conducting household interviews, and have undergone formal instructions in Research Methods and Survey Techniques in their course work. Efforts were made to ensure that the questionnaires were correctly filled by going through all the questions with each field assistant at the end of each field day. This allowed for any misinterpretations and mistakes if any, to be corrected before the next field day. Altogether, a total of 305 household surveys were conducted.

Socio-economic profile of households interviewed

No. Characters	Category	Frequency	% share
1. Ethnic origin	Malay	155	51
	Chinese	127	42
	<i>India</i>	20	7
	Total	305	100
2. Marital status	Single	97	32
	Married	206	68
3. Age of head of household	20 - 30	110	39
	31 - 40	114	39
	41 - 50	60	20
	51 - 55	6	2
4. Level of education of head of household	Standard 6	6	2
	Lower Cert. of Educ.	23	8
	GCE 'O' Level	81	27
	GCE 'A' Level	43	14
	Vocational Cert.	39	13
	Undergraduate	68	22

5. Employment type of head of household	Degree	42	14
	Graduate Degree		
		54	18
	Professional		
	Administrative	94	31
	Officer	55	18
	Clerical	2	1
	Labourer	21	7
6. Monthly household income	Service	60	20
	Sales, Marketing, etc.	17	6
	Education		
		15	6
	0000 - 0750	49	19
	0751 - 1500	54	21
	1501 - 2000	48	19
	2001 - 3000	34	13
	3001 - 4000	20	8
	4001 - 5000	15	6
5001 - 6000	20	8	
More than 6000			

Source: Household Questionnaire Survey, Kuala Lumpur, November 1993.

RESEARCH FINDINGS

Journeys to work ranged from 0.1 mile to 35 miles. The average distance travelled to work was 7.3 miles. A large majority of the respondents (65%) travelled between 3 to 10 miles daily to work. Incidentally, about one fifth (20%) of the respondents travelled less than 3 miles to work. Those who travelled more than 10 miles made up approximately 16% of the respondents.

In terms of the time taken for these work trips, it was noted that the mean travel time was 44 minutes, while the mode was 60 minutes. About a quarter of the respondents took no more than 20 minutes to get to work. Fourteen percent of the respondents took between 60 and 90 minutes to get to their places of work. Work trips were therefore short, especially in terms of the distance travelled. These findings, however, should be viewed with caution as they relate only to city residents. Work trips would probably be much longer if the samples were to include those who lived outside the city i.e., in the surrounding townships and neighbouring state. Relating distance travelled with the time taken, it can be observed that on the average, the travel speed for journey to work is approximately 7 mph to 10 mph.

For the journey to work, the private car was extensively used. Eighty-five percent of the respondents used the car to work regularly, and without any restriction. It is safe to conclude that those who own cars use their cars to work. Further analysis showed that of those who used the car to work, 90% drove the cars themselves. The remaining 10% travelled in someone else's car.

From the survey it was also realised that 46% of the respondents drove to work alone. Vehicles with passengers (other than the driver himself) amounted to 54% of the total. The number of passengers per vehicle varies from 1 to 7. Vehicles with only 1 passenger (other than the driver) make up about half of the total. Those with 2 passengers made up about 29%, while those with 3 passengers about 11%. Similarly, 11% of the vehicles with passengers carried more than 3 people. Of those who have passengers in their cars, a larger proportion (59%) were Malays. Only 34% of the Chinese respondents have someone in their cars. Consequently, a larger proportion of the Chinese respondents (56%) drove alone as compared to only 44% of the Malays.

Analysis by employment type shows that among the clerical employees (typist, clerks, secretaries, etc.) a larger proportion i.e. 71% have passengers. Only 29% work. The proportion of Professionals and those in the Managerial sectors who drove alone as opposed to having passengers are almost similar in proportion i.e. 50% drove alone and

another 50% drove with someone. This suggests that there is a higher tendency for clerical employees to carpool as opposed to those in the professional and managerial sectors.

Further analysis also showed that medium distance commuters i.e. between 5-9 miles, were those group that were more likely to have passengers. Sixty-four percent of those who travelled between 5-9 miles to work have someone with them, as opposed to 36% that did not. The reverse was true for short distance commuters i.e 5 miles or less. For this group, between 56% - 70% of the commuters drove alone. Only 30% - 44% drive with someone. This suggests that distance to work may be directly related to the number of passengers. On the question of the commuters willingness to add passengers to their cars, the analysis result suggests that there is no relationship between the distance travelled and willingness to add passengers. Willingness to add passengers may be independent of commuting distance. Household income too has no relationship with willingness to add passengers.

Data from the survey also showed that a large proportion (65%) of those who shared rides to places of work were not family members of the drivers. Only 35% of those who shared rides were family members of the drivers. It is also interesting to note that a large proportion of those who shared rides (91%) did not make any monetary payments to the drivers. A small minority (9%) paid the drivers.

Of those who drove to work, a larger proportion (44%) did not agree to add passenger(s) to their cars or vehicles. Thirty-two percent agreed to do so, while approximately one fourth of the respondents were not sure whether they should take any passenger or not. While age showed no relationship with willingness to add passengers to cars, marital status, however, did have a slight effect. It appears that a slightly higher proportion of the 'single' respondents agreed to add passengers to their cars compared to those already married. Table 1 summarizes the reasons given as to why passengers were not welcomed.

Table 1. Reasons for refusing to add passengers

Reasons	Frequency	Percentage
1. Different before/after work schedules	57	35
2. Different destinations	44	27
3. Inconvenience	37	22
4. The car is already full	18	11
5. Do not welcome strangers	8	5
6. Deprived privacy	1	-

For those who welcomed new passengers additional passengers, the reasons given were shown in Table 2.

Table 2. Reasons for willingness to add passengers

Reasons	Frequency	Percentage
1. Ability to make new friends	13	21
2. Ability to share cost	15	24
3. Ability to help one another	35	55

In terms of willingness to add passengers to their cars, it was realized that among the professionals, a higher

proportion (73%) did not agree to do so, compared to only 49% among the administrators/management staffs, and among 55% among the clerical staffs. Generally, about half of those who commute to work (44%) did not agree to take additional passengers, 33% agreed to do so while the remaining 24% were uncertain.

Generally, parking at work places was not a serious problem for most drivers as 60% of them were each provided with a space for their personal use. The remaining 40% have to look for parking spaces, daily. Parking was free for most drivers (70%). Only a third of the respondents paid for parking. The amount paid varies from RM12 per month to RM300 per month with a mean of RM79 and mode of RM60. For a larger majority of the respondents (64%) parking was not a problem. Only 36% of the respondents expressed dissatisfaction with the parking facilities.

As expected, a slightly higher proportion of those who faced parking problems in the city (70%) felt that carpooling should be introduced, compared to 62% among those who have no problem with parking. Parking provision at work places may also affect decision on carpool. The result of the analysis showed that a higher proportion of those who enjoyed free parking at work places (55%) did not agree to carpool, compared to those who agreed (38%). Among commuters who were not provided with car parking facilities, a higher proportion (50%) agreed to car pool compared to 34% of those who were ensured a parking bay at their work places. Parking provision may have an effect on carpooling.

Data from the survey also showed that a respondent spent an average of RM322 per month on transportation. This includes expenses on gas, parking fees, lubrication and maintenance services. It does not however, include monthly installation payments for the vehicles, change of tyres or other major engine or body work.

On the issue of traffic congestion, respondents, generally, agreed (95%) that the situation in Kuala Lumpur was bad. Indeed, 60% of the respondents said that the situation was very bad. Traffic congestion, according to the respondents occurred because of the following reasons, listed in the order of importance:

1. Fixed work hours, resulting in the rush into the city.
2. Too many cars on the road.
3. Narrow width of roadways.
4. No proper transportation planning.
5. Bad driving habits.
6. Poor public transportation services.
7. Too many single occupancy vehicles.
8. Poor road conditions exacerbated by road construction.
9. Mixed land use activities in the center thereby attracting traffic in large numbers.
10. Too many roundabouts, traffic signals, intersections and one way streets.

Respondents also agreed that traffic congestion in the city was disturbing making driving difficult and unpleasant. The analysis also showed that among the respondents who said that traffic congestion in the city did bother them, only 41% agreed to carpool as a passenger. Fifty percent did not wish to do so, while 9% of the respondents were unsure. For the same group of respondents, the proportion who wished to take turns driving was much smaller i.e. 38% compared to 54% who did not agree to take turns driving. Again on the issue of traffic congestion and carpooling, even though traffic congestion did bother a large number of respondents, a higher proportion (44%) still would not allow others to share ride with them. Only 32% of the respondents who said traffic congestion bothers, agreed to allow others to share ride. Twenty percent were not sure whether to share or not.

On the question of whether respondents were aware of car pooling currently pursued by the Government as a strategy to alleviate the problem of traffic congestion in the city, 97% of the respondents said they were aware. Television, it seemed, was the most effective means of campaigning or advertising as most of the respondents (62%) learned of the car pooling programmes from this source. Newspaper and magazines as well as the radio were also effective.

Respondents were also asked to evaluate the effectiveness of car pooling as a strategy to reduce traffic congestion in the city. Half of the respondents interviewed felt that the car pool would not be 'so effective' to reduce congestion. Another 25% of the respondents felt that it would be 'not effective at all'. Only 25% of the respondents

interviewed felt that car pooling would be an effective programme to reduce traffic congestion in Kuala Lumpur. Analysis by racial background showed that only 18% of the Malay respondents felt that carpool would be effective, compared to 29% of the Chinese respondents and 37% of the Indians.

The data obtained suggests that there is no relationship between the levels of education and respondents evaluation of the effectiveness of carpool ($R = 0.0185$). However, the professionals appear to be the group who thought positively of the programme, with 34% believing that it would be effective. Among the Managerial workers, only 19% felt that carpooling would be effective, while a quarter (25%) of those in the clerical, sale, marketing and services felt the same. There was, however, no relationship between levels of education and respondents rating of carpooling ($R = 0.0185$). Table 3 outlines the reasons given as to why they felt that car pool would not be effective.

Table 3. Reasons car pool will not be effective

Reasons	Frequency	Percentage
1. Different before/after work schedules	101	33
2. It will not get the public support	51	18
3. It is not practical, though good in theory	46	15
4. Non participation by elected officials, senior executives and managers	13	5
5. No sense of security	10	4
6. It is not a direct and long term solution	9	3
7. Inability to control car ownership and usage	7	2

On the question of whether car pooling should be introduced in Kuala Lumpur, two third of the total respondents interviewed felt that car pool as a strategy to reduce traffic congestion should be introduced, as opposed to a third who felt that it should not be introduced. A larger majority were, therefore, in favour of the car pooling. Analysis by race showed that both the Chinese and Indians respondents were more in favour of carpool compared to the Malays i.e. 72% vs 62%. There was, however, no difference between male and female respondents ($R=0.0371$). Those with at least an undergraduate degree showed a slightly lower support and confidence in carpool (55% - 60%) compared to those without college degree (68% - 78%). A larger proportion of those who commute with passengers (60%) felt that carpooling should be introduced compared to 40% of those who drove alone to/from work. Greater participation may perhaps, be expected from the present poolers. Reasons for respondents supporting car pooling are shown in Table 4.

From the above it can be seen that about three quarters of the total respondents interviewed believed in the ability of the car pool to reduce traffic congestion in the city of Kuala Lumpur. Another 14% felt that it could be effective, depending on the locality.

Table 4. Reasons for supporting car pooling

Reasons	Frequency	Percentage
1. It is able to reduce congestion	111	72
2. It may be effective in certain part of the city	21	14
3. It can save time and money	12	8

4. It help reduce pollution	8	5
5. It help reduce useful life of the car	3	2

Respondents were also asked whether they would like to participate in car pooling as a passenger. Half of the respondents interviewed did not agree to be passengers in a car pool. Forty-one percent agreed to be passengers while 9% were not sure of the answer. Comparing male with female respondents, it was shown that a larger proportion of male respondents (56%) did not agree to be passengers in a car compared to female (37%). A slightly higher proportion of respondents whose total household income is less than RM2,000 per month (56%) agreed to carpool compared to those whose income lies above RM5,000 per month. For the latter, the proportion who agreed to carpool lies between 14% - 40%. This suggests that the lower income households may be more supportive of the carpooling than the higher income respondents. Table 5 outlines the reasons given for not wanting to share a ride as a passenger:

Table 5. Reasons for not wanting to share ride as passenger

Reasons	Frequency	Percentage
1. Safety is not guaranteed	24	13
2. Different schedules, destinations, before/after work activities	148	82
3. Social and morality reasons	8	4

From the above, it can be seen that respondents generally disagree to join a car pool as a passenger because of personal commitments, after-hour official duties, family and social activities that require their presence. Respondents were also concerned with loss of safety and morality. The latter was the concern among Muslim women sharing ride with male strangers.

Finally, respondents were asked if they would agree to share driving to work. Again, a larger majority (54%) did not agree to do so. Only 38% of the respondents agreed to share driving. A small minority 8% were not sure of the answer. A slightly higher proportion of the male respondents (57%) did not agree to share driving compared to female (47%). Among those who agreed to share driving, a higher proportion (65%) were married individuals compared to 35% who were single. Of those who drove alone, only 35% agreed to share driving. Fifty-seven percent did not agree to do so. Further analysis of the data also showed that a higher proportion of respondents (70%) whose income was greater than RM5,000 did not wish to share driving, compared to respondents whose income was less than RM5,000 (44.%).

CONCLUSIONS

Car pooling and High Occupancy Vehicle Lanes cannot be expected to solve the traffic or congestion problems of large cities, including Kuala Lumpur. Car pooling is indeed, only one of the many Transportation System Management Strategies that could be applied. The fact that it is used with a significant amount of success in other cities of the world does not mean that it can be applied with a similar degree of success in Kuala Lumpur. Cultural and social values, ethics and religious factors are a few externalities influencing behaviour. The result of the perception studies in Kuala Lumpur suggests that public support of the programme is low primarily because of behavioral factors such as different work schedules, as well as before and after work activities. It is therefore important that the programme for car pooling in Kuala Lumpur take these factors into account. Incentives for poolers, are perhaps another area that requires closer examination.

Car pooling must be seen as one of the many strategies which must be simultaneously implemented before some measurable amount of result can be expected. The use of public transport must be encouraged, and the 'public transport facilities must be upgraded in order to be attractive to commuters. Policies aimed at discouraging private

auto usage must be implemented. Road pricing, area licensing and parking disincentives are possible complimentary programmes. At the same time, intersection and roadway capacity improvements must go on.

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