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Effect of Transport Policies to Shifting Private Car Users to Park-and-ride in Putrajaya, Malaysia

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Abstract: Problems associated with traffic, such as traffic congestion has occurred in Putrajaya due to the increased use of cars. Park-and-Ride (P&R) facility has been introduced to minimize private car into the CBD area. This study is to examine the factors that are influence car users and introducing several new policies (exclusive bus lane and parking charges at worksite parking) to shift to Park and Ride in Putrajaya. The finding were discussed time and cost saving are the important factors to influence car users to use P&R facility. The percentage of car users will shift to P&R was considered high if the bus lane and parking charges are implemented. Introducing exclusive bus lanes will increase the effectiveness (such as punctuality and frequency) of the busses, meanwhile, introducing parking charges will make car user pay more and will increasing their travel cost. To make P&R scheme more successful, introducing exclusive bus lanes and parking charge are the most relevant policy to shift car users to use P&R.

Key words: Park-and-Ride, congestion, Putrajaya, bus lanes, parking charges

INTRODUCTION

Putrajaya is a new federal administration of Malaysia has led to a further increase in private car ownership and only approximately of urban travel is by public transport. In view of the increased number of registered private cars and congestion in Putrajaya, a shift way from car using towards other environmentally modes, public transport have to be greatly improved. Apart from this, Park-and-Ride (P&R) facility has been introduced to minimize private car into the CBD area. The main objective of P&R is to reduce congestion during morning/evening peak hours. P&R have been applied in many countries and cities with main purpose are to encourage the transfer of transportation mode, and to attract travelers shift from car users to bus passengers by providing good service. Many studies have been conducted to use P&R facilities. Seik (1997) were found that cost saving is the major factor that car users switching to used P&R. Seik (1997) found that with the higher charges for entering and higher charges parking at CBD area are the important factors were influenced car users did not travel to the CBD area with they own car. Hole (2004) pointed out that P&R scheme will be well accepted if parking on-site introducing parking charges.

However, despite the growing accessibility traffic problems, P&Rs do not seem to attract the expected number of car drivers. A study conducted by Abdul Kadir *et al*. (2006) has been revealed that travel time and cost were influenced the decision of choosing between private vehicle and bus. Once the car has been purchased by user, little consideration is taken of its cost or the number of bus journeys that could be made for the same amount of money. The car therefore usually appears to be an economical alternative compared with public transport (Ollson 2003). Kamba *et al.* (2007) pointed out that that poor bus services such as unreliable, delay, inconvenience and uncomfortable significantly led to the excessive private vehicles ownership.

Figure 1 presents the number of registered vehicles in Malaysia for 2009. Private cars recorded the highest registration among the all type of vehicle for 2009. Approximately 513954 privates car were registered (Road Transport Department, JPJ, 2010). Mohamad and Kiggundu (2007) reported that the income factor, the provision of various motor assembly facilities and involvement of Malaysian government into automobile manufacturing are the influence factors to the rapid growth of private vehicles in Malaysia.

This study try to investigate what factors will influence private car users to shift to P&R with introducing new policies (exclusive bus lane and parking charges implementation).

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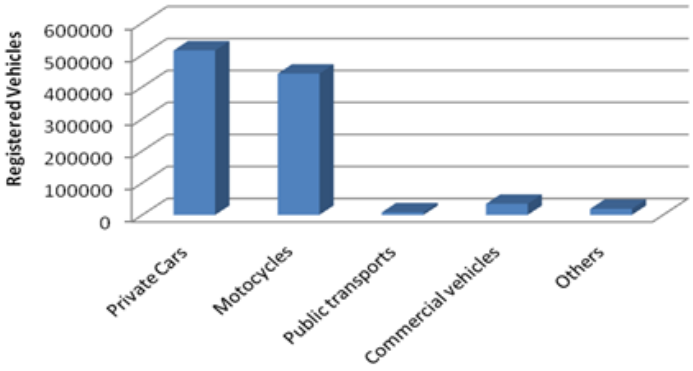

Fig. 1: Statistics of registered vehicles in Malaysia for 2009. (*Source: Road Transport Department*)

MATERIAL AND METHODS

To achieve the objectives of this study, survey was conducted in Putrajaya administration area. A total of 50 samples were collected. Face-to-face approach was employed to each car driver and asked them to filled-up a self administrated questionnaires form. Face-to-face interviews were used to complete the questionnaire for increased accuracy. If the respondent refuses to answer, another respondent were approached to answer. Data were collected by a team of 3 members over a week at administration areas of Putrajaya from 10 am to 3 pm. The questionnaire was designed with four sections; Section A: respondents' background, Section B: respondents' trip information, Section C: knowledge and attitude about P&R usage and Section D: Policy information about P&R. The last part of the questionnaire, respondents were asked about the policies would be introduced to persuade him/her to use P&R.

Analysis Approach:

Statistical procedures were employed to examine the characteristics of car users. Statistical Package for Social Sciences (SPSS) software version 18 was used to coding and analyzing the data. Factor analysis was employed in order to group together those variables which are highly correlated with each other. Correlation tests were then applied on the service attributes to evaluate the strength of relationship among attributes.

RESULTS AND DISCUSSION

Table 1 shows about the demographic of the respondents who involved in this survey. The information in Table 1 reveals that majority of the respondents are non user P&R (98%) and respondents' age less than 40 (76%). Almost 75% of the respondents are male and more than 90% of respondents have completed their study at tertiary level (skill certification, diploma and degree). More than half (64%) of respondents work as semi-professional worker. Most of the respondents (62%) earned monthly salary between RM1001 and RM3000 and they can consider as in middle income range.

Table 2 presents the respondent's driving experience. For driving information, 98% of the respondents are full license holder, meanwhile, only one respondent driving without license. In term of driving experience, it was found more than half (56.25%) of respondents were drove their car more than 10 years. Besides, it was discovered that 33.33% of the respondents drive around 16 to 20 km.

Table 3 shows the result of a factor analysis. The analysis resulted in two factor solutions, which explained 55.61% of the variance. The eigenvalues for those factors were 5.0 and 1.5. All factors have reliability (cronbach's alpha) greater than .709. The two factors were assigned with Primary Efficiency and Supporting Efficiency, respectively.

Table 4 presents about the factors that can influence the respondents to use the current vehicle to make a trip instead of to use P&R facilities in Putrajaya by using likert scale with 1 to 7 evaluation (1 = strongly disagree, 4 = not sure and 7 = strongly agree). All the respondents were asked about the factors that influence them to use P&R. It found that, 42% of the respondents agreed that they will switching to P&R facility if they can saving their travel cost, meanwhile, more than half (58%) of the respondents will switching to use P&R if

Table 1: Socio-demographic of respondents

Description	N	%
P&R user	1	2
Non P&R user	29	98
Total	50	100
	Age	
25 and below	7	14
26 – 30	12	24
31 – 35	12	24
35 – 40	7	14
40 and above	12	24
Total	50	100
Gender		
Male	37	74
Female	13	26
Total	50	100
	Education level	
Primary school	0	0
Secondary school	3	6
Tertiary level	47	94
Total	50	100
	Working sector	
Unemployed	2	4
Semi Professional	32	64
Professional	14	28
Administration	2	4
Total	50	100
	Income	
RM1000 and below	0	0
RM1001 - RM2000	13	26
RM2001 - RM3000	18	36
RM3001 and above	19	38
Total	50	100

Table 2: Respondent's driving experience.

Description	N	%
Type of license		
Full license	49	98
No license	1	2
Total	50	100
Driving experience		
Below 2 years	0	0
2 - 5 years	13	27.08
6 - 10 years	8	16.67
More than 10 years	27	56.25
Total	48	100
Driving distance (km)		
1 - 5	10	20.83
6 - 10	9	18.75
11 - 15	5	10.42
16 - 20	16	33.33
More than 20	8	16.67
Total	48	100

they can save their travel time. Majority respondents with 74% of respondents agreed to switch to use P&R if the frequency of the buses will reduced from every 30 minutes to every ten minutes. Fifty-four percents of the respondent strongly agreed that to used P&R if they were guaranteed with car security at P&R station and 94% of respondents agreed that the security on board is the important thing to attract them to use P&R. Most respondents (44%) agreed that the seat availability in bus make the car users to use P&R facility and more than half (54%) of respondents agreed that the cleanness in the bus will attract them to use P&R. In addition, one-third (36%) of the respondents were agreed that they will use P&R if the buses provided luggage storage to keep heavy luggage and two-third (68%) of the respondents were agreed that if the P&R station provided with extra services such kiosk, shop and automated teller machine (ATM). Overall, finding shows that the attitude of the respondents looks like not similar when it translated into their real world against P&R use.

Six out of nine items were asked and found statistical significance with intention to use P&R facility. Table 5 presents the results of biviarate correlation analysis between influence factors and intention to use P&R. From

Table 3: Results of factor analysis

Attributes	Factor 1: Primary efficiency	Factor 2: Supporting efficiency
Time	0.909	
Cost	0.840	
On board security	0.820	
Car security at P&R station	0.781	
Bus frequency	0.727	
Bus cleanliness		0.796
Luggage storage		0.795
Extra services		0.774
Seat availability		0.745

Table 4: Descriptive statistical analysis.

Attributes	N	Mean	SD
Cost saving	50	4.50	1.843
Time saving	50	4.94	1.778
Bus frequency	50	5.28	1.246
Car security at P&R station	50	6.02	1.253
On board security	50	6.08	1.175
Seat availability	50	4.82	1.395
Bus cleanliness	50	6.02	1.169
Luggage storage	50	5.74	1.275
Extra services	50	5.60	1.552

Table 5: Results of correlation test.

Attributes	Pearson Correlation (r)	95% Significance (p)
Cost saving	0.626	0.000
Time saving	0.704	0.000
Bus frequency	0.334	0.018
Car security at P&R station	0.507	0.000
On board security	0.444	0.001
Seat availability	0.301	0.033

this result, it found that the strong relationship ($r = 0.704$, $p < 0.000$) between the item associated with time saving and intentions to use P&R followed by cost saving ($r = 0.626$, $p < 0.000$). A study conducted by Lam *et al.* (2001) found that with introducing P&R trial scheme was help to alleviate traffic congestion and encourage the use of public transport for work and nonwork trips in Hong Kong. This P&R trial scheme has been accepted by car-owning middle income families it was because they attracted with cost and money savings. In addition, Hamid *et al.* (2008) stresses that, need to be considered about cost savings as well as time savings to switching car users to other alternative mode of transport.

Figure 2 shows the effect of the introduction of parking charges at worksite parking. The result showed that almost half (48%) of respondents were interviewed agreed that the introducing of parking charges will attract them to use P&R. In this moment, no parking charges were imposed to the car users in Putrajaya CBD area. It found that, providing free of charge parking at worksite actually subsidizes car use in CBD area. Hole (2004) was pointed out in her study, one way to reduce the number of cars travel to CBD area with introducing the parking charges at worksite parking. With introduce parking charge will make car user pay more and will increasing their travel cost.

Figure 3 presents the number of car users to switch to P&R if exclusive bus lane will introduce. The result showed 98% of respondents agreed that to use P&R if the government provide exclusive bus lane to avoid P&R's buses from congestion. Wall and McDonald (2007) were suggested that in their study to improve bus service quality including the P&R service, the introduction of bus lanes might be necessary for the improvements to be fully effective. A studied by Sutomo *et al.* (2003), found that the private vehicle users are more willing to shift to public transport if improved system of bus-lanes is applied than by introducing subsidy.

***Conclusion*:**

Some works are still undergoing to develop a behavioral intention model for car users shifting to P&R system. In order to understand the car driver's mode choice behavior and potential mode shift from the car to P&R system, the factor that influence choice of travel mode would be discovered and several policies will be introduced to shift car user to P&R system. In future works, the behavioral sciences theory namely Theory of Planned Behavior (TPB) will be used in understanding and identify the influencing factors to switching private car users to use P&R facility.

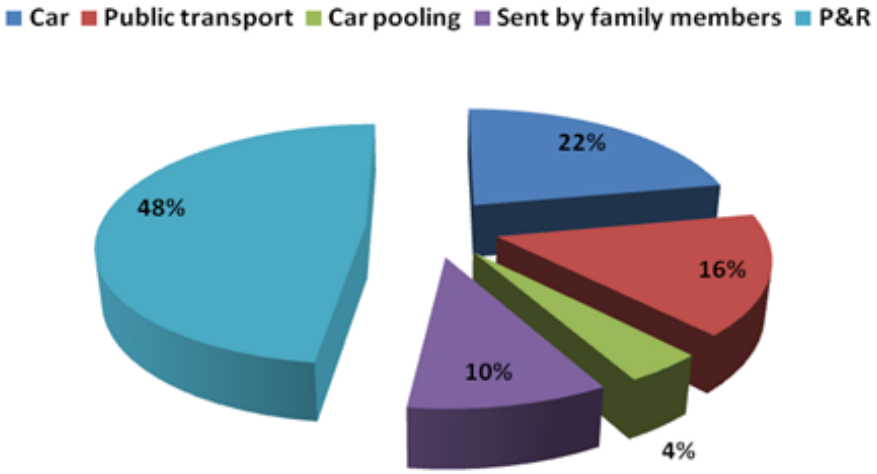

Fig. 2: Number of car user to switch to P&R if parking charges will introduce

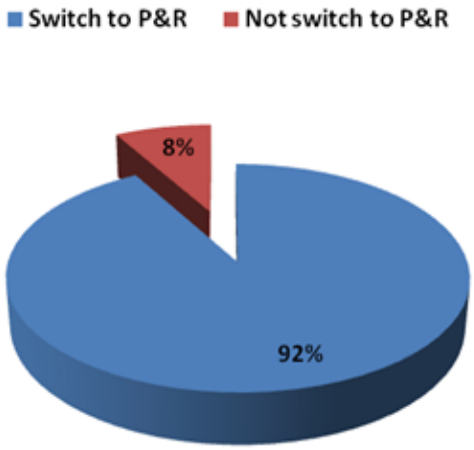

Fig. 3: Number of car users to switch to P&R if exclusive bus lanes will introduce.

As a new city and new federal administrative of Malaysia, Putrajaya have facing same problem like other city in the world. Traffic congestion is another major issue to motorists in Putrajaya. Effective plans to improve the traffic congestion in city centre are deemed necessary. Borrowing the experiences from developed countries, policies such as exclusive bus lanes and parking charges at worksite parking could be implemented to enhance greater use of P&R or public transport. Time and cost are the important factors to influence car users to use P&R facility. With introducing exclusive bus lanes will increase the effectiveness (such as punctuality and frequency) of the busses. In the same time, introducing parking charges will make car user pay more and will increasing their travel cost. To make P&R scheme more successful, introducing bus lanes and parking charge are the most relevant policy to switching car users to use P&R.

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