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By Using Model Shift and Improving the Walking Facilities: A Case Study in Kuala Lumpur, Malaysia

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Article Info	ABSTRACT
	The recent increase in privately owned vehicles has caused numerous problems: traffic congestions, unnecessary fuel lost and global warming are only few of these problems. This study will try to understand people's behavior and modal choice and try to sway them to means of public transportation. A survey of mode choice between cars users in a neighborhood in Kuala Lumpur was conducted. A total of 25 surveys were collected over the course of a month. Among data collected were demographic details such as age, gender, educational level and travel behavior. The data was processed by SPSS software to determine which factors encourages and discourages using private, public transportation or walking. The study highlighted four models travel time reduction, travel cost reduction, and increase the parking charges and improves the walking facility. The sensitivity analysis results show that the main attraction that might switch private car users is travel time and improving the walking facility. The consequences of these would be less traffic on the roads contributing to less pollution and greater safety.

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1.   INTRODUCTION

The most common mode of transport in Malaysia is the private car. Many reasons behind this such as: reliability, convenience and the instituted mode of payment [2], [4]. Using the private car will cause many impacts; traffic congestion, increase in the number of road accident (the no of accident increase 79.642 to 380.589 in the period 1990-2004 [6], [9] environmental impacts in the forms of air, noise pollution and increasing in the energy consumption. The relationship between transport and energy is a direct one, but subject to different interpretations since it concerns different transport mode, each having a specific performance level. There is often a compromise between speed and energy consumption [3], related to the desired economic returns [7], [9], [12]. Passengers and high value goods can be transported by Economies of scale; mainly those achieved by maritime transportation are linked to low levels of energy consumption Per unit of mass being transported [6], but at a low speed. Comparatively, air freight has high energy consumption levels, linked to high speed services [11], [14].

The non motorized transportation or we can call it active transportation and human powered transportation; which is mainly include Walking and Bicycling these modes provide recreation and transportation[1].There are ways to quantify the value of walking (the activity) and walk ability (the quality of walking conditions [13], including safety [16], comfort and convenience) [17]. Walking and walk ability provide a variety of benefits [11], including accessibility [5], consumer cost savings [7], public cost savings (reduced external costs) [9], more efficient land use, community livability, improved fitness and public health

[15], economic development [2], and support for equity objectives. Here is some of the specific ways to improve non motorized facilities Improve sidewalks [16], cross walks paths and bike lanes[12], correct specific roadway hazards to non motorized transport (sometimes called "spot improvement" programs) [17], [19], Improve the management and the maintenance for the facility [18], [19], including reducing conflicts between users, and maintaining cleanliness [9], [18]. A universal design (transportation systems that accommodate people with disabilities and other special needs) [22], [23]. Develop pedestrian oriented land use and building design [24], Increase road and path connectivity, with special non motorized shortcuts[20], such as paths between cul-de-sac heads and mid-block pedestrian links, Street furniture and design features [23] Traffic calming, improvement, traffic speed reductions, vehicles restriction and road space reallocation [21]. Safety education [24], law enforcement and encouragement programs [14], Integrate with transit; bike transit integration and transit oriented development [17], Bicycle parking [12]. Address security concepts of pedestrians and cyclists [8], [11], Personal Security refers to freedom from risk of assault [15], theft and vandalism. Such risks can discourage walking, cycling and transit travel. These problems can be addressed through various programs and design strategies that increase security [7]. These can include Neighborhood Watch and community policing programs [9], special police patrols (including police on foot and bicycles) [21], pedestrian escorts, and monitoring of pedestrian, bicycle, transit and Park and ride facilities. Transit agencies can implement special programs to increase rider security and respond to passenger concerns [17].

A Public bike system (PBS), which are automated bicycle rental systems designed to provide efficient mobility for short, utilitarian urban trips [4], [7]. Public Bike Systems (PBS, also called Bike Sharing and Community Bike Programs) provide convenient rental bicycles intended for short (less than 5 kilometer), utilitarian urban trips[6]. A typical Public Bike System consists of a fleet of bicycles, a network of automated stations (also called points) where bikes are stored [16], and bike redistribution and maintenance programs. Bikes may be rented at one station and returned to another [14], [17]. Stations with automated self-serve docking systems that accommodate 5-20 bikes are located at major destinations and transportation centers, spaced about 300m apart [13], [17], [19]. Use is free or inexpensive for short periods (typically first 30 minutes). This allows urban residents and visitors to bicycle without needing to purchase, store and maintain a bike. PBS are most efficient when bikes are shared many users each day [18]; some systems average as many as twelve daily users per bike [21]. Create a multi model access guide [20], [28], which includes maps and other information on how to walk and cycle to a particular destination [20], [22].

2.   LITERATURE REVIEW

The success of transportation engineering depends upon the co-ordination between the three primary elements, namely the vehicles, the roadways, and the road users [4]. Their characteristics affect the performance of the transportation system and the transportation engineer should have fairly good understanding about them [6], [10]. Vehicle and road factors affecting transportation, the factors influencing modal shift In the process of the mode shift from private mean of transport to the other models there are many factors must be considered. Mainly we need to consider the difference or the gaps between public policy aims and public attitude and behavior. So we can start the review by considering the car ownership and the cost and benefits of travel [8], [12], [16].

The walking facility is Transportation planning and design will not be complete if the discussion is limited to drivers and vehicular passengers [18]. The most prevalent of the road users are the pedestrians. Pedestrian traffic along foot paths, sidewalks, cross walks, safety zones, islands, and over and under passes should be considered [20], [22]. On an average, the pedestrian walking speed can be taken between 1.5 m/sec to 2 m/sec. But the influence of physical, mental, and emotional factors need to be considered. Parking spaces and facilities like signals, bus stops, and over and under passes are to be located and designed according to the maximum distance to which a user will be willing to walk. It was seen that in small towns 90 per cent park within 185 m of their destinations while only 66 per cent park so close in large city [6], [8], [11].

3.   RESEARCH METHODOLOGY
3.1. Research Scope

Many reasons are standing behind making the privet cars most popular mode of travel Such as; travel time, economic factors, reliability and being comfortable. The most acceptable reason for why people prefer privet transport rather than other is car offer opportunities not available by any other means of transport. The previous studies showing us there is minimization in the cost and travel time for the privet cars users, so our challenge is to develop balanced model to reduce the gap between the privet means of transport and the other models. To get a complete transportation planning us should concern about the most prevalent

of the road users (pedestrians) and how to design convenient and safe walk ways according to the main factors that affecting the level of service of pedestrians; design, location and the users.

3.2. Research Design

Research strategy being used is quantitative in character. Basically, this research is based on the primary and secondary data. Following that, the study revolves around the existing Method being used in Malaysia, to gauge uses walking facilities. After that, case study and analytical Model choice behavior and the shift from private to public transportation mode were analyzed using through data collection being interpreted using SPSS and logit model choice model that approach is mainly used on a local level. In several counties surveys are carried out concerning the mobility behavior of the population. In such contexts the willingness to undertake a modal shift was rarely surveyed. It is very likely that the train companies, national and public transport companies have such data for analysis, but the competitive aspects of the situation make it difficult to obtain these data.

The details of the road user's behavior that we got from the data collection and the procedure of the data analysis to establish the model. Figure 1 below shows the determinant variables that were used [1], [2].
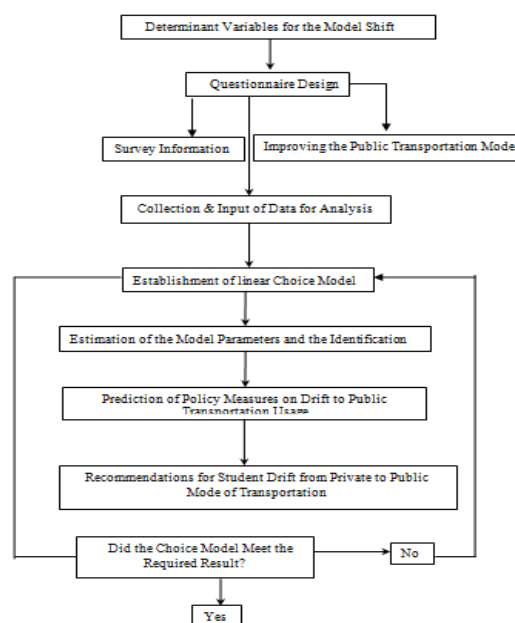

Figure 1. Design illustration of strategies used for data collection and analysis

3.3. Data Collection

Questionnaire that collected different attributes including age, race, and number of members of the household and level of education, thus giving a clear image of their socioeconomic and demographic profiles. Other information collected includes: level of knowledge (of public transport), travel time, travel cost, number of trips and the preferred mean of transportation A total of 300 questionnaires were distributed and collected throughout the process of data collection. The data was collected by personal interview with car users because they are the target of the study.

SPSS analytical system used to determine which parts of the questionnaire were relevant and which were not to each other. The procedure used for the variables assesses the number of commonly used measures and also provides information on the relationships between the individual items in the scale such as gender, nationality, age, household size and mode of transportation and the walking ability the explanatory variables of data collection.

4.   MODEL STRUCTURE

The logic model was used a final model to investigate mode choice behavior of travelers of modes of transport and to determine the tradeoffs travelers make when considering their mode of transport [9], [12].

The proposed model that contained all was used to determine the dependent variables; the logistic functional form is commonly identified as a single-layer "perception" or single-layer artificial neural network. A single-layer neural network computes a continuous output instead of a step function. The derivative of pi with respect to X is computed from the general form [1], [3]:

$$y = \frac{1}{1 + e^{-f(X)}} \tag{1}$$

Where f (X) is an analytic function in X. With this choice, the single-layer network is identical to the logistic regression model. This function has a continuous derivative, which allows it to be used in back-propagation.

The following functional form is used to determine the dependent variables.

$$P = \frac{1}{1 + D\,e^{\alpha(\text{var}iable)}} \tag{2}$$

$$P(t, a, m, n, \tau) = a\,\frac{1 + m\,e^{-t/\tau}}{1 + n\,e^{-t/\tau}} \tag{3}$$

The special case of the logistic function with a = 1, m = 0, n = 1, τ = 1, namely:

$$P(t) = \frac{1}{1 + e^{-t}} \tag{4}$$

For real parameters a, m, n, and τ. These functions find applications in a range of fields, including economics   [19]. A logistic function or logistic curve is the most common sigmoid curve. It models the "S-shaped" curve (abbreviated S-curve) of growth of some set: Here P denotes a set. Later we will use P to denote a function which varies over time. Normally such a function is written P(t). However, such a function may also be read as a set of ordered pairs of the form <t, P (t)>. By convention mathematicians are wont to write P to denote such a set. *P, where P might be thought of as population.* The initial stage of growth is approximately exponential; then, as saturation begins, the growth slows, and at maturity, growth stops [20], [23].

$$P(t) = \frac{1}{1 + e^{(-t)}} = \frac{1}{1 + exp^{(-t)}} = (1 + exp(-t))^{-1} \tag{5}$$

$$P` = P\,(1-P) \tag{6}$$

The function P has the intuitively appealing quality that:

$$1 - P(t) = p(-t) \tag{7}$$

Pilot survey data obtained from question related to proportion of people board on walking   with respective to a series of proposed travel time reduction has been used to calibrate the logit model with var = time factor [14].

$$P = \frac{1}{1 + D\,e^{\alpha(\text{var})}} \tag{8}$$

Let p(t) be the probability of success when the value of the predictor variable is t. Then let,

$$P = \frac{1}{1 + D\,e^{\alpha(r)}} \tag{9}$$

Algebraic manipulation shows that:

$$\frac{1-P}{P} = D\,e^{(\alpha \cdot r)} \tag{10}$$

$$\ln\left[\frac{1-P}{P}\right] = \ln D + \alpha^{(r)} \tag{11}$$

The above equation investigates the calibration process based on the values of D and α values which were extracted from ANOVA Table using Microsoft Excel. These results applied to the final equation shown below and then the results were used for model validation [4].

$$P = \frac{1}{1 + D\,e^{\alpha(\mathrm{variable})}} \tag{12}$$

5.   RESULTS AND DISCUSSION
5.1. Improving the Travel Time for the Bus and Train
Results for questionnaire analysis by SPSS are indicated in table1 which illustrate the response of the car users to shift from the bus and train to public modes by improving the travel cost. It is clear to observe the percent of car users how aimed to shift from private mode to public was increased from around 15 % to 100% when the travel cost is improved by 75%.

Table 1. Results for questionnaire analysis by SPSS

Improving travel cost	Frequency	Percent	Valid Percent	Cumulative Percent
15%	6	24.0	24.0	24.0
30%	1	4.0	4.0	28.0
45%	2	8.0	8.0	36.0
60%	3	12.0	12.0	48.0
75%	8	32.0	32.0	80.0
90%	5	20.0	20.0	100.0
Total	25	100.0	100.0	

Relationship between reduction travel cost and the share percentage is illustrated in Figure 2. It is demonstrated that the sharing percentage was directly proportional with reduction of travel cost. This may be attributed to the fact that money is an important issue. Improving the travel cost for the bus by reduction the travel cost increase utilizations of the public transportation bus use [18].
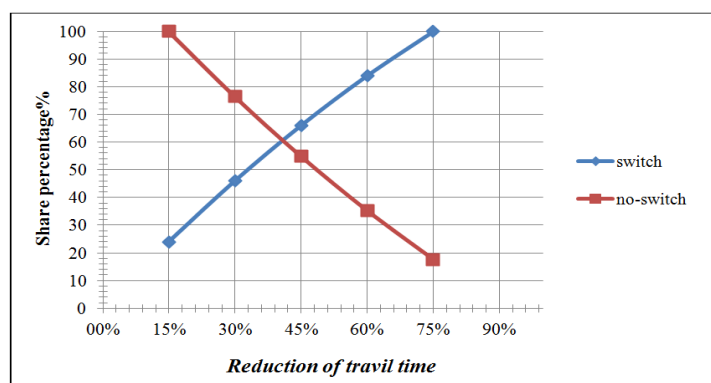

Figure 2. Relationship between sharing percentage and travel cost reduction

Results for data calibration by regression statistics are given in Table 2 and results for survey illustration is indicated in Table 2.

Table 2. An illustration Survey results and data calibration

Travelling Time Reduction	Survey results (P)	(1-P)/P	ln (1-P)/P
15%	0.235	3.255	1.180
30%	0.216	3.629	1.289
45%	0.196	4.102	1.411
60%	0.176	4.681	1.543
75%	0.157	5.369	1.680

Table 3. An illustration Survey results and logit model result

Travelling Time Reduction	Survey results (P)	Results form logit model
15%	0.235	0.236
30%	0.451	0.451
45%	0.647	0.646
60%	0.823	0.821
75%	0.998	1.033

Based on results indicated Table 2 and Table 3 which were used to model the survey results, it was found that survey results that were collected by Questionnaires and results were modelled by SPSS and the aforementioned equations were as approximated as it is shown in Figure 3. Therefore, it is demonstrated that the reduction in travel cost will be the key factor in shifting the people from private cars to public modes.
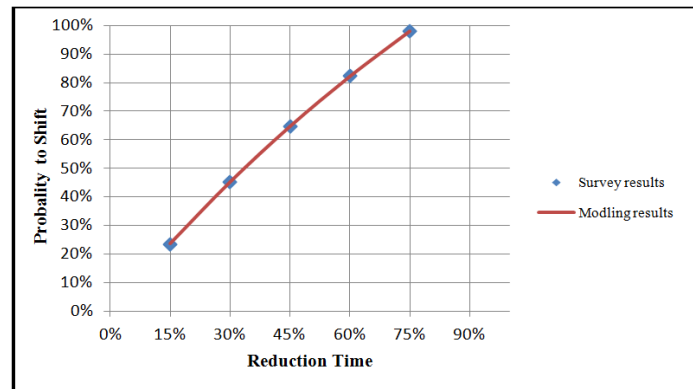

Figure 3. Relationship between reduction cost and the probability shift

5.2. Improving the Travel Cost

Relationship between reduction travel cost and the share percentage is illustrated in Figure 4. It is demonstrated that the 72% of the participants consider the public transport fares are affordable, that's mean we can convince them to use the public transport by developing cheaper service.
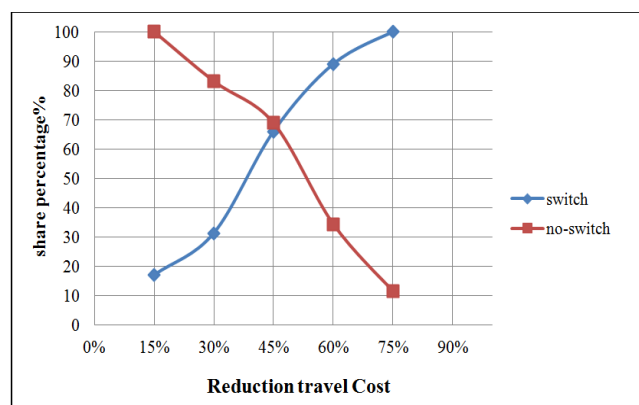

Figure 4. Relationship between sharing percentage and travel cost reduction

So when we reduce the travel cost by thirty percent we will increase the service users by 31.3% and if we reduce the travel cost by sixty percent we will increase the service users by 89%.

Results for data calibration by regression statistics are given in Table 4 and results for survey illustration is indicated in Table 4

Table 4. An illustration Survey results and data calibration

Improving Travel Cost	Survey results (P)	(1-P)/P	ln (1-P)/P
15%	0.169	4.91716	1.592731
30%	0.142	6.042254	1.798777
45%	0.344	1.906977	0.645519
60%	0.228	3.385965	1.219639
75%	0.109	8.174312	2.100997

Table 5. An illustration Survey results and logit model result

Improving Travel Cost	Survey results (P)	Results form logit model
15%	0.169	0.161233
30%	0.311	0.301612
45%	0.655	0.657738
60%	0.883	0.873122
75%	0.992	0.991129

Based on results indicated Table 4 and Table 5 which were used to model the survey results, it was found that survey results that were collected by Questionnaires and results were modelled by SPSS and the aforementioned equations were as approximated as it is shown in Figure 2. Therefore, it is demonstrated that the reduction in travel cost will be the key factor in shifting the people from private cars to public modes
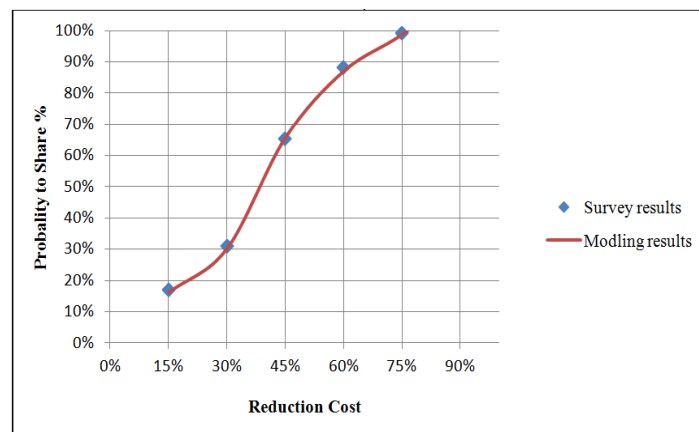

Figure 5. Relationship between reduction cost and the probability shift

5.3. Increasing the Parking Charges

Relationship between parking fees per houre and the share percentage is illustrated in Figure 6. The participants in this survey were asked if an increase in parking charge would make them consider shifting to public transport. The resent cost was assumed to be RM1/hour. 43.3% would shift if the cost was raised to RM3/hour, 75% with RM4/hour.

Results for data calibration by regression statistics are given in Table 4 and results for survey illustration is indicated in Table 6.
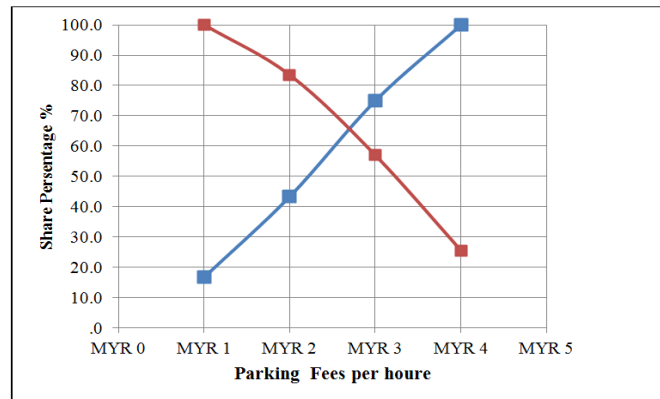
Figure 6. Relationship between sharing percentage and parking fees per houre

Table 6. An illustration Survey results and data calibration

Charging Fees	Survey results (P)	(1-P)/P	Ln((1-P)/P
2 RM	0.166	5.024096	1.6142
3 RM	0.265	2.773585	1.0201
4 RM	0.315	2.174603	0.7768
5 RM	0.248	3.032258	1.1093

Table 7. An illustration Survey results and logit model result

Charging Fees	Survey results (P)	Results From Logit Model
2 RM	0.166	1.6142
3 RM	0.265	1.0201
4 RM	0.315	0.7768
5 RM	0.248	1.1093

Based on results indicated Table 6 and Table 7 which were used to model the survey results, it was found that survey results that were collected by Questionnaires and results were modelled by SPSS and the aforementioned equations were as approximated as it is shown in Figure 7. Therefore, it is demonstrated that the reduction in travel cost will be the key factor in shifting the people from private cars to public modes.
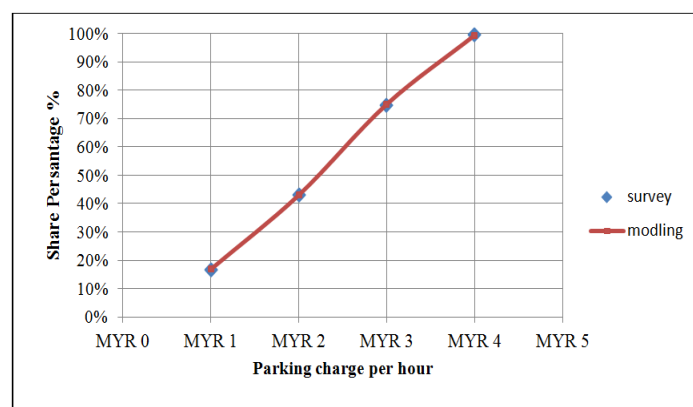

Figure 7. Relationship betweenparking charge per hour and the probability shift

5.4. Improving the Walking Facilities to Increase the Walking Ability

There are two major reasons discourage people from walking which is safety and protection from weather changing. According to that we have been asked the participant if we develop and improve walk ways which is safe and convenient with different percentages in which percentage they will consider to use it.

When we improve the service by fifty percent we will attract 10% of the car users and when we improve the service by sixty percent we will attract 81.7% of the car users as shown in Figure 8.
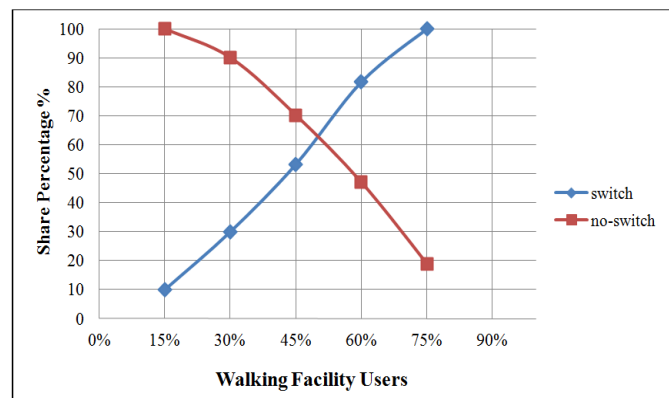

Figure 8. Relationship between sharing percentage and walking facility users

Results for data calibration by regression statistics are given in Table 4 and results for survey illustrations are indicated in Table 8.

Table 8. An illustration Survey results and data calibration

Improving Rate	Survey results (P)	(1-P)/P	Ln((1-P)/P
15%	0.099	9.10101	2.208385
30%	0.199	4.025126	1.392556
45%	0.232	3.310345	1.197052
60	0.283	2.533569	0.929629
75%	0.182	4.494505	1.502856

Table 9. An illustration Survey results and logit model result

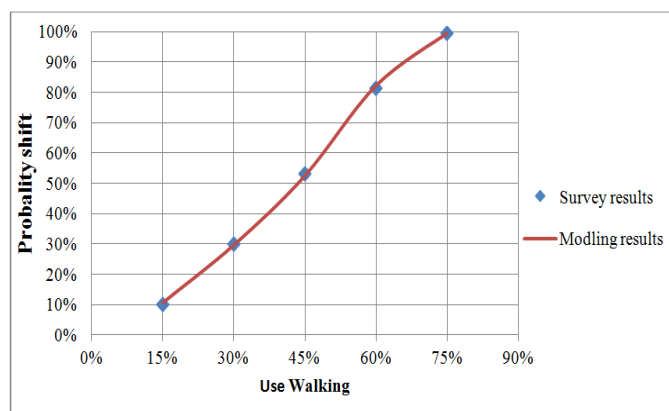| Improving Rate	Survey results (P)	results form logit model
15%	0.099	0.104
30%	0.298	0.295
45%	0.53	0.524
60	0.813	0.821
75%	0.995	0.994

Figure 9. Relationship between sharing percentage and use walking facility

Based on results indicated Table 8 and Table 9 which were used to model the survey results, it was found that survey results that were collected by Questionnaires and results were modelled by SPSS and the aforementioned equations were as approximated as it is shown in Figure 9. Therefore, it is demonstrated that the reduction in travel cost will be the key factor in shifting the people from private cars to public modes.

5.5. Sensitivity Analysis

Results for sensitivity ratio between independent and dependant variables are shown in Table 10. It is obvious to observe that the sensitivity ratio for 21.5% model shift whereas for 30 % increment time reduction for travel public transport the sensitivity ratio was 0.72, and the sensitivity ratio for 21% model shift whereas for 60 % travel cost reduction the sensitivity ratio was 0.35, while obvious to observe that the sensitivity ratio for 29.75% model shift whereas for 60 % pensive improvement in the pedestrian's facility the sensitivity ratio was 0.5

Table 10. Sensitivity ratio

	Changes in independent variable	Changes in dependent variable	Sensitivity ratio
1	30% travel time reduction	21.5% model shift	0.72
2	60% travel cost reduction	21% model shift	0.35
3	300% increase the parking charges	32% model shift	0.1
4	60% pensive improvement in the pedestrians facility	29.75% model shift	0.5

5.6. Determine T-Statistic

Results for T-statistic between standard error values for each model and T-statistic are shown in Table 11.

Table 11. T-statistic values for each model and the standard error

	Model	Standard error	T statistic
1	travel time reduction	0.165345	-38.7371
2	travel cost reduction	0.437228	-13.8125
3	increase the parking charges	0.26878	-21.1036

The t-statistic is one of the outputs of the regression analysis; it can be used to determine the significant of the independent variables in the model Table 11 showing the t-statistic values for each model and the standard error.

T-statistic measures how many standard errors the coefficient is away from zero. Generally, any t-value greater than +2 or less than - 2 is acceptable. The higher the t-value, the greater the confidence we have in the coefficient as a predictor. Low t-values are indications of low reliability of the predictive power of that coefficient.

6.   CONCLUSION

Conclusions and future work can be drawn based on the investigation done in this study:

1. Private carsshifting to public modes is highly influenced by the reduction of the travel cost and travel time.

2. Sensitivity ratio between dependent and independent variables is (0.35-0.72) indicated high level of results confidence.

3. T-statistic values are indications of low reliability of the predictive power of that coefficient.

4. Improving the walking facility which may help to shift private modes to publics by providing pedestrians with comfortable facility protect them from rain and sun light. The pedestrians should be separated from the motorized mean of transport by using sign boards, crossing bridges and zebra lines to ensure the pedestrian safety. A good lighting system is needed to sway the darkness and protection and covered drains to ensure the protection from the wild animals.

REFERENCES

[1] A. Ahamed, *et al.*, "Curb parking in Campus and Stimulating Students to use Public Bus within Universiti Kebangsaan Malaysia (UKM) Campus," *International Journal of Advances in Applied Sciences*, 2013, Vol. 2, pp. 105-112.

[2] A. Ahmed, *et al.*, "An Optimization solution for utilization minibuses service as an alternative of utilize private cars:Acase study around HENTIAN KAJANG in Malaysia,*" International organization of Scientific Research Journal of Engineering Academic Journals, India.* 2012.

[3] A. Ahmed, *et al.*, "An Optimization Solution by Service Science Management and Engineering (SSME) for Using Minibuses Service as an alternative for Private Cars Around Hentian Kajang in Malaysia," International *Journal of Civil Engineering and Construction Technology, USA.* 2012.

[4] Ali Ahmed Mohammed, "An Optimization Solution for Using Minibuses Service in Malaysia," *Record -13:978-3-8484-8365-5 LAP Lambert Academic Publishing GmbH & Co. KG, Germany,* 2012.

[5] Ali Ahmed Mohammed, "An Optimization Solution for Using Minibuses Service as an alternative of using Private Cars Around Hentian Kajang in Malaysia,master diss*," University Kebangsaan Malaysia,2010.* 2012.

[6] Garvill J., *et al.*, "Effects of increased awareness on choice of travel mode," *Transportation*, 2003, Vol. 30, pp. 63-79.

[7] Balsas C., "Sustainable transportation planning on college campuses," *Transport Policy*, 2003, Vol. 10, pp. 35–49.

[8] Bando, *et al*., "Analysis of optimal velocity model with explicit delay," *Physical Review E*, 1998, Vol. 58, No. 5, pp. 5429–5435.

[9] Krygsman S., *et al.*, "Multimodal trips in the Netherlands: Microlevel individual attributes and residential context," *Transportation Research Record*, 2001, Vol. 1753, pp. 11-19.

[10] Abdullah N., *et al.*, "Effect of transportation policies on modal shift from private car to public transport in Malaysia, " *Journal of applied Sciences,* 2007, Vol. 7, No. 7, pp. 1013-1018.

[11] Ahern A., *et al.*, "The use of stated preference techniques to model choices on interurban trips in Ireland," *Transportation Research Part A.* 2007.

[12] Angela Hull, "Policy integration: What will it take to achieve more sustainable transport solutions in cities?" *School of the Built Environment*, Heriot-Watt University, 2007.

[13] Axler R., *et al.*, "Out of Cars and Onto Bikes: Encouraging a Modal Shift from Cars to Bicycles at the University of Toronto," *ENV 421: Applied Research Seminar,* 2006.

[14] Beale J., *et al.*, "Marketing in the bus industry: A psychological interpretation of some attitudinal and behavioural outcomes," *Transportation Research Part F*, 2007, Vol. 10, pp. 271–287.

[15] Black W., "North American transportation: perspectives on research needs and sustainable transportation," *Journal of Transport Geography,* 1997, Vol. 5, No. 1, pp. 12–19.

[16] Bos I., "Changing Seats: A Behavioural Analysis of P&R Use," *PhD Thesis, Delft University of Technology, the Netherlands,* 2004.

[17] Gershenfeld Neil. A., "The Nature of Mathematical Modeling," *Cambridge,UK: Cambridge University Press*, 1999..

[18] Jannedy, *et al.*, "Probabilistics," *Cambridge, Massachusetts: MIT Press*, 2003.

[19] Ortuzar, et al., "Modelling transport," *Third edition, Canada, John Wiley and Sons, LTD.*, 2006.

[20] Riza, "Urban Transport Management System," *Engineering Faculty, UKM IRPA*, 2004.

[21] E. Szimba, *et al.*, "Passenger transport market: Segmentation, trends and policy conclusions- Results from Think-up," *Seminar S4, Potentials for modal shift: A segmented Approach for the European transport market*, 2002.

[22] Ahn, et al., "Freeway traffic oscillations and vehicle lane-change maneuvers," *Transportation and Traffic Theory*, 2007.

[23] Angela Hull, "Policy integration: What will it take to achieve more sustainable transport solutions in cities?" *School of the Built Environment, Heriot-Watt University,* 2007.

[24] Abdullah N., *et al.*, "Modeling of transportation behavior for coercive measures for car driving in Kuala Lumpur," *ARPN Journal of engineering and Applied Sciences*. 2007.

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