Pertanika J. Trop. Agric. Sci. 36 (S): 295 - 310 (2013)

TROPICAL AGRICULTURAL SCIENCE

Journal homepage: http://www.pertanika.upm.edu.my/

Recreational Economic Value of the Perlis State Park, Malaysia: An Application of Zonal Travel Cost Model

Syamsul Herman, M. A.[1,2]*, Ahmad S.[2,3], Ramachandran S.[1,2] and M. Rusli Y.[4]

[1]*Faculty of Forestry, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia*
[2]*Institute of Tropical Forestry and Forest Product, Putra Infoport, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia*
[3]*Institute of Agricultural and Food Policy Studies, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia*
[4]*Faculty of Environmental Studies, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia*

ABSTRACT

Perlis State Park is known for recreational activities. Since there is no significant income from timber production for the state of Perlis, outdoor recreation provides the alternative source of income. Since managing a state park costs substantially, assessment of recreational uses justifies the initial cost. This paper, using the semi-aggregated travel cost method, estimates the recreational value of Perlis State Park for Malaysian domestic visitors. The recreational value of the park is estimated at RM5,340,642.48. The value derived from the study contributes to the stakeholders' assessment of the intangible value of the park to justify the ecotourism developmental cost. The valuation of the recreational activities in public parks reveals the non-market economic value of the park under certain type of management. This paper also emphasises on the importance of maintaining visitor arrivals as a means to sustain the recreational value.

Keywords: Recreation demand model, Travel Cost Model (TCM), functional forms, heteroscedasticity, recreation benefit

INTRODUCTION

Natural environments, such as forests, mountains, rivers, streams, and others, have been the venues for various kinds of recreational pursuits like camping, hunting, trekking, biking, boating, climbing, and many more. The existence of these activities is what makes a particular area has its recreational value (Freeman, 2003) from direct visitor spendings or embedded in various types of expenditure. Nevertheless,

ARTICLE INFO

Article history:
Received: 13 August 2012
Accepted: 20 September 2012

E-mail address:
syamsulherman@gmail.com (Syamsul Herman, M. A.)
* Corresponding author

ISSN: 1511-3701

managers of these areas need to balance the utilisation of these recreational activities and conservation. This concern has prompted managers of natural areas to quantify the possible alternative earnings, which may be generated from recreational activities in these areas.

In Malaysia, most natural areas, such as national parks, state parks, are public lands and managed by governmental departments. One good example, in the state of Perlis, the Perlis State Forestry Department (PSFD) is a governmental department that manages the Perlis State Park (PSP). Due to its status as a protected area, PSP is restricted from any kind of forest resource extractions, thus, limiting the income to the state government. As the governing agency of the area, PSFD needs to assess the alternative value generated from non-extractive forest-based product and this information may give PSFD some ideas on the value of the PSP in terms of recreational products.

Source: Perlis State Forestry Department (2006)

Fig.1 Location Map of the Perlis State Perak

The purpose of this paper is to demonstrate that a commonly used non-market valuation approach, i.e. the Travel Cost Method (TCM), can be used to generate a proxy estimate of the benefits by using PSP as the study area. To the researchers' knowledge, this is the first study carried out to estimate the recreational value of PSP.

Perlis State Park

Perlis State Park (PSP) is located in the northernmost area of Peninsular Malaysia, along the western border of Perlis, where Peninsular Malaysia meets Thailand (Fig.1). The park is situated on the longest continuous range of limestone hills in the country, called the Nakawan Range, which lies from Kuala Perlis to Thaleban National Park in Thailand. The purpose of its establishment is for the conservation of the unique limestone of the Nakawan Range. Apart from its conservation purposes, the park is also popular for outdoor recreational activities such as trekking, mountain climbing, camping, bird watching, and the like.

The park covers an area of 5,015 ha comprising of Mata Ayer Forest Reserve (2,156 ha) and Wang Mu Forest Reserve (2,859 ha). Next to PSP, is the Thaleban National Park in Southern Thailand. The park is currently administered by PSFD, handed over after the establishment project by Danish International Development Agency (DANIDA), World Wide Fund for Nature (WWF) and the Forestry Department of Peninsular Malaysia. It is the first state park in the country that is administered by a state Forestry Department.

Based on these attributes, the recreational experience of PSP can be categorised as caves, trails, lakes, and cross-border shopping experiences (Syamsul *et al*., 2006). Generally, these recreational products can be enjoyed at three main locations, namely, the Wang Burma Recreational Complex (WBRC), Gua Kelam Recreational Area (GKRA) and Wang Kelian Sunday Market (WKSM).

WBRC is equipped with man-made facilities such as chalets, hostels, and campsites. The second location, GKRA, is a former mining area but now it is the main tourism destination of the northern part of Peninsular Malaysia. Meanwhile, WKSM is known for its cross-border tourism and shopping experience and it is included as one of the attraction spots of the state park. The uniqueness of the market is that visitors are allowed to cross the Thailand-Malaysia border, by up to 2km without any travelling documents.

PSP has received an increasing number of visitors since its establishment in 1996. Up to 2003, there were 7,755 overnight visitors in 2003 compared to merely 937 overnight visitors in 1996. However, the trend shows a fluctuation in the visitor arrivals in the subsequent years (Table 1). PSP has been included as one of the main tourism destinations since the state government announced 2003 as the Visit Perlis Year (Government of Malaysia, 2006). This also included the WKSM as an attraction in PSP (Azyyati *et al*., 2007).

TABLE 1
Number of Visitors to Perlis State Park from 1996 to 2010

Year	Total	Local*	Foreigners*
1996	937		-
1997	982		-
1998	1,260		-
1999	1,787		-
2000	2,945		-
2001	5,672		-
2002	4,260		-
2003	7,755	7,273	482
2004	5,591	5,418	173
2005	2,706	2,493	213
2006	3,741	3,672	69
2007	3,891	3,891	66
2008	3290	3145	144
2009	4869	4792	77
2010	2005	1906	99

Source: Perlis State Park Office (2011)
*Note: The breakdown of visitors is not available for the years before 2003

PSP is located in a small Malaysian state of Perlis (80,302 ha). In spite of its size, it has a significant forest cover. From the total area, 11,555 ha are forested lands. Even though the forest area covers 14.39% of the total land areas, there has been no production of timber (except in 1998) compared to other states in Malaysia (Table 2). At the moment, the alternative uses for these forested areas are listed in terms of non-consumptive use such as conservation, education research, and recreational use.

On the other hand, the amount the state of Perlis receives in economic return from recreational and touristic activities at the park is ambiguous and remains unknown. Information on the economic value is important for the state government in order to understand any source of income from the forested areas. This knowledge is crucial, especially as the area has been gazetted for its protection from any form of logging and harvesting of other forest goods.

Hence, an alternative utilisation of the site could be in the form of non-consumptive use such as recreation and conservation. In order to justify the alternative usage of the forest, an assessment of the estimated value of the benefits from recreation and conservation must be made. It is therefore of great interest to determine if the allocation and expenditure for ecotourism in the park is worth the effort by the managing agency.

This paper demonstrates the alternative value derived from outdoor recreation as an alternative to forest extraction in protected areas. The economic value, as estimated from this study, can help PSFD to justify the presence of recreation and government allocation on the development and maintenance of recreational infrastructure in the park.

METHODOLOGY

Travel Cost Method

Over the years, recreation demand has been associated with the estimation of services of forest areas and other recreational use values. The travel cost approach is a popular methodology for assessing many recreational demand studies in natural areas. Since its establishment, various studies have encountered issues theoretically and empirically, and these lead to improvements

TABLE 2
Production of Logs by State (cubic meters, m3)

Year / State	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Johor	296,179	211,295	179,217	193,700	181,927	198,342	142,846	159,152	96,419	213,816
Kedah	221,257	113,276	228,138	164,183	157,005	141,622	138,246	147,042	109,480	179,453
Kelantan	1,757,492	1,146,382	1,081,987	1,339,501	944,700	873,026	919,466	694,256	815,585	1,066,479
Melaka	72,565	16,223	10,767	4,310	1,610	2,830	-	4,407	111	1,508
Negeri Sembilan	114,814	64,497	149,234	119,443	68,241	103,823	102,661	102,646	80,956	73,860
Pahang	2,862,507	2,114,889	2,326,912	1,706,176	1,462,046	1,629,796	1,604,859	1,826,066	1,953,273	1,782,523
Perak	939,243	721,469	653,384	878,000	606,264	723,599	757,884	887,454	787,548	833,802
Perlis	-	26	-	-	-	-	-	-	-	-
Pulau Pinang	768	60	100	-	-	-	-	-	-	-
Selangor	109,807	42,694	56,625	69,994	65,015	44,388	71,288	40,492	38,981	48,142
Terengganu	1,005,791	669,004	669,694	596,843	668,322	640,864	682,146	711,403	522,738	493,864
W. Persekutuan	-	-	-	-	-	-	-	-	-	-

Source: Forestry Department Peninsular Malaysia (2006) of the model in terms of econometrics, survey sampling and utility-theoretic derived welfare estimators (Starbuck, 2003).

There are two types of TCM; Zonal TCM (ZTCM) and Individual TCM (ITCM). Early applications of TCM studies were typically based on aggregate zonal, where zones are defined as the concentric areas of increasing distance from the study site (Walsh *et al*., 1989; Freeman, 1993). The price (or travelling cost) is the cost of travelling from the average distance from the zones to the study site. As the distance of the zones gets further away, the prices increase. By this, the variation in price depends on the distance and the number identified zones. Price, and other explanatory variables, is regressed against the per capita visit rates from each zone. ITCM, on the other hand, uses individual data obtained from each respondent rather than zones. Due to the aggregated nature of the dependent variable data, ZTCM was applied as it is more suitable in comparison to ITCM.

There are limitations associated with the traditional zonal travel cost model (ZTCM). Aggregation is always associated with ZTCM. The distance variable in the traditional ZTCM varies due to the difference in the distance of the zones of origin, which means that ZTCM relies on highly aggregated data. Although the respondents are from different zones of residence, the measurement of distance is merely a straight line across region from the respondent's origin to the study site in question. The nature of ZTCM, where the dependent variable is highly aggregated in zones, leads to heteroscedasticity problem. A consequence of heteroscedasticity is an inefficient estimator. The effects of heteroscedasticity on OLS coefficient are discussed in the following section.

Heteroscedasticity, Model Transformation and Model Selection

Studies using cross sectional data often encounter heteroscedasticity problem. The heteroscedasticity problem is often associated with ZTCM (Rosenthal & Anderson, 1984). Since the variance is not homogenous across the zones (observations), the OLS estimators are statistically inefficient, increasing the size of confidence interval (Diamantedes, 2000). In the presence of heteroscedasticity, the ordinary least square (OLS) estimator no longer the best unbiased efficient estimator since the disturbance covariance matrix is non-scalar (Gujarati & Porter, 2009). While detecting heteroscedasticity can be done visually, a more formal approach can be conducted by Goldfeld Quandt test or White test and/or Breush-Pagan-Godfrey test.

One way in working out heteroscedasticity is by model transformation. Model transformation can be carried out in several methods and the logarithm transformation is the most commonly used (Ward & Beal, 2000). The heteroscedasticity problem, that arises from the aggregation of the zones and also application of cross sectional data, is resolved by having a semi-log model.

Studies using semi-log and log-log functional forms include those by Allen *et al*. (1981), Ahmad (1994), Christiansen (1997), Lansdell and Gangadharan (2003), and Poor and Smith (2004), to name a few. The advantages of using semi-log functional form include minimizing the problem of heteroscedasticity as well as eliminating the potential problem of negative trip prediction (Loomis & Cooper, 1990). In comparing different functional forms, Chotikapanich and Griffiths (1998) suggested the use of maximized log-likelihood function value as preferable instead of the R^2 as a descriptive of goodness of fit measure, particularly for the models with different dependent variables. In many studies, the log-likelihood values and Akaike Information Criteria (AIC)[1] are used as the primary means in determining the functional form that best fits the data.

Survey and Sampling Procedure

Surveys were conducted between February 2007 and December 2009. Since the objective of the study was to estimate recreational value of the whole PSP, the respondents were selected among those who came for recreational purposes and the locations where recreational activities were conducted. Personal interviews were conducted at WBRC, WKSM, and GKRA.

The respondents were selected from the leaders of the groups. If the group was a family, the respondent chosen was either the father, mother, or the eldest brother. On the other hand, if it was a non-relative group member, the respondent was the person in charge of the trip. Only one member was interviewed as the respondent. It was assumed that the information given by the leader of the group reflected the information for the entire family or group and not merely his/her own (Ahmad, 1994).

In order to ensure a full return and quality data, the respondents were interviewed personally. Following Kuosmanen *et al*. (2004), only the respondents with the purpose of recreation are interviewed to resolve multi-destination trip visitors[2]. To avoid overestimated consumer surplus, foreign visitors were not included in the survey as they might be visiting other destinations in the country other than a single trip made solely to PSP.

Socio-economic Characteristics of the Respondents

The survey managed to collect 653 usable questionnaires, out of 700 used in the interview sessions. A summary statistics of respondents is presented in Table 3. The median and average ages of the respondents are 35 and 35.11 respectively, older than the median (26.2) of the Malaysian population (Department of Statistics Malaysia, 2010). The sample is educated, with 98.3% have

[1]Akaike Information Criteria are the commonly used criteria to determine alternative regression model, where it lies on the sum of squares. A lower value indicates a better performance of the model. Refer to Gujarati (1988).

[2]In resolving multi-destination trip (MDT), Kuosmanen *et al.* (2004) suggested to ignore MDT visitors by either excluding them from the analysis, or by treating them as if they were single-destination visitors.

attended formal education at school and/ or university level (Table 4). Meanwhile, the average income of the respondents is RM1,624[3] per month, as compared to 47% of the national population in middle-income (RM1,200-3,499 per month) household (Pricewaterhouse Cooper, 2006).

TABLE 3
Statistic Summary of the respondents

Variables [a]	Percentage
Gender proportion of sample male	67.7%
Mean age	35.11 (11.66)
Monthly income (RM)	1,624.66 (1,396.65)

[a] Figures in the parenthesis denote standard deviation

TABLE 4
Respondents' Education Level

Education Level	Number	% of total
Higher degree	2	0.30
First degree	226	34.60
Secondary school	278	42.50
Primary school	134	20.50
No formal education	11	1.70
Missing	3	0.5
Total	651	100.00

Applications of the Travel Cost Method

Syamsul *et al*.'s (2012) compiled study applied TCM for valuation studies in Malaysia for the past 30 years. These studies had applied both ZTCM and ITCM approaches. The majority of these studies focused on the valuation of recreational and tourism resources in the country. Many of these studies used visit per capita as the dependent variable.

In this study, visit per capita was used as the dependent variable for the study, as suggested in many previous studies (Syamsul *et al*., 2012). Nevertheless, Brown and Nawas (1973) cautioned that the zonal method is unable to separate the influence of the almost similar variables such as travel cost and travel time. Based on this, the semi-aggregated model was used, with aggregated visit per capita as the dependent variable, whereas individual observations as the independent variables. This particular approach combines the best features of the zonal and individual observation approaches (Brown *et al*., 1983; Ahmad, 1993; Syamsul, 2010).

Definitions of the Dependent Variable

The dependent variable for a zonal TCM is the visitation per capita from the zones of the respondent's origin, which is determined by researcher (Fleming & Cook, 2008). Zones are often based on statistical division[4] system in a country (Stoeckl & Mules, 2006; Ward & Beal, 2000; Fleming & Cook, 2008). In this study, zones were determined according to the local municipality council, where visitors are currently (during the study) residing. Meanwhile, the zones are based on the Population and Housing Census 2000, Malaysia's report.

[3]All figures are in Malaysian Ringgit; RM1 = USD 0.3314, EURO 0.256 (31 July, 2012)

[4]A statistical division is a defined area that represents large, general purpose, regional type geographic area (Fleming & Cook, 2008).

The visitation rate per capita is given by:

$$VC_i = (V_i \times VY_i) / P_i \qquad \text{[Eq. 1]}$$

Where,

VC_i is the visit per capita for the respondents from zone *i*, V_i is the respondents sampled from zone *i*, VY_i is the frequency of visits per year by the respondents sampled from zone *I*, and P_i is the population of zone, *i*.

Definition of Travel Cost Variable

Travelling cost measures the mileage cost in terms of distance, multiplied by vehicle maintenance cost per kilometre. The study only collected samples from motorised road vehicles. This means travel costs for rail and air were excluded, since distance measurements were only taken for personal vehicles or taxis. However, the travelling costs to and from airports and train stations were included. The travelling costs per person were then calculated by dividing with the number of persons travelling together in the same vehicle. The total travel cost per person was then calculated by including all out-of-pocket personal expenditures during travelling to the site for recreation[5]. The calculation is given by:

$$\text{RITC} = \left(\frac{\text{Travelling cost + individual cost}}{\text{Number of person in the same vehicle}} \right) \text{X 2 trips (to and fro)}$$

where:

RITC = Return individual travel cost

The travelling cost was calculated by multiplying the cost per kilometre by the distance from the respondent's residence to the study location (see Fig.2). The unit of measurement is RM per kilometre.

Distances were measured using Mapsource Version 4.09 software on a Garmin Global Positioning System (GPS) by measuring the distance from the nearest township of the respondents' residence to N6 41.873 E100 11.472, which is the GPS coordinate for PSP headquarters in Wang Burma. The town's geographical location is identified via the *mukim*[6] of the township, in addition to its postcode. It was assumed that the respondents took the shortest and the most convenient route available in making their trips.

The cost per kilometre is based on the rates provided by the Highway Planning Unit (HPU), the Ministry of Public Works, Malaysia[7]. These 'cost per kilometre rates' vary depending on the type of vehicle used by the respondents. Other personal expenditures (, such as food and drinks, bus ticket, and lodging) during the travelling phase were also included as parts of the travelling cost. All the expenditure was measured in the Malaysian currency, Ringgit Malaysia (RM). In addition, the travelling cost included personal expenditures made for the journey, such as petrol, toll charges, meal

[5]It was assumed that children and teenager under the age 16 did not contribute to the trip expenditure, Hence, the expenditures were only sustained by adults in the same group.

[6]Mukim is a sub-district geographical administration unit practiced by the local municipality in Malaysia.

[7]Through the Highway Planning Unit, the Ministry of Public Works, Malaysia, conducted studies on the cost per kilometer on personal and commercial vehicles in Malaysia. The cost for sedan was estimated at RM0.28 per km, and motorcycles at RM0.07 per km.

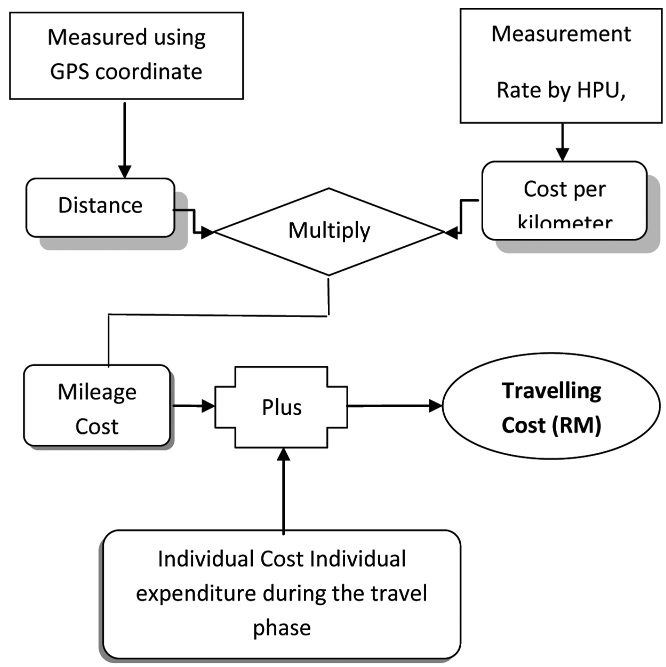

Fig.2: The Measurement of Travel Cost

and also if there was any accommodation cost. There is no entry and/or recreational fee to the park. The total travelling cost was then multiplied by 2 to reflect a return trip.

Definition of Socio-Economic Variables

The survey asked the respondents to identify their age, the highest level of educational attainment and household income. Age was measured in years. The income variable in this study measures the gross monthly salary (RM), and/or wage, as reported by the respondents. For self-employed respondents, the measurement was based on their average monthly profit. Meanwhile, the education level was determined in the number of years attended in formal education. During the on-site data collection, education level was coded in terms of categorical data. Visitors stated only their highest education level attained based on the different levels of education practiced in Malaysia (see Table 5). The data were later transformed into a continuous measurement of years of education. The years of education reflected the highest education level based on Table 5. Thus, the variable for education was in terms of continuous data (i.e., years of education) representing education level, rather than categorical data.

TABLE 5
Categories of Education Level

Category	Education Level	Years of education
1	No formal education	0
2	Primary school	6
3	Secondary school	12
4	Tertiary education level	16
5	Postgraduate study	18

RESULTS AND DISCUSSION

Model Specifications

In order to obtain the recreational demand function, the zonal visitation rate was regressed against the round individual travel cost (RITC), and three socio-demographic variables, namely; age (Age), education years (EduYr) and monthly income (Inc). The empirical modified model derived is shown in *Eq. 2*.

$$VisCap_{ij} = \beta_0 + \beta_1 RITC_{ij} + \beta_2 EduYr_{ij} + \beta_3 Age_{ij} + \beta_4 Inc_{ij} + \varepsilon \quad [Eq.\ 2]$$

Where,

$VisCap_{ij}$: The visit rate per capita of individual i from zone j

$RITC_{ij}$: The total round trip travel cost of individual i to site j

$EduYr_{ij}$: Level of education of an individual$i$, in years

Age_{ij} : Age of the individual$i$ from zone j

Inc_{ij} : The monthly income of individual i from zone j

$\beta_0 - \beta_4$: Coefficient to be estimated

In the study, heteroscedasticity was detected by performing the Goldfield-Quandt test. Following the steps explained by Gujarati and Porter (2009), the sample ($n = 653$) was ordered according to *RITC* and the sample was split into three sub-samples ($n\text{-}p/2 = 300$). The central ($p= 53$) was then omitted. The OLS regression then yielded $\sigma_1 = 3698.44$ and $\sigma_2 = 463.08$. Hence,

$$G = \frac{\sigma_2}{\sigma_1} = \frac{3698.44}{463.08} = 7.98661$$

Using a one tail test with 5% critical value, $F_{(0.95,\ 298,\ 298)} = 1.21$. The test showed that $G>F$ (7.98661 >1.21), therefore, a null hypothesis of homoscedasticity was rejected. Thus, it can be stated that heteroscedasticity existed in the observation. This suggests that the coefficient estimator is inefficient.

Comparing and Selecting the Functional Forms of the Transformed Models

In resolving for heteroscedasticity, the model was then transformed into two functional forms; log-linear (LL) and double-log (DL). The result for all transformed models is shown in Table 6. As a comparison, the linear model (LM) is also presented in the same table. All the models have the same number of observations ($N=653$). The ANOVA test shows that the F value is significant at 0.05% confidence level in all the models, indicating rejection of the null hypothesis that all the coefficients are zero.

TABLE 6
A Comparison of the Selected Functional Forms

	LM	LL	DL
R^2	0.053	0.218	0.413
Adj. R^2	0.029	0.199	0.399
Log-likelihood	1122.910	-853.336	-759.613
Akaike info Criteria	-3.387	2.666	2.379
F value	2.22	11.09	27.99

All the selected models (linear and transformed) were then compared to select the best model fit, which was later used to estimate the consumer surplus. The foundation of comparing among the models is by the measure of R^2 and the adjusted R^2. In this study, however, the maximum log-likelihood and AIC were used as the primary means of determining the best functional form that fit the data. The value of the maximised log-likelihood function is preferable over the R^2 value, as a descriptive adequacy of fit measure, particularly for models with different dependent variables (Chotikapanich & Griffiths, 1998). The result demonstrates that the DL model has the highest R^2 (0.4132) and adjusted R^2 (0.3985) value. This is supported by the log-likelihood value that reveals the DL model has the highest value (-759.613)[8]. Meanwhile, the AIC value confirms the consistency in result, where DL model has the lowest value (2.379). Against all the criteria, the functional form of the preferred equation is found to be:

$$\text{Ln}VisCap_{ij} = \beta_0 + \beta_1 \text{Ln}RITC_{ij} + \beta_2 LnEduYr_{ij} + \beta_3 LnAge_{ij} + \beta_4 LnInc_{ij} + \varepsilon \quad [Eq.\ 3]$$

Thus, the DL model is chosen for further analysis and discussion.

Estimation of the Consumer Surplus

The estimation of the recreational value and users' welfare could be done once the demand function had been specified. Comparing R^2, the adjusted R^2 and verified by the log-likelihood value and AIC value, the analysis pointed out that the DL model is the best fit. Therefore, the DL equation was chosen as the best model consumer surplus calculation. Derivation of the demand model yielded the consumer surplus, which is shown below.

Following Stoeckl and Mules (2006) and Graham-Tomasi *et al*. (1990), the calculation of consumer surplus for DL model is as follows:

For $\beta_{TC} > -1$

$$CS_i = \sum [\ (Max\ TC)(Min\ V) - TC_i V_i / \beta_{TC} + 1]\ X\ Pop_i \quad [Eq.\ 4]$$

Where,

CS_i: Consumer surplus for the zone *i*–th
V_i: Average visit from the zone *i*–th
β_{TC}: Coefficient of the travel cost
Max TC: Actual maximum total travelling cost from the sample

[8]The negative sign in the AIC scores is the difference between the best model (i.e. the smallest AIC) and each model; therefore, the best model has an AIC difference of zero or approaching zero (Burnham & Anderson, 2002). The AIC scores are shown as changes in the AIC scores or the differences between the best model (the smallest AIC) and the other models. Therefore, the best model has the smallest changes. Hence in the study, the selected model is the model with the highest log-likelihood and the lowest AIC value (Burnham & Anderson, 2002).

Min V: Actual minimum visit per capita from the sample

Pop_i: Population for the zone *i*–th

Adding up the *CSi* from each individual zone yielded the total measure of the consumer surplus from the entire zones included in the study. The aggregated consumer surplus of all the zones represents the total estimated net recreational benefit for the site.

From the sample, there were 148 different zones identified from all the states in Malaysia. The total *CSi* for the surveyed visitors (*N=653*) was estimated at RM57,842.11. Dividing the *CSi* with the total visits yielded the CS per trip or the willingness to pay for outdoor recreation. The calculated value was RM39.24 per trip.

In the study, the statistics of the visitor arrivals was compiled for the three survey locations; WBRC, GKRA and WKSM. The statistics for WBRC was supplied by the PSP Park Warden Office, while the statistics for GKRA was supplied by the Department of Agriculture, Malaysia[9], and WKSM was provided by the Department of Immigration, Malaysia, through its Wang Kelian Post office[10]. Only the data for the WBRC and WKSM visitations for the year 2007 were available for this study, hence, the value was estimated for the same year.

However, the statistics presented by the Department of Immigration, Malaysia, Wang Kelian Post office does not reflect the actual recreation visitors to WKSM. Instead of giving statistics for the specific WKSM visitors, it represents the number of people passing through the Malaysia-Thailand border for the whole year. Using such a number might overestimate the total value. Since WKSM only operates on Sundays, only Sunday visitor statistics of 2007 was included in the calculation, which was 52 days (14.25% of 365 days) or approximately 11,367 visits (Table 7).

TABLE 7
The Estimated Total Recreational Value for PSP

	Visitors Arrival		Estimated Value
	Actual	Adjusted	
WKRC[a]	3,930	3,930	154,213.20
GKRA[b]	120,805	120,805	4,740,388.20
WKSM[c]	79,770	11,367	446,041.08
Total	204,505	136,102	5,340,642.48

[a]Perlis State Park Office, 2009
[b]Department of Agriculture, Perlis, 2009
[c]Department of Immigration, Perlis, 2009

Assuming the total number of visitor arrivals in 2007 as equivalent to the number of the actual visits to PSP (each visitor made one visit), the calculation for the total net recreation value for PSP was then measured by multiplying the *CS* per trip to the total visitation to PSP. Using the adjusted visit rate for WKSM, the total net recreational benefits for the site was then estimated at RM5,340,642.48 for the year 2007.

CONCLUSIONS

Under the current management's strategies, the recreational value estimates found from

[9]Visitor arrival at GKRA is recorded by the admission ticket at the cave entrance. The fee collection is being managed the Department of Agriculture, Malaysia.

[10]The Wang Kelian Post Office located at the Malaysia-Thailand border handles all day-to-day immigration documents of visitors upon exist and entry. The office keep records of visitor statistics entering and/or leaving the country.

this study confirm that there is a substantial economic value in terms of the recreational use of PSP. This economic value seems to justify the efforts to make PSP a venue for outdoor recreational experience opportunity, not only in Perlis, but also for the entire northern region. Even though the study was conducted after the development of the park, the valuation of PSP has direct implications, whereby the recreational value indicates the type of management system in practice and the level of use of the resource.

In general, the economic valuation of recreational activities in public parks reveals the non-market value of the park under certain type of management. If the park management approaches change in a way that will reduce funding for maintenance, operations, or even new development, it will also have impacts on the benefits or even the welfare of the park itself. The knowledge of such changes can be justified since the present level of use and benefits can be assessed, as has been shown in this study. However, under the present conditions, if the park management wishes to request additional allocations for maintenance and new development, it is more justifiable now because the present benefits or recreational utilization can be estimated.

Another important point, in regards to value, is that the estimated recreational use value is associated with the visitation rates. The total economic value is determined by multiplying CS with the visitation rates for a particular year. In addition, changes in visitation will also affect the associated recreational value. However, for the past seven years, the trend has indicated declining visitation rates. If the trend continues to decrease, it would also reduce the recreational value. Therefore, there is a need for the management to have strategies to increase visitations, as this will improve the economic value. Nevertheless, a special study is still needed to consider the likely impacts of these measures, not only on the total visitation but also the physical impact of the recreational activities in the state parks. In more specific, the benefits need to be evaluated against the expected benefits of the increasing number of visitors while maintaining the limits of recreational usage in the protected areas.

ACKNOWLEDGEMENTS

This study was funded by the Ministry of Science, Technology and Innovation, Malaysia, through the Intensification of Research in Priority Areas (IPRA) grant. The authors would like to thank the staff of Forest Research Institute Malaysia (FRIM) for the fieldwork done. A special gratitude also goes to the officers of Perlis State Park and Perlis State Forestry Department for their cooperation during entire study. The authors also thank Ms. Nur Syuhada Che Ibrahim for her assistance in the writing process of the paper.

REFERENCES

Ahmad, S. (1993). Faktor pesaing di dalam penilaian permintaan rekreasi luar. *Pertanika. Journal of Social Science & Humanity, 1*(2), 199-204.

Ahmad, S. (1994). *Demand for and value of outdoor recreation in Langkawi by domestic visitors*.

Unpublished Ph.D thesis. Universiti Putra Malaysia. Selangor, Malaysia.

Allen, G. P., Stevens, T. H., & Barrett, S. A. (1981). The effects of variable omission in the travel cost technique. *Land Economics, 57*(2), 173-180.

Azyyati, A., Syamsul, H. M. A., & Ahmad, S. (2007). Economic value of Perlis State Park as a recreational area. In H. Norhara, N. Nik Zanariah, H. Aminah, S. How, & N. Norhayati (Eds.), *Highlights of FRIM's MOSTI Project 2007* (pp. 74-78). Kuala Lumpur: Forest Research Institute Malaysia Publication.

Brown, N. G., Sorhus, C., Chou-Yang, B., & Richards, J. A. (1983). Using individual observations to estimate recreation demand functions: A caution. *American Journal of Agricultural Economics, 65*, 154-157.

Brown, W. G., & Nawas, F. (1973). *Impact of aggregation on the estimation of outdoor recreation demand function.* Oregon: Oregon Agricultural Experiment Station Project.

Chotikapanich, D., & Griffiths, W. E. (1998). Carnarvon Gorge: A comment on the sensitivity of consumer surplus estimation. *The Australian Journal of Agricultural and Resource Economics, 42*(3), 249-261.

Christiansen, G. (1997). Economic value of recreational use, Hartley Historic Site. *NSW NPWS Environmental Economics Series.* Sydney.

Christensen, J. B., & Price, C. (1982). A note on the use of travel costs models with unequal zonal population: Comment. *Land Economics, 58*(3), 395-399.

Diamantedes, J. (2000). *Relating Objective and Subjective Measures of Water Quality in the Travel Cost Method: An application to Peconic Estuary System.* (Unpublished Ph.D dissertation). University of Rhode Island. Rhode Island, USA.

Fleming, C. M., & Cook, A. (2008). The recreational value of Lake McKenzie, Fraser Island: An application of the travel cost method. *Tourism Management*, p.9.

Freeman, M. A. (2003). Economic valuation: What and why. In P. A. Champ, K. J. Boyle, & C. T. Brown, *A Primer on Nonmarket Valuation* (pp. 1-26). Dordrecht, the Netherland: Kluwer Academic Publishers.

Department of Statistics Malaysia (2010). *Population and Housing Census, Malaysia, 2010*. Department of Statisitcs Malaysia. Putrajaya

Government of Malaysia (2006).*Rancangan Malaysia Kesembilan.* Kuala Lumpur: Percetakan Nasional Berhad.

Gujarati, D. N., & Porter, D. C. (2009).*Basic Econometrics.* Boston: McGraw-Hill Irwin.

Graham-Tomasi, T., Adamowicz, W. L., & Fletcher, J. J. (1990). Errors of truncation in approximations to expected consumer surplus. *Land Economics, 66*(1), 50-55.

Kuosmanen, T., Nillesen, E., & Wesseler, J. (2004). Does ignoring multidestination trips in the travel cost method cause a systematic bias. *The Australian Journal of Agricultural and Resource Economic, 48*(4), 629-651.

Lansdell, N., & Gangadharan, L. (2003). Comparing travels cost models and the precision of their consumer surplus estimates: Albert Park and Maroondah Reservoir. *Australian Economic Papers, 4*, 399-417.

Loomis, J., & Cooper, J. (1990). Comparison of environmental quality-induced demand shifts using time-series and cross-section data. *Western Journal of Agricultural Economics, 15*(1), 83-90.

Poor, J. P., & Smith, J. M. (2004). Travel cost analysis of a cultural heritage site: The case of historic St. Mary's City of Maryland. *Journal of Cultural Economics, 28*, 217-229.

Pricewaterhouse Cooper (2006). From Beijing to Budapest: Winning brands, winning formats, 4^{th} Edition.

Rahimatsah, A. (2002). *Tourism Planning in Protected Areas: Managing Visitors and Development in Perlis State Park, Malaysia.* Unpublished PhD Thesis. Universiti Teknologi Malaysia, Johor, Malaysia

Rosenthal, D. H., & Anderson, C. J. (1984). Travel cost models, heteroscedasticity and sampling. *Western Journal of Agricultural Economics, 9*(1), 58-65.

Starbuck, C. M. (2003). *Examining forest recreation demand: non-timber values and regional impacts.* (Unpublished PhD thesis dissertation). The University of New Mexico, Alburquerque, USA.

Stoeckl, N., & Mules, T. (2006). A travel cost analysis of the Australian Alps. *Tourism Economics, 12*(4), 495-518.

Syamsul, H. M. A. (2010). *Valuing Recreational Benefit of Perlis State Park, Malaysia using Travel Cost Method.* (Unpublished Ph.D. thesis dissertation). Universiti Putra Malaysia, Selangor, Malaysia.

Syamsul, H. M. A., NikAzzyati, A. K., Ahmad, S., & Aldrich, R. (2006). *Outdoor recreation and tourism opportunity in a protected area: The Perlis State Park experience*. Paper presented at the Global Issues and Challenges in Business and Economics Seminar, Port Dickson, Negeri Sembilan, December 13-15, 2006.

Walsh, R. G., Ward, F. A., & Olie, J. P. (1989). Recreational demand for trees in National Forests. *Journal of Environmental Management*, *28*, 255-268.

Ward, F. A., & Beal, D. (2000). *Valuing Nature with Travel Cost Models*. Massachusetts: Edwar Elgar Publishing.