

# **AN APPLICATION OF THE EXPERIMENTAL CHOICE MODEL TO ESTIMATE PREFERENCES FOR OUTDOOR RECREATION ATTRIBUTES IN TAMAN NEGARA MALAYSIA NATIONAL PARK**

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*The main objective of the study is to explore the applicability of the choice experiment method to reveal preferences of visitors. The preferences are related to the attributes of eco-tourism resources in Taman Negara Malaysia. Four alternative sets of combinations of attributes which included types of accommodation, congestion levels, permitted length of stay per permit and entrance fees are given to visitors to choose. The results of the analysis on the probability of choice function reveal that types of accommodation, indicated by differences in room rates, and congestion levels are the two significant factors influencing visitors preferences for the eco-tourism resources. The choice of types of accommodation facilities can be implied to the preferences for quality services and facilities. On the other hand, the congestion level is associated with lower entrance fee and costs of visits.*

*Preferences, choice experiment method, attributes, eco-tourism*

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## **INTRODUCTION**

Traditional methods of evaluating satisfaction of visitors for environmental resources, such as the contingent valuation method and travel cost method, assumed implicitly the preferences of visitors for the attributes of environmental resources. The choice experiment approach, on the other hand, attempts to reveal explicitly the preferences of visitors for the attributes of the resources.

Choice experiment was introduced in the environmental economic literature by Adamowicz *et al.* (1994) recently. In applying the technique, individuals were asked to respond to a set of questions that require them to choose one alternative from several given options. The choice made by the individual indicates a preference for the attributes of the alternative over others.

**Taman Negara Malaysia as an Eco-tourism Destination**

The objective of the establishment of Taman Negara Malaysia is the preservation of the representative indigenous flora and fauna, and objects of geological, archeological, historical and ethnological and other scientific and scenic interests to promote education, aesthetic values and recreation of the people (Department of Wildlife and National Parks, 1983).

The conservation of the national assets in Taman Negara is now acknowledged as the drawing power for the country's eco-tourism industry. The popularity of Taman Negara Malaysia as an eco-tourism destination is apparent in the increasing number of visitors from year to year (Table 1). The government has realized this potential and made plans to capture the benefits of Taman Negara Malaysia as a tourism destination in line with the present emphasis on tourism development in the country.

**Table 1**  
**Tourists Arrivals to Taman Negara Malaysia (1990 – 2002)**

<b>Year</b>	<b>Domestic Tourists</b>	<b>International Tourists</b>	<b>Total</b>
1990	6903	104444	17,347
1991	7,932	11,846	19,778
1992	11,889	13,086	24,975
1993	15,366	15,668	31,034
1994	17,499	18,978	36,477
1995	21,292	21,598	42,889
1996	23,803	23,469	47,272
1997	34,731	24,122	58,853
1998	31,762	27,866	59,628
1999	28,405	28,850	57,255
2000	32166	33378	65544
2001	34091	31383	65474
2002	39204	27301	65744
2003	30052	21757	51809

Source:DWNP, 2003

With the government stands towards privatization of certain aspects of public organization, the privatization of the facilities at the park headquarters in Kuala Tahan becomes more practical. The re-development project of the park headquarters encompasses the construction of a new administration building, new fully-equipped chalets, new restaurant, refurbishment of the rest

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house, upgrading the jetties, construction of a recreational complex, modification of the hostel and camping area, and landscaping of the park headquarters.

In line with the privatization of facilities in Taman Negara park headquarters, other services like transportation from Kuala Tembeling to Kuala Tahan and tour guiding services are opened to small enterprises. Local residents are given the priority in undertaking these small enterprises. Avenues are also open for other private operators to be involved in the provision of services for the growing number of visitors. Accommodation and restaurant facilities catering especially for the budget travellers are already opened up by enterprising residents of the area.

Visitors' preferences for eco-tourism attributes in Taman Negara can be influenced by many factors, such as accessibility, congestion level, costs, type of accommodation, safety, cleanliness, attractiveness, attitudes of hosts, and range of activities that can be participated. In the decision making process, potential participants select an alternative that is perceived as the best compromises under a given set of circumstances.

The worth of a park is strongly related to the degree to which it satisfies visitors needs in providing valued experience. Levels of satisfaction expected by visitors are influenced by facilities available, the eco-tourism resources, the services provided by the managers and agencies, and also by the attitudes of the host community in the area.

The value of a park can be enhanced by the decisions made in planning and management stages. For good planning and management decisions, good information must be made available. With respect to Taman Negara Malaysia, it is therefore essential that the Department of Wildlife and National Park, the manager of the park, to obtain relevant information on visitors' preference for eco-tourism attributes in Taman Negara, Kuala Tahan from time to time.

### **OBJECTIVES**

Using a variant of the stated preference approach known as choice experiment, this study makes an attempt to determine the visitors' preferences for eco-tourism attributes in Taman Negara, Kuala Tahan. The specific objectives include: (1) To identify the socioeconomic and visit characteristics of the international visitors to Taman Negara, Kuala Tahan, and, (2) To use a choice experiment model to elicit the preferences for eco-tourism attributes in Taman Negara, Kuala Tahan.

### **Choice Experiment Method**

Choice experiment (CE) is a recently developed alternative to contingent valuation method (CVM) in order to overcome many of the difficulties embedded in contingent valuation studies. CE allows individuals to value bundles of attributes and to assess the trade-offs amongst the attributes that individuals may be willing to make. According to Mitchell and Carson (1989), CE is an extension or a variant of the traditional elicitation approach, the two alternatives (referendum) CVM. In brief, the CE employs a series of questions with more than two alternatives that are designed to elicit responses that allow the estimation of preferences over attributes of an environmental state.

Choice experiments (CEs) have been employed in the marketing, transportation and psychology literature for some time (Batsell *et al.* 1998). The method arose from conjoint analysis, which is

commonly used in marketing and transportation research (Louviere 1988). According to Kroes and Sheldon (1988), CE represents a new generation of stated preference research. They argue that in CE not only can different questions be given to respondents (to ask for discrete choices, rather than preferences expressed by rank ordering or scaling), but (more importantly) these questions are put in a behavioural choice context, for example, “if you were to have these alternatives available to you, which one would you choose?”

According to Adamowicz (1995), CEs differ from typical conjoint methods since individuals are asked to choose from alternative bundles of attributes instead of ranking or rating them. Thus, CEs are consistent with random utility theory and are useful as a method of eliciting passive use values. Furthermore, while both CVM and CE are similar types of stated preference experiments, CVM focuses on a precise scenario and attempts to gather information about respondent's choice regarding this precise scenario. In contrast, the CE approach attempts to understand the respondents' preferences over the attributes of the scenario rather than the specific scenario. In this way, trade-offs among a broader set of attributes can be elicited.

### **Review of Past Choice Experiment Studies**

The measurement of passive use values has become an important issue in environmental economics. Adamowicz *et al.* (1998) used both choice experiment (CE) and contingent valuation method (CVM) approaches in a comparative manner to measure passive use values for a woodland caribou management programme in Alberta, Canada. Using the information from choice experiments and contingent valuation, the authors tested for differences in preferences and error variances arising from the two methods.

The CE questions were designed from five attributes of the scenario: wildlife populations (caribou and moose), wilderness area (forest management agreement), recreation restrictions (a categorical variable), forest industry employment, and a change in provincial income taxes. Individuals were asked to choose among the current situation (as described by current levels of the attributes) and two alternative “futures”.

The authors considered the results as encouraging in the sense that the estimated CE models performed well. The CE approach was also shown to have several advantages over CVM. In particular, it allowed them to examine values of attributes, impacts of the choice of functional form on welfare measures, and endowment effects. Finally, the use of CE allowed the researchers to examine the importance of possible status quo bias.

Boxall *et al.* (1996) undertook an empirical comparison of CVM and CE by evaluating the impacts of environmental quality changes. Both of these methods require individuals to state their preferences for environmental qualities. The study focused on recreational moose hunting in 15 Wildlife Management Units in west central Alberta, Canada.

Attributes used in the moose hunting stated preference experiment were: (1) evidence of moose population, which consisted of actual sightings of animals, observations of tracks and dropping, and auditory evidence; (2) access within the hunting area; (3) levels of congestion, which involved encounters with other hunting parties in different situations; (4) the quality of roads used to travel to hunting areas; (5) the distance one must travel to hunting areas; and (6) the presence of forest industry operations.

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Significant differences were found between the values derived from the two methods. However, detailed examination of the implied choice behavior suggested that respondents had ignored substitute recreation areas in the CVM question. Restricting the choice experiment model to consider only the one site where quality was varied resulted in welfare estimates similar to the CVM model. The study highlighted the importance of substitutes in environmental valuation and suggested that choice experiments might be more appropriate than CVM in some cases.

Carlsson and Martinson (1999) carried out a study to test the validity of choice experiments with donations for environmental projects. In particular, they also tested whether or not willingness to pay for projects differed between a hypothetical and an actual choice experiment. Each alternative in the choice set was characterised by three attributes; the amount of money the respondent received, donation paid to an environmental project, and the type of environmental project. Using external tests of validity, the researchers confirmed that CE did not suffer from overestimation of willingness to pay in contrast to CVM. Nonetheless, the researchers concluded that both experiments produced transitive and stable preferences when internal tests of validity were done.

A theoretical and an empirical analyses on transaction value embedded in stated preference (SP) data were undertaken by Koichikuriyama (1998). In the study, scope tests were applied to several contingent valuation data sets to detect whether willingness to pay (WTP) was derived from consumption value or from transaction value. Although the scope insensitivity hypothesis was rejected, the WTP values obtained from CVM were shown to be overestimated due to the inclusion of transaction value.

For the CE method, the author used a mole-intercept survey to elicit the WTP values from the general public for a protected wetland ecosystem. Similarly, the author estimated the effects of transaction value in SP data. The empirical results again showed that the WTP was overestimated due to the inclusion of transaction value.

### **METHODOLOGY**

#### **Experimental Design**

The main aim of choice experiment method is to infer information related to the preferences of visitors. In particular, visitor respondents are asked to choose one option from several well-defined alternative scenarios involving eco-tourism resources. Each alternative is described using various levels of the attributes of eco-tourism.

Several decisions have to be made when designing the experiment. The most important step in designing a stated preference exercise is the determination of attributes to be included in the experimental scenario and the levels of each attribute. In this study, the design will be based on the information obtained from secondary sources including reports of Department of Wildlife and National Parks, past research and communication with the relevant authority. The final design is constructed after pre-testing and refinement have been made..

The choice experiment questions are designed from four attributes of the eco-tourism scenario in Taman Negara Malaysia. The attributes include the types of accommodation, the congestion level, the permitted period of stay of each entry permit and the levels of entrance fee to the park.

These four attributes, each having four levels, form the basis for the design of the choice experiments. The 4 alternative combinations were assumed to reflect changes in the quality of the attributes offered to the visitors; alternative 1 being the highest and 4, the lowest. It is thus assumed that each combination targets a predetermined market segment. Respondents are presented with the four choice scenarios. They are then asked to choose an alternative among these alternative scenarios as defined by the varying levels of the attributes described in Table2.

**Table 2**  
**Attributes and Levels used in the Choice Experiments**

Attribute	Levels
1. Type of accommodation with the rate per night	▪ Budget Chalet (RM 10 and above)
	▪ TNR Hostel (RM40.25)
	▪ TNR Guesthouse (RM165)
	▪ TNR Chalet (RM216)
2. Visitor congestion level (number of visitors per day)	▪ 100 visitors
	▪ 150 visitors
	▪ 200 visitors
3. Permitted period of stay in Taman Negara per permit	▪ 250 visitors
	▪ 1 week
	▪ 2 weeks
	▪ 3 weeks
4. Entrance fee per visitor	▪ 4weeks
	▪ RM 2
	▪ RM 4
	▪ RM 6
	▪ RM 8

\*Note: TNR stands for Taman Negara Resort

It should be noted that with 4 attributes and 4 levels of each attribute, a universe of 4<sup>4</sup> possible combinations can be formed. This means that there are 256 possible ways of combining four levels of four attributes to form the choice scenarios. It is impractical to ask respondents to choose amongst all of these. Furthermore, it may be cognitively too demanding for the respondents to answer such a complex questionnaire. Taking into consideration that this study is exploratory in nature, consequently, only a choice set containing 4 alternative combinations is presented to the respondents to avoid the difficulty in making trade-offs between attributes in a large choice set.

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## Questionnaire Design

The questionnaire used in this study contains three sections. The first section is intended to find out respondents' visit characteristics. The second section elicited demographic information of the visitor. The final section contains the choice experiment scenarios where each respondent is asked to choose one most favourable alternative from the choice set (Table 3).

## Data Collection

A pilot survey was done on a small number of visitors who had visited Taman Negara Malaysia, Kuala Tahan, in order to test the effectiveness of the questionnaire before the actual interview. The pre-testing was necessary to make sure that there was minimum bias in the survey questions and only relevant questions were included. A brief explanation on choice experiment model was given to the respondents to avoid misunderstanding and facilitate responses. The actual site survey on 250 visitors was carried out utilizing the personal face to face interview technique.

**Table 3**  
**Choice Experiment Scenario used in Questionnaire**

<i><b>Alternative 1</b></i>
▪ Guesthouse with TNR facilities and services (RM165)
▪ Visitor congestion level at 100 visitors per day
▪ 4 weeks of permitted period of visit
▪ RM 8 of entrance fee
<i><b>Alternative 2</b></i>
▪ Chalet with TNR facilities and services (RM216)
▪ Visitor congestion level at 150 visitors per day
▪ 3 weeks of permitted period of visit
▪ RM 6 of entrance fee
<i><b>Alternative 3</b></i>
▪ Hostel with TNR facilities and services (RM40)
▪ Visitor congestion level at 200 visitors per day
▪ 2 weeks of permitted period of visit
▪ RM 4 of entrance fee
<i><b>Alternative 4</b></i>
▪ Budget chalet (RM10)
▪ Visitor congestion level at 250 visitors per day
▪ 1 week of permitted period of visit
▪ RM 2 of entrance fee

**Probability of Choice Function**

The use of the choice experiment method in economic analysis is appealing because it is based on random utility theory (McFadden 1974). According to Adomowicz *et al.* (1995), in each case, the choice of an alternative represents a discrete choice from a set of alternatives. The utility function for a given alternative,  $i$  consists of an objective component part,  $V_i$  and a discrete component,  $\epsilon_i$ . In the choice experiment, the  $V_i$  contains attributes of the situation. The overall utility of alternative  $i$  is represented as

$$U_i = V_i + \epsilon_i \tag{1}$$

An individual will choose alternative  $i$ , if the choice probability of alternative  $i$  is greater than the utilities for all other alternatives in the choice set.

$$\text{Prob } \{i|A\} = \text{Prob } \{V_i + \epsilon_i > V_j + \epsilon_j ; \forall j \in A\} \tag{2}$$

Where  $A$  is the set of all possible alternatives. It is assumed that error terms are independently and identically distributed type  $I$  extreme value with scale parameter. Given an additive utility function and the distribution assumptions on the error terms, the probability of choosing alternative  $i$  becomes:

$$\text{Prob } \{i|A\} = \frac{\exp(\mu V_i)}{\sum_{j \in A} \exp(\mu V_j)} \tag{3}$$

Where  $\mu$  is the scale parameter. In any single sample the scale parameter can not be identified, and thus is assumed to be 1.

This CE model was estimated using the linear functional form. All attributes in the CE model are entered as continuous variable. While for some demographic variables, which are categorical, are included using dummy variables.

The choice probability model in this study is depicted as:

*Probability of choice = f [Socio-demographic characteristics (e.g. gender, marital status, income, etc), eco-tourism attributes (e.g. visitor congestion level, entrance fee, etc)]*

The probability of choice function is shown as:

$$P = \beta_0 + \beta_1 \chi_1 + \dots + \beta_n \chi_n + \beta_1 Z_{m1 \dots m4} + \epsilon$$

Where,

- P = Probability of choice of an alternative
- $\beta_0$  = constant term
- $\beta'$  s = coefficients
- $\chi_1 - \chi_n$  = socio-demographic characteristics
- $Z_i$  = alternative  $i$  with combinations of attributes  $m1 - m4$ ;  
 $i = 1, 2, 3, 4$
- $m1$  = accommodation types
- $m2$  = congestion levels
- $m3$  = length of stay per permit
- $m4$  = entrance fees
- $\epsilon$  = error term



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## RESULTS

### Summary of Socioeconomic and Visit Characteristics

People are the heart of any tourism system. The demographic features, socio-economic status and their participation in activities are fundamental inputs to the success of tourism development programme. Insights into the characteristics of the users are the keys to understanding of leisure behavior and to ensuring that the planning of tourism opportunities is sensitive to the desires of the users.

After taking into consideration of the financial and time factors, 250 visitors to Taman Negara, Kuala Tahan are selected as the sample for this study. Most of the visitors are young adults aged between 20-29 years old and have gone through, at least, the secondary level education. The majority of them possess higher education attained at institute, college, polytechnic and university levels.

The majority of the visitors are foreigners, making up 71.24% of the total respondents. The lower proportion of local visitors in the sample does not imply that participation of local citizens in forest based tourism is lower compared to foreigners. Since the period of study was neither on Malaysian public holidays nor school holidays, the number of local visitors is expected to be low. Most of the sampled visitors are either involved in professional works or students. The average gross monthly income of foreign visitors is relatively higher compared to gross monthly income of local visitors; this may be attributed largely to the higher foreign exchange rates relative to Malaysian ringgit.

Generally, visitors to Taman Negara, Kuala Tahan come in groups of friends or partners. Most visitors stay in Taman Negara for two to four days depending on the choice of activities. 94.1% of the visitors sampled indicate being first-timers to Taman Negara; only a few are repeat visitors to the park. For local visitors, the journey to Taman Negara which involves longer travel distance and the higher cost of travel could be the main dissuasive factor. Nonetheless, most of the respondents interviewed stated that they would like to visit the park again because of its attractiveness.

### Probability of Choice Estimates

An initial analysis is carried out to determine the most preferable hypothetical combination. The result indicates that Alternative 2 of the choice scenarios, consisting the attributes of Taman Negara Resort chalet (RM216), visitor congestion level of 150 visitors per day, 3 weeks of length of stay per permit and RM6 for entrance fee, is the most desirable alternative. 33% of the respondents chose the combination.

The result of regression for probability of choice function is given in Table 4. The analysis is done to test the relationship between the respondent's probability of choice for the eco-tourism attributes (based on the hypothetical combination of attributes at different levels) and other independent variables.

The result obtained shows that the types of accommodation indicated by different rates and the visitor congestion level are significant at 95% confidence level. None of the socio-demographic variables show significant relationship with the dependent variable. Hypothetical entrance fee is also shown not to be a significant variable to influence visitor choice of the eco-tourism attributes, may be due to the low fees offered in the choice set.

In this model,  $R^2$  of 0.713 means that 71.3% of the variance is explained, leaving 28.7% to be explained by factors other than the variables in the equation. The F value for the probability model is 186.24; it can thus be concluded that at least one of the variables is not equal to zero, and the model is reliable in explaining the variation in probability of choice.

The result shows that the higher the accommodation rate, the higher is the probability of the visitor to choose that alternative. In the choice set, the rates of accommodation are ranged from RM10 to RM216 only. The RM10 is the rate for budget chalet (facilities operated by local residents at the periphery of the park), this is followed by RM40 for hostel in Taman Negara Resort, RM165 is the rate for Taman Negara Resort guesthouse and the RM216 is the rate for chalet in Taman Negara Resort. The increase in the accommodation rates implies increases in quality of services and facilities of the accommodation. □

**Table 4**  
**Regression result (Dependent variable: probability of choice)**

Variable	Regression coefficients	T
	?	
Intercept (c)	-0.133	-6.265
Hypothetical accommodation types ( $z_8$ )	9.67E-04	18.9
Hypothetical congestion level ( $z_9$ )	1.61E-03	18.063

Note : the level of significant is 5%

- R square = 0.713
- F statistic (186.244) > F table (3.065)

The positive relationship indicates that visitors prefer the type of accommodation with high quality services and facilities. They are willing to pay more for better quality. The choice made by the respondents may also be related to other factors such as employment level and income levels. It is obvious that Taman Negara Malaysia generally attracts visitors of higher employment echelon such as professionals, administrators, etc. who can afford to pay higher accommodation rates in order to get better services.

The second significant attribute is the congestion level. It is interesting that the tolerance of respondents interviewed for less optimal conditions is quite high. However, this does not indicate that most of the visitors will prefer higher congestion level. In this study, the range of congestion level is set at 100 visitors per day to 250 visitors per day. It should be noted too that in the choice set, the higher congestion level is combined with lower accommodation rate, lower entrance fee and shorter period of stay for the entry permit.

## CONCLUSION

The study is exploratory in nature, to test the applicability of the choice experiment method to determine visitors preferences for the attributes of eco-tourism resources. The analysis indicates that the method produces results that are consistent *a priori*, given the constraints involved.

The study shows that the preferences of the visitors for the eco-tourism attributes in Taman Negara are influenced by types of accommodation offered and expected congestion levels.

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Visitors are willing to pay higher rates for the accommodation facilities with the expectation of better qualities of services and facilities since quality of services correlates with higher rates.. On the other hand, congestion level is positively related to preferences when the choice set includes combination of lower costs of visit. Although there may be other factors which influence the visitors' choice, as this is a pioneer study using the choice experiment method, only four selected attributes were included mainly to parsimonise the study. Furthermore, the lack of experience in setting questionnaire for choice experiment model may create the problem of poor model specification and omission of relevant variables.

Still, the study is useful in providing initial information to the management of Taman Negara Malaysia. Visitors are conscious of the quality of services and facilities and are willing to pay for better services and facilities. Alternatively, given the availability of lower cost facilities, visitors are willing to accommodate higher level of congestion but for a shorter length of stay in the park. It is hoped that in the future more studies on visitors' preferences will be carried out in view of to the rapid changes in human recreation behaviour and taste, and in management policies and rules of the park. Thus, new findings should be explored using other comparable data sets to provide latest information, which would be useful for management and planning. It is suggested that further refinement should be made in the future studies in order to improve the analysis. A bigger sample size is suggested in order to get a more reliable and impartial estimate of values. Data should be collected throughout the year, and not on specific period only. Finally, it is clear that there is room for future research using the choice experiment method.

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