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How international visitors do contribute to management processes of Perhentian Island Marine Park Malaysia?

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Abstract
The current paper seeks to estimate the value of management attributes in Perhentian Island Marine Park (PIMP). In order to collect the data, Choice Modelling (CM) questionnaires were used. After some checking with the related software and based on the literature and previous studies and suggestions, an experimental design was developed. Four ecological attributes and four relevant management processes for PIMP were selected. The results indicated that the respondents are concerned about conservational and relevant management process attributes. In the basic model, the main attributes were divided into two parts. The coefficients had prior expected signs, and they were statistically significant at 1% level. The findings can be utilized by Department of Marine Park Malaysia (DMPM). Based on the concept of ecotourism, local population benefits and marine resources maintenance are important besides fulfilling the satisfaction of visitors.

Keywords: Perhentian Island Marine Park, Choice Modeling, Management attributes, Ecotourism

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Introduction

Oceans, coasts, and marine ecosystems have vital roles at global, national, and local levels which are apparent to any individual since they create economic, environmental, social, cultural, and security opportunities. These opportunities are growing and perhaps significantly able to compete in use. Thus, planning and management of these growing uses are important for any country that is geographically located close to the ocean. Furthermore, these opportunities can diversify a country's economy which can help reduce dependency of the economy on economic sectors (e.g. manufacturing of goods). In the new millennium, leisure activities take shape in the form of tourism and ecotourism. Implicit economic impact of leisure activities is apparent when people's efficiency increases after recreational activities. Thus, investigating this related issue is of utmost importance.

Malaysia is surrounded with open water and South China Sea. Therefore, maritime boundaries have created marine opportunity for this country such as tourism. Nowadays, tourism industry has grown in the world. As an economic sector, this industry can be promoted in order to improve the low level of per capita income, the low level of foreign currency incomes and unemployment. The Ministry of Natural Resource and Environment (NRE) has Strategic Action Plan in moving towards the goals to be fulfilled in 2020. Consistent with this plan, DMPM for the first time has documented Strategic Plan of 2011-2015 which is based on the International Union for Conservation of Nature and Natural Resources (IUCN) and the World Bank Management indexes. In this planning document, key performance indicators (KPIs) have also been introduced in order to compare the performances and purposes of the plan. For instance, increasing biophysical index for coral cover, focal species and water quality have been predicted in this plan (DMPM, 2011). In addition, this plan is a step towards improving conservation and stability of Malaysia's marine environment as well as achieving its objective to become a leader in Southeast Asia in 2015 as a Marine Biodiversity Conservation and Management that emphasizes the improvement and development of physical capacity in Marine Park.

The two strategic objectives stipulated in the strategic plan of DMPM are: (1) increasing the effectiveness of marine park management from estimated 40% in 2010 to 50% in 2015, and (2) utilizing and developing of marine biodiversity which should be encouraged in a sustainable manner. Thus, to achieve these objectives and main task of establishment of marine parks, i.e. protection and conservation of aquatic flora and fauna, a proper management procedure should be established which considers the ecological and human activities.

Regarding what has been discussed above, the current paper seeks to estimate the value of management attributes in Perhentian Island Marine Park. In other words, this research is going to answer the following questions:

i. How much are the respondents willing to pay for the management practice attributes in PIMP?
ii. If the management process information is included in CM, what is its impact on preferences?

Review of the literature

In the related literature, practical application to quantitative assessment of damages was used as the prevention of soil erosion to analyze the benefits. This application has generated some extra market benefits, such as public goods in nature (Arabamiry, 2009). A well-known and widely used approach is Contingent Valuation Method (CVM). It is also the oldest method employed in several areas of economics and environmental economics.

Through a questionnaire-based survey in which the *status quo* is about the good followed by a proposed change (in management and/or policy) that may be real, or if there is a reason or an interest on valuation in a current situation, the good is not undergoing any changes. Hypothetically, the value which the individuals hold for that good can be estimated by directly asking

them how much they are willing to pay (if anything), (Carson and Hanemann, 2005).

The main key phases for a CVM survey as proposed by Hanley, Spash and Cullen (1993) are design and development, administration, evaluation and interpretation of the survey outcomes. Therefore, the process of CVM can be defined as follows: to generate a hypothetical market, to estimate WTP or WTA, to estimate the mean and median of WTP or WTA, to aggregate the amounts of WTP or WTA, and to assess the validity of CVM estimation (Yacob, Radam, & Awang, 2008).

Bidding game, Payment Card, Open Ended and Dichotomous Choice are the WTP elicitation formats of CVM. Dichotomous Choice is highly recommended due to its ability to match the way consumers make choices in the market place (Arabamiry, 2009). Carson and Mitchell (1989) stated that, it also refers to referendum which has two types, namely, dichotomous choice and double bounded Dichotomous Choice.

Some potential biases in CVM have caused the environmental economists to utilize CM instead (Bateman *et al.*, 2002). When there are multiple changes in the attributes, CVM is less flexible in estimating the values. Meanwhile, researchers are interested in providing requests of policy makers regarding the impact of level of attributes and their marginal values (e.g. increase in coral cover, marine turtles, fish species and water quality due to management process). In addition, according to Bennett & Blamey (2001), CM is also utilized when there are alternative multiple attributes for using options and marginal changes in each individual attribute to estimate the environmental values, in which CM has this capacity.

Apparently, CVM and CM are the most widely employed and best known techniques for measuring the values of ecosystem functions and non-use values. Furthermore, according to Whitten and Bennett (2001), in the stated preference technique, the two main methods are CVM and CM. Nevertheless, based on the nature of the work at hand, the implementation of CM and CVM is different; for instance, the intention of the study depends on the total non-market value of a good as a whole. On the other hand, from particular attributes view, individual values are the intentions. However, public good as a whole in CVM can be considered. But in CM each attribute of a public good will be investigated. In management decision, CM offers distinct advantage compared to CVM. Thus, when management/policy perspective consideration are basic intentions, choice experiment is more preferable. CM measures the marginal value of per unit change in each attribute. Hence it is more easily applicable. According to Hanley, Wright & Adamowicz, (2004) in a policy assessment, absolute provision of the goods is less of a concern than marginal changes in the provision of goods. Hence, both CVM and CM can be used. However, Bateman *et al*. (2002) stated that, several attributes and levels can be considered simultaneously in CM while only one attribute with two levels can be investigated in CVM. Therefore, utilizing CVM may be unprofessional; When multi-dimensional changes and trade-offs between situations is the intention of the study, a series of CVM studies can be considered though it is more costly. In addition, the relative importance existed among attributes cannot be directly compared in CVM; thus CM is easier to apply. Choice experiment is more informative because respondents express their preferences among multiple changes, attributes, levels and over a range of payment for a good, including a no change alternative.

In spite of well known, rapidly growing and wide use of CVM, it has been indicated that CVM ability of reliability and accuracy of estimated WTP are faced with some criticisms (Yacob *et al.*, 2008). Therefore, some potential bias and errors are associated with CVM in environmental applications.

Method

In order to collect the data, CM questionnaires were used. After some checking with the software (e.g. SPSS) and based on the literature and previous studies (e.g. McCartney, 2009; Yacob *et al.,* 2008)

and suggestions (Caussade *et al*., 2005), the experimental design was developed and constructed.

In this study four ecological attributes and four relevant management processes for Perhentian Island Marine Park (PIMP) were selected. The attributes for conservation are divided into three levels. Based on the predicted indexes (KPIs) in the Strategic Plan of DMPM, two levels for each ecological aspect outcome increment, i.e. 5% and 10% and a 0% change level or baseline (Table 1) were used. For the relevant management process[1] attributes, based on predicted aims in the Strategic Plan of DMPM, and in order to achieve effective management from 40% to 50%, four attributes were selected divided into 3 levels, including 0% change level or baseline. In each choice set, each attribute varies across alternatives (Table 1). Hypothetical but practical management processes are formulated in order to achieve high ecological aspect outcome and less restrictive human activities in PIMP.

Furthermore, in order to achieve a financial sustainability, the entrance fee after adoption was revised. So the attribute cost had four levels, in which the bid levels ranged from RM5 to RM30. The amounts were arranged based on the revised entrance fee. In each choice set for all attributes (ecological and cost), the *status quo* appears at 0% and RM5. This is because, apart from the *status quo*, some levels of expenses for any improvement in environmental goods are required. Caussade *et al*. (2005) found out that the number of attribute levels has a small effect on the error variance. Therefore, utilizing attribute levels in this survey can be described as shown in Table 1.

In comparison with developed and industrial countries, in developing countries, such as Malaysia, financial contribution of government for conservation and preserving of natural resources are still low. In addition, conservation and protection of aquatic flora and fauna is the main task for the establishment of Marine Park. Currently except the entrance fee, there is no trust fund in existence to improve effective management from visitors' side. Therefore, an amount for this trust fund as marginal entrance fee or increase in entrance fee is suggested to estimate visitors' willingness to pay for relevant management process. Its level is from RM5 to RM25, based on probable revised entrance fee.

Table 1. Attributes and levels for Perhentian Island Marine Park for ecological attribute (part one) and management process (part two)

Part one: Ecological Aspect (EAS) or Conservation attributes		
Attributes (or variables in the model)	Levels	Current situation
Coral cover (CC)	1) 0% improvement of coral cover (no change) 2) 5% improvement of coral cover 3) 10% improvement of coral cover	In faire condition (32.8%)
Marine turtle (MT)	1) 0% improvement of marine turtles (no change) 2) 5% improvement of marine turtles 3) 10% improvement of marine turtles	Overall numbers decreased through the years
Fish species (FS)	1) 0% improvement of fish species (no change) 2) 5% improvement of fish species 3) 10% improvement of fish species	Abundance and size reduced
Water quality (WQ)	1) 0% improvement of water quality (no change) 2) 5% improvement of water quality 3) 10% improvement of water quality	Source of pollution increased
Cost (EF)	1) RM 5 2) RM 10 3) RM 15 4) RM 30	RM 5

1. For each management processes and ecological attribute four levels have been suggested and attributed to a focus group including eight PhD students from Faculty of Environmental Studies (Department of Management and Planning) and Faculty of Economics and Management, that two level for each relevant management processes have been chosen for each ecological attribute.

Part two: Relevant Management Process (RMP)		
Attributes (or variables in the model)	Levels	Current situation
Coral cover management process (MCC)	1) No closed coral area (no change) 2) closed bleaching coral area 3) closed bleaching coral area + restoring and rehabilitation of coral area	No closed coral area
Marine turtle management process (MMT)	1) No beach closure (no change) 2) 3- month seasonal closure (for example in the egg- laying season) 3) 3- month seasonal closure + public awareness	No beach closure
Fish species management process (MFS)	1) Some seasonal closure and low site stress (no change) 2) 4- month closure 3) 4- month closure + increase in Marine Inventory Data Updating (MIDU)	Some seasonal closure and low site stress
Water quality management process (MWQ)	1) No ECO- Certificate (no change) 2) Compliance with Green Hotel Criteria (ECO-Certificate) for hotels and resorts 3) Compliance with Green Hotel Criteria (ECO-Certificate) for hotels and resorts + public awareness	No ECO- Certificate
Marginal entrance fee (MEF)	1) RM 0 increase 2) RM 5 increase 3) RM 10 increase 4) RM 25 increase	No increase

Therefore, based on ecological and management attributes as introduced in Table 1, the value of attributes or the variables can be estimated representing the individual utility which can be specified as follows:

For ecological or conservation attributes:

$$U = \beta_1 CC + \beta_2 MT + \beta_3 FS + \beta_4 WQ + \beta_5 EF + \varepsilon \quad (1)$$

For relevant management process attributes:

$$U = \beta_1 MCC + \beta_2 MMT + \beta_3 MFS + \beta_4 MWQ + \beta_5 MEF + \varepsilon \quad (2)$$

Since in stated preference research, socio-demographics and attitudinal questions can be components of this technic (Bennett & Blamey, 2001); to ascertain the respondents' perceptions of choice questions, debriefing questions (Landry & List, 2007), such as consideration of budget and non-attendance of attribute(s), while they are answering the choice set, can be utilized in the questionnaire, as we did in this survey. Therefore, in order to explain preference heterogeneity some relevant covariates were drawn by allowing socio-demographic interaction[1] through some aspects which were included in the questionnaire.

Results

The general econometric model is based on the model specified in equations 1 and 2 which are individuals' utility for EAS or conservational attributes and RMP in which individuals' choice (or utility) are functions of attributes. The results are presented in Table 2 as model 1 and 2 respectively.

The results indicated that the respondents are concerned about conservational and relevant management process attributes. In the basic model, the main attributes were divided into two parts. The coefficients had prior expected signs, and they were statistically significant at 1% level. Coefficient and standard error of EF and MEF appeared lower compared to other

1. For example general demographic data included gender, age and education and so on; general environmental experience included member of an environmental group, protection of an attributes through undertaken activities in beach and regarding a particular attribute of their experiences; confidence and confusion and ignorance of attributes.

variables. This is because these two variables had been coded with actual value during model estimation, whilst other attributes were coded as 1, 2, and 3 for separate levels. To estimate economic values of ecological aspect and management processes, the basic factor as a monetary variable in each part was considered. These factors which affect the probability choice (and WTP) are EF and MEF.

Table 2. Multinomial basic model for EAS and RMP

Model 1 (EAS)			
Variable	Coefficient(β)	Std. Error	P -value
Coral Cover (CC)	0.7700	0.0622	0.0000***
Marine Turtle (MT)	0.3371	0.0566	0.0000***
Fish Species (FS)	0.4396	0.0499	0.0000***
Water Quality (WQ)	0.7684	0.0512	0.0000***
Entrance Fee (EF)	-0.0298	0.0049	0.0000***
Summary statistics			
Number of observation	3633		
Log likelihood function	-926.4418		
Log likelihood, No coefficients	-991.5654		
Pseudo R^2	0.0657		
Adjusted Pseudo R^2	0.0637		
Marginal values of EAS attributes			
CC	25.8013	5.1553	0.0000***
MT	11.2945	2.5485	0.0000***
FS	14.7302	2.7506	0.0000***
WQ	25.7480	3.8325	0.0000***
Wald[a] Statistic = 47.0929			
Prob. From Chi-squared[4] = 0.0000			
Model 2 (RMP)			
Variable	Coefficient(β)	Std. Error	P -value
Management process relative to CC (MCC)	0.4081	0.0643	0.0000***
Management process relative to MT (MMT)	0.4211	0.0713	0.0000***
Management process relative to FS (MFS)	0.5006	0.0494	0.0000***
Management process relative to WQ (MWQ)	0.8682	0.0546	0.0000***
Marginal Entrance Fee (MEF)	-0.0232	0.0050	0.0000***
Summary statistics			
Number of observation	3114		
Log likelihood function	-803.6473		
Log likelihood, No coefficients	-927.0125		
Pseudo R^2	0.1331		
Adjusted Pseudo R^2	0.1310		
Marginal values of RMP attributes			
MCC	17.5520	5.0167	0.0005***
MMT	18.1114	4.9818	0.0003***
MFS	21.5341	4.6184	0.0000***
MWQ	37.3417	7.2292	0.0000***
Wald Statistic = 29.43514			
Prob. From Chi-squared[4] = 0.0000			

Notes: ***, **, * denotes significance at the 99%, 95% and 90% level of confidence respectively

[a] in LIMDEP program Marginal Rate of Substitution (MRS) between attributes and EF and MEF can be computed through Wald procedure

The goodness of fit has been tested by looking at visitors' choices in two parts (Table 2). One of the criteria for considering goodness of fit is likelihood ratio test[1]. At 1% level of significance and five degrees of freedom, the critical value of chi-squared is 15.09. Therefore, for both two models null hypothesis (i.e. coefficient are simultaneously and significantly equal to zero) is rejected strongly because chi-

1. According to Ben-Akiva and Lerman (1985) - $2\ln L^*$ has an approximate Chi-Squared (χ^2) distribution with "M" degree of freedom where $L^* = \max L^R$ (max of the log-likelihood function) – max L^{UN} (max of the log-likelihood unrestricted). Also, Gujarati (2002) stated likelihood ratio (LR) statistic in logit model is equivalent with F test in linear regression models.

square for two models was 130.2472 and 246.7304 respectively. This means that with a likelihood ratio test, marginal effects (β_S) are not jointly zero. Moreover, another criterion is the overall goodness of fit that is pseudo- R^2 statistic[1] for logit model. As indicated in Table 2, pseudo- R^2 and adjusted pseudo- R^2 are 0.0657 and 0.0637 for model one, and 0.1331 and 0.1310 for model two respectively. Thus, the level of explanatory power for model two is stronger than that observed in model one. Furthermore, according to the log likelihood function which is -926.4418 for model one and -803.6473 for model two it can be said that it is better fitted. Therefore, respondents' support can be deduced from these results to increase the marine conservation by supporting relevant management process conclusively.

Marginal values are significant at 1% level in both parts. Based on the results, for instance, one unit with more improvement in coral cover in PIMP has 25.8013 marginal value, and increases the respondent's utility. Similarly, it can be interpreted for other marginal values of attributes in Table 2.

However, the results of the basic models have expected signs and are significant, but there are more accurate approaches to improve the fitted and estimated models. These approaches include level attributes model and/or interacting them with socio-economic variables as implemented in upward sections.

Discussion and conclusion

The growing trend of the number of international visitors of PIMP is one of the findings of this study. Around 62% and 64.28% of visitors of PIMP were international in 2011 and 2012 respectively. As for this study, it was about 60% of respondents' population. These findings can be useful, not only for DMPM as the main stakeholder in managing the parks, but also for the tourism operators to promote ecotourism activities. However, the attraction of domestic visitors to visit PIMP is more important than international visitors because of their support, protection, and conservation of marine ecosystem in Malaysia.

Tourism and ecotourism have important roles in Malaysian GDP. Creating a sustained balance between ecotourism and marine resources is an important task of policy makers and authorities. The findings of this survey can be utilized by DMPM. Based on the concept of ecotourism, besides fulfilling the satisfaction of visitors, local population benefits, and marine resources maintenance are also important. Hence, for future use, these subjects must be considered simultaneously. Despite the short-term benefits, the long-term benefits must be also in order. The results of information gained from the visitors' profile, such as socio-demographics, visit characteristics, opinion and perception can provide practical input. Besides recreational values, visitors also stated about the existence, bequest, and option values for PIMP; DMPM and other stockholder, by capturing these opportunities, can provide not only suitable facilities and services for their customers, but also through participating them, can create the best time for visitors. Particularly, the time they are staying in PIMP by taking their contribution can improve surrounding marine ecosystem.

The Strategic Plan of DMPM was expired in 2015. In this plan, increasing in biophysical index in Coral Cover, Focal Species Abundance and Water Quality had been predicted under biodiversity management section. KPI has been applied as a measurement of improvement in ecosystem. Furthermore, improvement in effective marine park management to 50% by 2015 is one of the strategic intentions in this plan. In this study, attributes and their levels (KPIs) were utilized from this strategic plan. For future studies, application of the result of this study and outcomes of the Strategic Plan of DMPM that has been expired in 2015 is suggested. More specifically, such application can be

1. Pseudo-R^2 between 0.2 and 0.4 in conditional, multinomial and mixed logit model is considered acceptable goodness of fit of the model (Louviere *et al.,* 2000).

done to check whether DMPM achieved intentions of this plan.

Becoming a management leader for marine biodiversity conservation in South East Asia by 2015 was the Malaysian aspiration. Although previous studies were related to marine park arena (Yacob *et al.,* 2008 and Yeo, 2004) in Malaysia, and the first attempts to utilize CM in marine park arena had been done by Yacob *et al.* (2008), it seems the present study is the first effort to employ this technique in economic valuation regarding marine ecosystem function product such as coral, turtle, fish and water quality attributes and their management process at the same time. Hence, the results of this study are capable of being extended to other marine parks or economic valuation of ecosystem functions in Malaysia and other countries in South East Asia, in case those marine parks are similar in ecosystem, visitors and other levels with PIMP.

In spite of the importance of environmental issues, perhaps, there is a lack of sufficient attention to them. It is a subject not only in developing countries but also throughout the world. Usually the governmental budgets in the majority of countries tend to be limited on conservation or protection of sites. In these events authorities need to have sufficient fund and use economic rents which exist in these areas to achieve their critical mission. However, currently, entrance fee is a mechanism to fund in PIMP. The rate of visitors of PIMP indicates a growing trend; thus, net benefits from visitors are increasing (Othman, 2012). Hence, this amount is negligible and it is not a real price for this public good and needs to be revised. This issue has been pointed out by Yacob *et al.* (2008) and Yeo (2004). Thus, increasing in marine parks entrance fee in Malaysia has been recommended. To determine an appropriate sample size the important factors are budget, time, available unit of sample and the aims of the study. However, there may be some limitations regarding these factors. This study aimed at estimating user's values for ecological aspects and relevant management processes attributes that PIMP visitors' held for these attributes. Also, due to budget limitation, units of sample were PIMP visitors and other stakeholders (e.g. local residence and tour operators) were excluded. Therefore, to get more overage and to attain high standard quality of outcomes in economic valuation studies, it is suggested for future studies to include other stakeholders such as local residence and tour operators as sample units.

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