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# The Estimation of Economic Benefits of Urban Trees Using Contingent Valuation Method in Tasik Perdana, Kuala Lumpur

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## ABSTRACT

Urban trees provide a multitude of tangible and intangible services which include provisionary, regulatory, as well as cultural and support services to the community. Unfortunately, to set a monetary value on these said services is challenging to say the least. Ignorance of such monetary value is unintentional and this is mainly due to the lack of awareness and the absence of monetary value of the services itself. Hence, the quality of these urban trees degrades over time as no one appreciates its monetary value. In light of this situation, a study was initiated to determine the economic benefits of the urban trees that were planted surrounding Tasik Perdana (TP) area. For this purpose, a total of 313 respondents were interviewed in the TP area using the contingent valuation method (CVM). The objective of this study was to elicit willingness to pay (WTP) for these urban trees. WTP represents the willingness of a person to pay in monetary terms to secure and sustain these urban trees. Hence, seven bid prices were used and distributed to the respondents: RM1.00, RM5.00, RM10.00, RM15.00, RM20.00, RM25.00 and RM30.00. Logit and linear regression models were applied to predict the maximum, mean, and median WTP. The study concludes that the estimated mean WTP is RM10.32 per visit and the estimated median WTP is RM10.08 per visit.

*Keywords:* Monetary value, urban park, willingness to pay, bid price, logit model

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## INTRODUCTION

Urban trees provide a variety of services which include provisioning services such as aesthetic trees, regulating services (e.g., flood control and climate control), cultural services (e.g., historical park, national parks or natural forms of land), and also supporting services in soil formation, plant growth and oxygen production. Studies have found that there has been an extraordinary disengagement of humans from the natural environment since few hundred years ago (Mazlina & Ismail, 2008; Maller *et al*., 2005; Axelrod & Suedfeld, 1995). Thus, people are encouraged to engage in outdoor activities and have regular contact with nature. Trees are the main feature of nature and urban parks are a commonplace for urban dwellers to conduct their activities and to be close to nature.

Sadly, the same urban trees are slowly but surely moving towards physical degradation. Some of the more seriously degraded trees have to be removed as they pose danger to the general public. One of the factors that has contributed to urban trees degradation is violence. Vandalism is becoming more prominent especially in urban park areas (Abdul Malek & Mariapan, 2009). For example, the Kuala Lumpur City Council (DBKL) and other related government agencies have spent a total of RM2.4 million to replace the facilities that were damaged by vandals (Dalip, 2001). Moreover, improper use of urban trees such as leaving heavy objects under them may cause physical stress. Improper planning during the plantation phase, such as planting the trees in unsuitable locations, will also cause stress and affect their growth. In addition, natural disasters or events such as in severe lighting storms can also cause serious damages to the tress and inevitably pose danger to the public. Often, the maintenance of these trees is seen to be the sole responsibility of the respective agencies that are responsible for landscaping services and not as the responsibilities of the beneficiaries of the services provided by these trees. These trees should be properly managed and conserved to ensure that they will continue to provide the services and at the same time improve the quality of life of the urban dwellers.

A management plan for urban trees should be in place as a guide for related decision-makers, especially for park managers. A well-distributed, open space (green lung) can dramatically improve the quality of life of the people (Federal Department of Town and Country Planning, 2005). Meanwhile, a high quality park service requires huge city government budget to be allocated for personnel, park resources, and for administrative activities (Iamtrakul *et al*., 2005). In order to estimate the amount of budget that is needed for such items, the monetary value of these urban trees should be determined prior to undertaking the economic valuation of urban trees.

However, the monetary value of the urban trees in urban parks is often undefined as there is no available market for them. Therefore, the urban trees which provide intangible benefits and services are often misconstrued as non-market value products and not traded in a real economic market. If the economic value of the urban trees is not known, these trees may never be insured and they will thus remain inadequately managed and subsequently affect the urban dwellers' safety and quality of life.

In addition, one of the consequences for not knowing the real economic value of urban trees is the lack of appreciation towards the services provided by these trees. Therefore, the general public might not be willing to pay if an additional fund is required for urban tree management. Moreover, a park manager may pay less attention on the urban trees management when there is no monetary value given to these urban trees. As a result, these trees are removed without much due consideration to their environmental benefits and the monetary losses that they may have incurred.

One of the methods that can be used to quantify the benefits and services of non-market goods such as urban trees is the contingent valuation method (CVM) (Jim & Chen, 2008; McPherson, 1999). The first CVM survey was proposed by Ciriacy-Wantrup (1947). After seventeen years, Davis (1963) successfully developed a practical application to evaluate the economic value of recreation in the Maine woods. Now, many studies on the non-market goods utilising the CVM method have been conducted such as those by Treiman and Gartner (2005), Togridou *et al*. (2006), Adams *et al*. (2008) and Natalia and Mercedes (2010).

## MATERIALS AND METHODS

### *Study Area*

Kuala Lumpur Lake Gardens is also known as *Taman Tasik Perdana* (TTP). It is located right in the middle of Kuala Lumpur city. The whole area is estimated to be 91.6 hectares, which includes the flowering shrubs, shady trees, botanical gardens, and other notable features. This is a recreational park and it is one of the most popular recreational areas among the locals and foreign visitors. The park was established amongst other parks, providing recreational facilities and historical structures – these include the Orchid Garden, Hibiscus Garden, Butterfly Park, Bird Park, Boathouse, Deer Park, Panggung Anniversary, Malaysian National Monument, ASEAN Gardens, Memorial Tun Razak and Carcosa Seri Negara. TTP is the first and oldest public park in Kuala Lumpur. It was the brainchild of Alfred Venning, the British State Treasurer in the 1880s (Malaysia Travel Guide, n.d.). The second Prime Minister of Malaysia, Tun Haji Abdul Razak Hussein officially opened the park on May 1$^{st}$, 1975.

This research study site is located in the Lake Gardens or Taman Tasik Perdana (TTP), which is close to the artificial lakes. According to Kuala Lumpur City Hall (DBKL), approximately RM5.6 million was spent to manage and maintain this park from 2005 to 2009. Currently, there are five new phases added to the park, which have started in April 2010. To date, there are 753 new trees and shrubs which have been planted in this area (Table 1).

TABLE 1
The newly planted species in Tasik Perdana

| No. | Plant | Quantity |
|---|---|---|
| 1 | *Actinodaphne macrophylla* | 10 |
| 2 | *Actinodaphne sesquipedalis* | 6 |
| 3 | *Adansonia digitata* | 4 |
| 4 | *Alerites moluccana* | 5 |
| 5 | *Alstonia scholaris* | 5 |
| 6 | *Amherstia nobilis* | 5 |
| 7 | *Anacardium occidentale* | 5 |
| 8 | *Andira surinamensis* | 3 |
| 9 | *Aquralia malaccensis* | 3 |
| 10 | *Aralidium pinnatifidum* | 10 |
| 11 | *Arfeuillea arborescens* | 5 |
| 12 | *Azadirachta excelsa* | 5 |
| 13 | *Baccaurea parviflora* | 5 |
| 14 | *Bacckia frutescens* | 5 |
| 15 | *Barringtonia racemosa* | 5 |
| 16 | *Bauhinia grafinii* | 20 |
| 17 | *Biringtonea* Spp *(Milingtonia hortensis)* | 3 |
| 18 | *Brachychiton rupestris* | 4 |
| 19 | *Brownea grandices* | 3 |
| 20 | *Buchanania arborescens* | 5 |
| 21 | *Bucida buceras* | 5 |
| 22 | *Caesalpinia ferrea* | 10 |
| 23 | *Calophyllum curtisii* | 5 |
| 24 | *Calophyllum soulattri* | 5 |
| 25 | *Campnosperma auriculatum* | 4 |
| 26 | *Canarium littorale* | 3 |
| 27 | *Cassia rainbow shower* | 1 |
| 28 | *Chempaca alba* (Michelia alba) | 5 |
| 29 | *Chorisia speciosa* | 5 |
| 30 | *Chrysephyllum cainito* | 5 |
| 31 | *Chukrasia tabularis* | 5 |
| 32 | *Cleitanthus malaccensis* | 5 |
| 33 | *Clusia majar* cv var | 5 |
| 34 | *Cola gigantea* | 2 |
| 35 | *Couroupita guianensis* | 5 |
| 36 | *Cratoxylum formosum* | 4 |
| 37 | *Crotoxyllum cochinchinensis* | 10 |
| 38 | *Crotoxylon cochinchinenses* | 2 |
| 39 | *Cycas peetinata* | 10 |
| 40 | *Cycas rumphii* | 5 |
| 41 | *Cynometra malaccensis* | 3 |
| 42 | *Cynometra ramiflora* | 3 |
| 43 | *Delonix regia* | 3 |
| 44 | *Dialium indum* | 5 |
| 45 | *Dillenia reticulata* | 4 |
| 46 | *Diospyros blancoi* | 5 |
| 47 | *Diospyros buxifolia* | 5 |
| 48 | *Diospyros lanceifolius* | 12 |
| 49 | *Diospyros tristis* | 5 |
| 50 | *Diospyros wallichii* | 5 |
| 51 | *Dipterocapus chartacens* | 5 |
| 52 | *Dipterocapus kunstleri* | 5 |
| 53 | *Dyera costulata* | 10 |
| 54 | *Elaeocarpus angustifolius* | 10 |
| 55 | *Eleocarpus apiculatus* | 5 |
| 56 | *Erythrina glauca* | 3 |
| 57 | *Erythrophleum guineense* | 5 |
| 58 | *Eugenia cerinum* | 5 |
| 59 | *Eugenia clariflorum* | 20 |
| 60 | *Eugenia companulatum* (Fine leaf) | 5 |
| 61 | *Eurycoma longifolia* | 20 |
| 62 | *Fagraea fragrans* | 5 |
| 63 | *Fagraea racemosa* | 15 |
| 64 | *Ficus microcapha* | 5 |
| 65 | *Ficus* Sp (Thai) | 10 |
| 66 | *Firmiana malayana* | 5 |
| 67 | *Flacourtia inermis* | 5 |

Table 1 (*continued*)

| | | |
|---|---|---|
| 68 | *Garcinia cowa* | 5 |
| 69 | *Garcinia scortechinii* | 20 |
| 70 | *Gardenia carinata* | 5 |
| 71 | *Gardenia tubifera* | 5 |
| 72 | *Guaiacum officinle* | 5 |
| 73 | *Hopea ferruginea* | 3 |
| 74 | *Horsfieldia superba* | 5 |
| 75 | *Intsia bijuga* | 6 |
| 76 | Japanese round pine | 5 |
| 77 | *Kigelia africana* | 6 |
| 78 | *Knema hookeriana* | 5 |
| 79 | *Koelreuteria formosana* | 5 |
| 80 | *Koomposia excelsa* | 5 |
| 81 | *Lagerstroemia floribunda* | 5 |
| 82 | *Lagerstroemia speciosa* | 2 |
| 83 | *Lagerstromia* sp (Red flower) | 5 |
| 84 | *Lecythis ollaria* (Monkey pot) | 10 |
| 85 | *Lepisanthes alata* (Johore tree) | 5 |
| 86 | *Lopanthera lactescens* | 10 |
| 87 | *Mangifera lagenifera* | 4 |
| 88 | *Maniltoa* sp | 5 |
| 89 | *Moringa thouarsii* | 5 |
| 90 | *Neodypsis lastelliana* (Red neck) | 15 |
| 91 | *Osmosia sumatrana* | 5 |
| 92 | *Pagiantha dichotoma* | 5 |
| 93 | *Pandanus utilis* | 5 |
| 94 | *Parkia javanica* | 3 |
| 95 | *Parkia speciosa* | 3 |
| 96 | *Pentaspadonmotleyi* | 5 |
| 97 | *Phyllanthus pectinatus* | 3 |
| 98 | *Phyllocarpus septrenlrionalis* | 4 |
| 99 | *Pimeleodendron griffithianum* | 5 |
| 100 | *Plumeria* pink | 2 |
| 101 | *Plumeria* red | 1 |
| 102 | *Plumeria tricolor* | 1 |

Table 1 (*continued*)

| | | |
|---|---|---|
| 103 | *Plumeria* white/yellow | 2 |
| 104 | *Podocarpus makii* | 5 |
| 105 | *Polyalthia rumphii* | 5 |
| 106 | *Pometia pinnata* | 5 |
| 107 | *Pongamia pinnata* | 5 |
| 108 | *Pritchardia pacifica* | 10 |
| 109 | *Pterocarpus indicus var pendula* | 15 |
| 110 | *Samanea saman* | 5 |
| 111 | *Sandoricum koetjape* | 3 |
| 112 | *Saraca cauliflora* | 10 |
| 113 | *Scorodocarpus borneensis* | 5 |
| 114 | *Sindora* Sp | 5 |
| 115 | *Sterculia cordata* | 5 |
| 116 | *Sterculia parviflora* | 5 |
| 117 | *Sterculia rubiginosa* | 5 |
| 118 | *Streblus elongatus* | 5 |
| 119 | *Suregada multiflora* | 5 |
| 120 | *Syzygium malaccaensis* | 4 |
| 121 | *Tabebuia argentea* | 10 |
| 122 | *Tamarindus indica* | 4 |
| 123 | *Terminalia calamansanai* | 5 |
| 124 | *Tristania obovata* (Multi Stem) | 15 |
| 125 | *Tristania obovata* (single stem) | 7 |
| 126 | *Tristania whitetiana* (single stem) | 5 |
| 127 | *Xanthophyllum eurhynchum* | 5 |
| 128 | *Xanthostemon chrysanthus* | 5 |
| | Total | 753 |

### *Data Collection*

The actual survey was carried out from October 2010 to January 2011 in the mornings of many weekends. The survey was authorised by the Dewan Bandaraya Kuala Lumpur (DBKL) who allowed such a survey to be carried out within the stipulated time period. A total of 313 respondents (park visitors) were randomly selected and successfully interviewed.

*Questionnaire Design*

The questionnaire was written in Malay and English. Open and close-ended questions were used for this purpose. Open-ended questions are subjective questions that require the respondents to respond in any way they prefer while close-ended questions require responses that limit the subjects to the choices provided to them. The questionnaire was further divided into three separate parts that cover the following subjects:

- Background

  This includes the general background of the study site and the research objectives.

- Visitor's valuation of environment goods

  These questions elicit the respondents' willingness to pay (WTP) and their preferences relevant to the urban trees conservation.

- Demographic questions

  These questions are related to the respondents' personal characteristics (origin, gender, age, marital status, race, working status, level of education, and monthly income).

*Model Formulation*

Economists define value based on the ideals of rationality and consumer sovereignty (Hanley *et al*., 1997). An individual is assumed to have preferences over urban trees, and thus the utility function formed. Consumer surplus is the money metric of unobservable utility function and can be either willingness to pay (WTP) or willingness to accept (WTA) compensation measure. Hence, preference can be indexed by the utility function and changes in the utility are estimated by consumer surplus.

With appropriate restrictions, individual's WTP or WTA for a change in urban trees is based on a theory of rational choice by consistent estimate of preferences. Logit or logistic regression is normally used to determine WTP (Hanemann, 1984). The answer given by the respondent either is 'Yes' or 'No' in the WTP. Meanwhile, the form of the logit model is as follows:

$$P_i = \left( E(Y_i = \frac{1}{X_i}) \right) = \frac{1}{1 + \exp^{-(\alpha + \beta_i BID + \beta_i x_i + \varepsilon_i)}} \quad [1]$$

This model determines the probability of saying 'yes' to a bid price at different levels of independent. Where $P_i$ is a probability that $Y_i$ =1 (yes response), $BID_i$ is the bid offered, $X_i$ is the vector of independent variable, $i$ is the index of observation, $\alpha$ and $\beta$ are the intercept and vector of the coefficients to be estimated corresponding to a logistic distribution, and Ɛ is a random error that follows the normal distribution with a mean zero and a common variance $\sigma^2$. The linear form of the model [2] is as follows:

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = \alpha + \beta_i + \beta_i X_i + \varepsilon_i \quad [2]$$

where, $L_i$ is called logit and it is the log of the odd ratio. The maximum likelihood is the estimation method. The coefficient represents the change in $L_i$ that is associated with a one unit change in $X_i$ when other coefficients are held constant. The estimation of the mean and median WTP for the logit model, using the estimated coefficients from [2], can be estimated as follows (Hanemann *et al.*, 1991):

$$Mean \approx \frac{\ln(1+\exp^{\hat{\alpha}+\hat{\beta}_i \dddot{x}_i})}{-\hat{\beta}_i} \quad [3]$$

$$Medium \approx \frac{\hat{\alpha}+\hat{\beta}_i \dddot{X}_i}{-\hat{\beta}_i} \quad [4]$$

where is the coefficient of the estimate on the bid price, is the estimated intercept, and is the mean of the respective explanatory variable. In addition to the logit model, the liner regression model was also estimated using the open-ended WTP question. By using the maximum WTP data (open-ended WTP question) as the dependent variable against the other independent variables, a linear regression model using the ordinary least square technique (OLS) was employed, as follows:

$$\text{Max } (WTP_i) = \alpha + \beta_i X_i + \varepsilon_i \quad [5]$$

where $X_i$ is the vector of the independent variables, and $\varepsilon_i$ is an error term which is assumed to be normally distributed with a mean zero and a common variance $\sigma^2$, $\varepsilon_i \sim N(0, \sigma^2)$.

## RESULTS AND DISCUSSION

### *Respondents' Profile*

Table 2 shows the social-demographic characteristics of the local respondents interviewed. The highest percentage of the respondents was from Kuala Lumpur (53.2%), and this was followed by the respondents from Selangor (43.2%). This also means that the majority of the respondents were from Kuala Lumpur, and this was due to the close proximity of the park to their places of residence. Approximately 50.6% of the respondents were female and 49.4% were male. There is an even distribution of percentage of respondents' gender in the study.

TABLE 2
Respondents' profile

| Variable | Percentage (%) |
|---|---|
| Origin | |
| Kuala Lumpur | 53.2 |
| Selangor | 43.2 |
| Negeri Sembilan | 0.9 |
| Pahang | 0.9 |
| Penang | 0.9 |
| Perak | 0.9 |
| Gender | |
| Male | 49.4 |
| Female | 50.6 |
| Age | |
| 20 or below | 9.7 |
| 21-30 | 47.0 |
| 31-40 | 26.0 |
| 41-50 | 13.7 |

Table 2 (*continued*)

| | |
|---|---|
| 50 Above | 3.3 |
| ( Minimum = 18, Maximum = 63, Mean = 32) | |
| Marital Status | |
| Single | 44.6 |
| Married | 53.8 |
| Divorced | 0.3 |
| Widowed | 1.3 |
| Race | |
| Malay | 61.2 |
| Chinese | 27.6 |
| Indian | 10.6 |
| Other | 0.6 |
| Working Status | |
| Government servant | 15.6 |
| Private sector | 36.8 |
| Businessmen | 16.0 |
| Home duties | 12.7 |
| Student | 16.3 |
| Retiree | 1.6 |
| Unemployed | 1.0 |
| Level of Education | |
| Completed primary school (standard 1 to 6) | 1.0 |
| Completed secondary school (form 1 to 5) | 24.2 |
| Completed high school (form 6) | 10.5 |
| Certificate or diploma education | 26.8 |
| First degree | 32.4 |
| Master and PHD | 5.2 |
| Monthly Income (RM) | |
| 500-1000 | 1.7 |
| 1001-2000 | 18.8 |
| 2001-3000 | 43.3 |
| 3001-4000 | 25.0 |
| 4001-5000 | 6.8 |
| 5001 Above | 3.4 |
| (Minimum = RM 500, Maximum = RM 10000, Mean = RM 2896.63) | |

The age of the respondents is illustrated and grouped into five categories, as shown in Table 1. The majority of the respondents were between 21 and 30 year old (47.0%), followed by the age group of 31 to 40 year old (26.0%). Meanwhile, the mean age of the respondent was 32 year old.

About 53.8% of the respondents were married, 44.6% were single, and a small percentage was either divorced (0.3%) and widowed (1.3%). In terms of their racial category, 61.2% of the respondents are Malays, 27.6% are Chinese, 10.6% are Indian, and 0.6% indicates other races.

The majority of the respondents (68.4%) are employed and they work in the private sector (36.8%). The respondents who do not work (31.6%) are categorised as home duties, students, retirees, and unemployed. The majority of the respondents are bachelor degree holders (32.4%), followed by certificate and diploma holders (26.8%) and secondary school leavers (24.2%). These data indicate that the majority of the respondents have completed at least secondary school level.

Meanwhile, the respondents' levels of income are grouped into six categories. The majority of the respondents are with income between RM2,001.00 and RM3,000.00 (43.3%). The highest income recorded is for a respondent who works as a professional (RM10,000) and the lowest income is RM500.00. This result shows that most of the respondents' income status is in the medium class category.

### *Reasons for WTP and Not WTP for Urban Tree Conservation*

Table 3 indicates the reasons of the respondents who are willing to pay and the reasons for those who are not willing to pay for urban tree conservation. Surprisingly, the majority of the respondents indicated that they are willing to pay for urban trees conservation as a means to contribute towards the general maintenance of the park (34.4%), and this is perhaps to have a sense of ownership of the park. They felt that this is the most efficient and general way to improve the urban tree conservation. As for those who are not willing to pay (28.3%), one of the reasons cited is that the bid price recommended is too high.

TABLE 3
Reason for WTP and not WTP for urban tree conservation

| Statement | Percentage (%) |
|---|---|
| Reasons for WTP | |
| Restore and rehabilitate natural features | 33.8 |
| Improve the park to become more attractive | 22.3 |
| Reduce the burden of the government | 5.2 |
| As a general contribution to maintain the park | 34.4 |
| Other reason | 4.3 |
| Reasons for not WTP | |
| Cannot afford to pay | 13.8 |
| Would like to pay but not this much | 28.3 |
| Support urban tree programme in other ways | 27.7 |
| Cost should be borne by the government | 25.4 |
| Other reason | 4.8 |

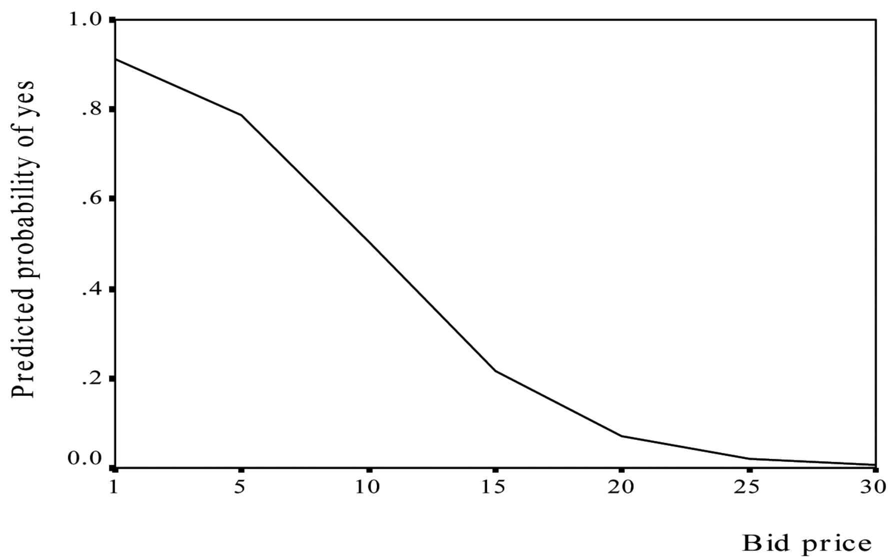


Fig.1: Predicted Probability of Yes on Bid Price

*The Estimated WTP*

As shown in Table 4, the percentage of the respondents who are not willing to pay increases as the bid level increases, while the percentage of those who are willing to pay decreases as the bid level increases. Figure 1 indicates a negative relationship between the respondents' willingness to pay and the bid price offered. This shows that most of the respondents are willing to pay a lower amount for urban tree conservation as an entrance fee.

TABLE 4
WTP and the mean of maximum WTP at different bid levels

| Bid | Number (N) | Not WTP (%) | WTP (%) |
|---|---|---|---|
| 1 | 44 | 0 | 100.0 |
| 5 | 44 | 20.6 | 79.4 |
| 10 | 46 | 63.0 | 37.0 |
| 15 | 45 | 82.2 | 17.8 |
| 20 | 45 | 88.9 | 11.1 |
| 25 | 44 | 93.2 | 6.8 |
| 30 | 45 | 100.0 | 0 |

Table 5 demonstrates the theoretical expected relationship of the willingness to pay and the explanatory variables prior to the survey and the actual relationship after the survey has been completed. It is expected that the bid price has a negative sign, while other variables (except origin, gender, age, marital status, and race have no prior expectation) have positive signs. The positive sign indicates that the variable has a direct relationship with the willingness to pay for the urban tree conservation, and vice versa.

TABLE 5
The expected relationship of the variables

| Variable | Expected Relationship | Actual Relationship |
|---|---|---|
| Bids | - | - |
| Origin | + | + |
| Gender | ? | + |
| Age | ? | - |
| Marital status | ? | + |
| Race | ? | - |
| Working status | + | + |
| Education level | + | - |
| Income | + | + |

Note: + indicates positive relationship; - indicates negative relationship; ? indicates no prior expectation

In comparison to the expected sign to the actual sign, only the education level is out of the expectation. This signifies that as the education level of the respondent is lower, the higher the respondents' willingness to pay for urban trees conservation. The actual relationship indicates that gender and marital status are positively related to the willingness to pay for the urban tree services. The male respondents (gender) are more likely to pay in comparison to the female respondents, whereas the unmarried respondents (single) are more likely to pay as compared to the married ones. On the other hand, age and race were found to be negatively related to the willingness to pay for the urban tree conservation. Jamal and Shahariah (2003) also found that there is a negative relationship between age and the probability of willingness to pay. They also found that the younger respondents were more likely to pay and the respondents from other races were more likely to pay as compared to the Malay respondents.

TABLE 6
Results of the logit and OLS models

| Variable | Model 1 | | Model 2 | | Model 3 | | Model 4 |
|---|---|---|---|---|---|---|---|
| | Coefficient (stand. Error) | $EXP(co)_1$ | Coefficient (stand. Error) | $EXP(co)_2$ | Coefficient (stand. Error) | $EXP(co)_3$ | Coefficient (stand. Error) |
| Bids | -0.472*** (0.130) | 0.624 | -0.450*** (0.107) | 0.638 | -0.442*** (0.100) | 0.643 | - |
| Origin | 2.588* (1.399) | 13.304 | 2.065** (0.984) | 7.887 | 2.106** (0.961) | 8.215 | 3.053** (1.175) |
| Gender | 2.648** (1.317) | 14.120 | 1.920* (0.992) | 6.820 | 1.814* (0.968) | 6.134 | 0.796 (1.294) |
| Age | -0.050 (0.082) | 0.951 | 0.016 (0.063) | 1.016 | 0.018 (0.059) | 1.108 | 0.036 (0.103) |
| Marital status | 1.051 (1.379) | 2.862 | 1.573 (1.230) | 4.820 | 1.698 (1.173) | 5.461 | 0.985 (1.589) |
| Race | -0.945 (1.221) | 0.389 | -2.288** (1.115) | 0.068 | -2.436** (1.047) | 0.088 | -1.265 (1.371) |
| Working status | 1.680 (1.363) | 5.367 | 2.216* (1.153) | 9.167 | 1.814* (1.039) | 6.137 | 1.127 (1.406) |
| Education level | - | - | 0.152 (0.157) | 1.164 | - | - | -0.002 (0.231) |
| Income | 0.000 (0.001) | 1.000 | - | - | - | - | 0.000 (0.000) |
| Constant | 2.321 (3.599) | 10.184 | 0.263 (3.414) | 1.301 | 2.1291 (2.566) | 8.410 | 2.022 (5.230) |
| -2 Log likelihood | 30.288 | | 45.712 | | 46.990 | | |
| Cox & Snell R Square | 0.595 | | 0.578 | | 0.578 | | |
| Nagelkerke R Square | 0.812 | | 0.794 | | 0.794 | | |
| R square | | | | | | | 0.150 |
| Adjusted R Square | | | | | | | 0.040 |

Note: *** - significant at 0.01 level
** - significant at 0.05 level
* - significant at 0.1 level

*Logistic and OLS Model*

There were four models used to estimate the WTP for the socio-demographic variables (Table 6). As shown in Table 6, Model 1 indicates the highest R square value compared to that of the other logit models. There is no commonly accepted threshold value for the pseudo R square statistic that denotes a satisfactory or well specified model (Bateman *et al*., 2002). Model 4 is the OLS estimate, with only origin from Kuala Lumpur (0.012) is significant at the 0.05 level. The maximum willingness to pay for urban trees is increased multiplicatively by 3.054 for every unit increased in origin from Kuala Lumpur.

Without the education level variable, only Model 1 has three significant variables, which are bid price (0.01), origin (0.05), and gender (0.1). The odd ratio of the willingness to pay for urban trees is increased multiplicatively by 0.624 for every unit decreased in the bid price; the odd ratio of willingness to pay for urban trees is increased multiplicatively by 13.304 for every unit increased in the origin from Kuala Lumpur; the odd ratio of willingness to pay for urban trees is increased multiplicatively by 14.120 for every unit increased of the male respondents (gender).

Meanwhile, Model 2 also has five significant variables, which are bid price (0.01), origin (0.05), gender (0.05), race (0.05), and working status (0.1). Model 2 shows that the odd ratio of willingness to pay for urban trees is increased multiplicatively by 0.638 for every unit decreased in bid price; the odd ratio of willingness to pay for urban trees is increased multiplicatively by 7.887 for every unit increased in the origin from Kuala Lumpur; the odd ratio of willingness to pay for urban trees is increased multiplicatively by 6.820 for every unit increased in the male respondents (gender); the odd ratio of willingness to pay for urban trees is increased multiplicatively by 0.068 for every unit decreased in the Malay respondents (race); the odd ratio of willingness to pay for urban trees is increased multiplicatively by 1.164 for every unit increased in the government servant (working status).

With the absence of the education level and income variables, Model 3 has the same five significant variables with lower standard errors compared to that of Model 2. Model 2 shows that the odd ratio of willingness to pay for urban trees is increased multiplicatively by 0.643 for every unit decreased in the bid price; the odd ratio of willingness to pay for urban trees is increased multiplicatively by 8.215 for every unit increased in the origin from Kuala Lumpur; the odd ratio of willingness to pay for urban trees is increased multiplicatively by 6.134 for every unit increased in the male respondents (gender); the odd ratio of willingness to pay for urban trees is increased multiplicatively by 0.088 for every unit decreased in the Malay respondents (race); the odd ratio of willingness to pay for urban trees is increased multiplicatively by 6.137 for every unit increased in the government servant (working status).

*Mean, Median, and Maximum WTP*

The estimated mean WTP for urban trees is approximately RM10.32 per visit, while the estimated median of WTP is approximately RM10.08 per visit. The estimated maximum WTP is RM5.40. These estimates were calculated as follows:

$$E(WTP) = \frac{\ln(1+e^{3.348-1.003*0.612})}{-(-0.271)} \quad [6]$$

$$E(WTP) = RM10.32$$

$$Me(WTP) = \frac{3.348-1.004*0.612}{-(-0.271)} \quad [7]$$

$$Me(WTP) = RM10.08$$

$$Max\,(WTP) = 2.022 + 3.053(0.532) + 0.796(0.494) + 0.036(31.531) + 0.908(0.446) - 1.265(0.612) + 1.127(0.156) - 0.002(13.788) + 0(2896.635) \quad [8]$$

$Max(WTP)$ = RM5.40

The estimated mean WTP is close to the median WTP (Puan, 2005), and the mean WTP is slightly greater than the median WTP (Nik Mustapha, 1993; Amiry, 2009). The median of this study is similar to the median from Alias *et al*. (2002) who found that both the medians are almost RM11.00. As for the estimated mean WTP of this study, it is also similar as the mean of the local respondents from a study by Samdin (2002) and in between the mean range of the local respondents from Amiry (2009), in which those means are almost equivalent to RM10.00. The result indicates that the willingness to pay is at RM10.32 per visit on average, while the majority preferred paying RM10.08 per visit.

## CONCLUSION

The payment vehicle in this research was accepted as the WTP as an entrance fee. Once the entrance fee mechanism is implemented, the monetary value of the park is expected to improve. However, one should note that there is a high probability that many of the respondents are willing to pay at a lower bid level for urban tree conservation in TP. The logit model indicates that the mean and median WTP are RM10.32 and RM10.03 per visit, respectively. The linear model indicates the maximum WTP of RM5.40 per visit. Based on the findings, an entrance fee mechanism is recommended to be put in place so that park managers may utilise the additional fund for urban tree management and maintenance work and thus, reduces its dependence on the public fund for this particular purpose.

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