

The Effect of Preference for Nature-Based Recreations: Application of a Multi-Destination Travel Cost Method

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Abstract

This study examines the effect of visitors' preference for nature in estimating the economic value of recreation services. The increasing demand for leisure travel has raised interest in promoting both tourism and nature conservation in recreation areas. This study presents the importance of various preference factors in driving travel behaviors. The inclusion of a factor capturing multi-destination trip is utilized with a travel cost method to investigate travel behaviors and travel costs. The general model of travel costs that estimates consumer surplus supposes that costs are incurred in a single destination trip; however, this may not always hold for nature recreation trips because visitors often stop at more than one destination on a trip. This paper utilizes multi-destination trips for the travel cost method to emphasize differencing in recreation benefits. This analysis of consumer surplus uses a dataset collected in Winter 2017 from recreation areas in Northeastern Thailand. The comparison of different regressions is applied to distinguish the consumer surplus between the standard travel costs and those capturing costs for multi-destination trips, as well as the interaction of visitors' preferences. The findings provide insight that the differences of consumer surplus varies approximately from 84 to 92 Baht per person after accounting for visitors on multiple destination trips. The results show that the visitors' welfare has significantly increased by approximately 9.2%. The implications for precisely estimating recreation values for tourism in nature-based settings are discussed.

Keywords: Consumer surplus, ecosystem services, multi-destination, preferences, travel cost method

JEL Classification Codes: Q26, Q51, Q5

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1. Introduction

Most non-trade ecosystem services that contribute to human welfare are often undervalued because their benefits are not directly recognized. The direct contribution of services, like travel amenities and recreational services, is reflected in individuals' preferences. Sociocultural components, for instance, ethics, attitudes, and norms, often shape people's preference for a service and these factors have an effect on the service's economic value (Martín-López, Montes, & Benayas, 2007). Since a recreational service is not directly linked to market price, it is important to accurately estimate the social welfare as a means to highlight the value of ecosystem service in monetary terms. Without assigning an economic value to recreational services, the welfare of users maybe understated (Fisher & Turner, 2008). These facts emphasize the need to incorporate the economic value of amenity services into the decision making on natural resource planning and recreation management. This study focuses on the economic value of recreation experiences by investigating the effect of visitors' preference for a natural environment and determining whether it influences recreational demand. The naturebased recreation site in this study is the wilderness area located in Chiyaphym Province, Thailand. The recreation sites are adjacent to the National Parks and the protected area. The sample was visitors visiting three recreation sites including the Chulabhorn Dam Park, the Tub Lao Spring, and the Phu Khieo Wildlife sanctuary. Since the recreation sites are nearby and provide the variety of outdoor activities, a majority of visitors are attracted to the place with a view of the trip as a bundle of destinations. For these reasons, this recreation sites are appropriate for this study.

One of the major contributions of the paper is to provide an application of the travel cost model that incorporates multiple destination trips to estimate the

consumer surplus benefits of recreation. The travel cost method that provides a surrogate price for a recreational experience only considers the travel costs incurred in reaching a single site. Such a single-destination trip assumption restricts the estimation of a trip's benefit. The assumption of a single site destination is possibly incorrect if the travel cost includes all of the expenses for reaching nearby sites visited in the same trip; consequently, the total recreation site benefit is underestimated (Loomis, Yorizane, & Larson, 2000). The prominent concern of leisure travel in locations with connected natural areas is that local visitors are dominant and seem to make multiple visits. Addressing this gap is essential to investigating how policies of tourism and conservation mutually promote a location. This paper can provide evidence on the failure to account for multi-destination trips in determining recreational valuation.

The current study has three primary objectives as follows:

(1) to determine factors that affect the travel frequency of visitors in a recreation area;

(2) to determine how the preference for nature influences the number trips of multiple-destination visitors; and

(3) to examine the differences in consumer surplus when estimating recreational value to see if consumer surplus for multi-destination visitors is significantly different in preference.

The rest of this paper is organized as follows. Section 2 presents the previous studies on travel cost models for recreational valuation, with particular focus on those for public areas managed by the government (i.e. National Parks). A theoretical framework, data collection, and a description of the study area are presented in Section 3. In Section 4, the essential empirical results of this study and discussion are summarized.

2. Conceptual Framework

Ecosystem services supply direct and indirect benefits to human beings and the natural environment. Not only are indirect benefits difficult to directly observe, but it is also difficult to assign a price to them. In the literature on non-market valuation, the method applied to estimate the use values of nature recreation have existed for over four decades, stemming from Hotelling's work (1947). The principle approach to determining recreational benefits applies the travel cost model (TCM), assuming that the expenditures of a trip can reveal preference of consumers. The cost that people incur during their trips to a

recreation sites represents the surrogate value of the recreation site (Haab & McConnell, 2002). The TCM is commonly used to estimate the use value of nature recreation. It is derived from the indirect utility function where a visitor maximizes his/her satisfaction from a trip to a recreation site that is constrained by a price or an amount of income of visitors. TCM assumes that the frequency of trips to a recreation site decreases as the travel distance increases (Bockstael & McConnell, 2007). The Marshallian demand function applied to estimate the benefit for visitors to a recreation area is given in Equation 1. For this study, the demand function is applied in this form.

$$Q(\text{trips}) = fn(\text{travel cost}, \text{travel time}, \text{preference}, \text{income}) \quad (1)$$

Because this study aims to understand the actual travel behaviors associated with a recreational trip and because this study focuses on nature-based recreation, the TCM is applied. A flexibility of TCM is that demand schedules can be applied using secondary data to various recreations, such as purchasing a permit for a recreational visit (Bowes & Loomis, 1980; Smith & Kopp, 1980). The two forms of travel cost methods that are commonly applied to estimating recreational values are the Zonal Travel Cost Method (ZTCM) and the Individual Travel Cost Method (ITCM) (Willis & Garrod, 1991). The recreation demand function of the ZTCM specifies a system of demand in an equation model with aggregate zonal data developed by Clawson and Knetsch in the 1960s (Clawson & Knetsch, 1966). This traditional model describes the demand as an aggregation of visitors from a population area (zone). The travel cost model is initially applied to valuing benefits by varying distances from recreation sites by multiplying the average cost of a visit to that area by the total number of visits. However, the travel cost valuation based on a zonal method has a

limitation due to the aggregated data within a similar distance from the original recreation site. The issues include the inability to separate income, price substitution, preference and taste, and it often leads to underestimating the price variable (Ward & Loomis, 1986). The heterogeneity of individuals in a zonal recreation model results in the susceptibility of aggregation bias (Moeltner, 2003). Moreover, differences in individual characteristics affect travel expenses, and this results in the inaccurate aggregated ZTCM (Ward & Beal, 2000). The ITCM was further developed to apply the travel cost model exclusively using microdata by observing individual or household level data (Brown & Nawas, 1973; Gum & Martin, 1975). This method calculates the value of a recreation site using the travel cost incurred by the visitors to the site (i.e. frequency of visits). Likewise, the ITCM can estimate the recreation demand when a visit made by an individual or household to the recreation sites more than once a year (Asafu-Adjaye, 2005; Rolfe & Dyack, 2011). Additionally, the estimation procedures of ITCM offer robustness estimates (Willis et al., 1991),

although the information of travel cost is unobserved (Englin & Shonkwiler, 1995).

One consideration in TCM is the role of income in affecting visitors' expenditures for recreation. Economic theory posits that income acts as a demand shifter between quantity and price for various kind of purchasing activity. In general, the demand curve decreases, that is, the higher the cost, the lower the rate of visiting a particular site. A majority of TCM research accounts for income in travel demand and shows negative relationships between income and visits (Loomis et al., 2000; McKean, Johnson, & Taylor, 2010; Taylor, McKean, & Johnson, 2010). Lower income visitors tend to have fewer alternatives for recreation and environment amenities than higher income visitors. Local visitors rely on public lands and public resources for recreation. It is possible that visitors attempt to engage in low cost recreation that is easily accessible in their area. In general, outdoor recreation in a rural area often attracts more local visitors. In that respect, the estimate of recreation value in the context of developing economies should concentrate on the effects of income on visitors' travel expense. Several studies have applied ITCM to estimate the economic value of recreation areas (Himayatullah & Siddiqui, 2003; Rao & Balasubramanian, 2017) and several studies have particularly applied the ITCM to estimate recreation value in Thailand. The studies used the ITCM revealed the recreation value for an entrance fee to the National Forests in Northern Thailand (Isangkura, 1998), the recreational benefits of the Coral reefs at Phi Phi Islands (Seenprachawong, 2003), and the demand for forest recreation at Phu Kradueng National Park (Boontho, 2008). To follow these researchers, the current study applies the ITCM to estimate the value of recreational services in this particular protected area of interest.

The motivation of this paper is the concern of using TCM for economic valuation. The standard assumption of

travel costs of a single-destination trip as a valid proxy for the value of a recreation site may not hold in nature recreation. A single destination trip means that travel costs are incurred to travel from one place (home) directly to visit the site and then to return directly to the origin (home). Some TCM researchers have addressed the issue of multi-purpose or multi-destination trips since the early application of Clawson and Knetsch's 1966 travel cost model. Parsons and Wilson (1997) incorporated a visit to a secondary recreation site (an incidental trip) into a single recreation demand model. Their multi-destination (MD) model involve side trips where alternative recreation sites are treated as complementary goods and it is assumed that the travel cost for such trips allocate the total trip cost to the consumption of the primary recreation and the side trips. The problem of MD trips in TCM occurs when a traveler has another destination on the way to, nearby, or on the way back home from the recreation site of interest (Kuosmanen, Nillesen, & Wesseler, 2004; Loomis et al., 2000). In tourism research, a trip of outdoor recreation consists of cumulative attractions in nature. The characteristics of recreation sites do not exist in isolation; they are often found to be substitutes and complements to each other (Wall, 1978). It makes sense that a recreationist enjoys these alternatives in relation to other attractions in proximity. Visitors tend to view the multi-destination visits as rational behavior pattern that reduces time and costs associated with travel (Ben-Akiva & Lerman, 1985). Also, the benefits of multi-destination trips concepts underpin the travel behavior explaining a trip to a tourism region (Lue, Crompton, & Fesenmaier, 1993). Thus far, these purposes motivate the desire to determine the recreation demand for MD trips and preference for nature in this study. In TCM, ignoring MD trips can lead to bias in determining the recreation benefits. Some studies have found overestimates of consumer surplus

(Martínez-Espiñeira & Amoako-Tuffour, 2009) while others have found either positive or negative bias (Hill et al., 2014; Loomis et al. (2000) have suggested different options to account for MD trips. A dummy variable for multiple destination trips is introduced into a model to capture the demand shifter. If the intercept of the dummy variable is statistically significant, it indicates the intercepts of two trip groups are different, and a positive coefficient implies that multi-destination visits work as complementary goods. In this study, the investigation focuses on visitors' taste to see whether it acts as a means of demand shifting, which would lead nearby recreation sites to be considered as complementary goods. The consumer surplus (CS) of a recreation trip is the area below the demand curve and above the price line. The CS represents the economic value of the recreational benefit to the visitor, or the values that visitors place on a nature recreation site that cannot be defined in markets.

The factors of individual tastes or preferences play a vital role for travelers in their trip decisions. The relationships that affect travel behavior can be analyzed with TCM. In general, the taste or preference variable is assumed to be homogenous in a demand function. The analysis using empirical data in Thailand shows that the most vital attribute for visitors affecting their decision to visit Khaoyai National Park is its beautiful natural scenery (Pongkijvorasin & Chotiyaputta, 2013). Further-more in common, the recreation demand function accounts for individuals' preferences, because visitors have to allocate time for each alternative destination. This relationship leads to the assumption that a visitor bases his/her decisions either on a preference regarding the characteristics of the trip destination or a trip that primarily aims for multiple destinations. These subjective factors determine the essential factors of a trip for an individual visitor. Similarly, personal attitudes influenced pleasure travelers in

determining their travel destination among alternatives (Um & Crompton, 1990). For example, the beautiful setting of whale watching is a significant factor for certain travelers (Loomis et al., 2000). In the same line of study, the satisfaction of a site in term of bird species and the frequency of observing birds has positive significance on the estimate of coefficients (Czajkowski et al., 2014). Assuming a homogenous preference of individual users in a demand function leads to biased estimates of parameters and the expected consumer surplus estimates (Breffle & Morey, 2000). Thus far, this motivation is a significant contribution in this study to encompass preference factor for MD trip visitors.

One of the primary objective in this paper is to present the effects of the inclusion of MD trips on the recreation valuation model by retaining the MD visitors and using the statistic procedure followed Loomis et al. (2000). The value of travel time is not included in this analysis and the distance to the recreation site is not included in the model because these effects are expected to be small for leisure travelers and most of the survey respondents reside near the recreation areas. This paper investigates the effect of the preference for natural services as well as its interaction for visitors making MD trips on their trip decisions to construct an individual travel cost model to estimate the consumer surplus of outdoor recreation benefits in the proximity of a protected area. To date, the study of recreation valuation has under examined the sensitivity of visitors' benefits in nature recreation when multi-destination trips are considered.

3. Methods and Data

1) Study area

The recreation areas in this study are located in Northeastern Thailand, in the Khon San sub-district in Chiyaphum Province (along Highway Number 12, from Khon Kaen to Chiyaphum). A forest

ecosystem that dominates over 60% of the area in Chiyaphum Province is ranked as one of the top five recreational areas in the country (Department of National Park and Wildlife Conservation, 2015). The recreational opportunities in this wilderness connect several well-known visiting sites along Highway Number 201 (Phu Khieo–Chum Phae, Khon Kaen). The first location toward the end of the highway is the Chulabhorn Dam. This hydroelectricity dam is an earth core rock-filled dam built in 1970 by the Electricity Generating Authority of Thailand (EGAT). Its primary functions are to generate electricity with a capacity of 20,000 KW and to irrigate a riparian area for agriculture. The dam impounds the Phrom River flow, a branch of Mekhong River, and meets the Choen River downstream of the dam. The various activities provided for visitors include hiking, camping, and bird watching. Several spots of interest surround this site, including the Chulabhorn Dam Park. The park is located at the north end of the reservoir, covering 41 rai[†] with beautiful scenery of high mountains and a preserved forest. Nearby the park, ancient wild plants that are protected species like Son Sam Roi Yot (*Lycopodium*) and Horsetail (*Equisetum*) are found in this area. Currently, over 180 rai of this area are part of the Natural Resources Protection Area of the Plant Genetic Conservation Project (PGCP) under the Royal Initiative of H.R.H. Princess Maha Chakri Sirindhorn.

The next visiting site is the Phu Khieo Wildlife Sanctuary, known for being one of the best wildlife spots in the country, due to the adjacency of three protected areas; Nam Nao National Park, Tad Mok National Park and Ta Bao-Huai Wildlife Sanctuary. This wildlife sanctuary is a mixed deciduous and dipterocarp forest with some semi-evergreen trees, but it also covers grassland area and lakes at the

higher elevation of around 900 meters. Moreover, it is the habitat of over 100 species of mammals, 400 species of birds, 100 species of reptiles and 70 species of fish. The final recreation site observed in this study, Tub Lao Spring, locally known as Nam Pud Tub Lao, is eight km away from the dam and the wildlife sanctuary. This park covers an area approximately 160 rai and is adjacent to the Pha Phueng Wildlife Sanctuary under the Phu Sam Phaknam National Park, Wildlife and Plant Conservation. The villagers residing in the surrounding area believe that the natural water spring is gradually absorbed from the underground water of mountain watersheds and emerges as spring waterfall all year round. The amount of water flowing is over 400 cubic meters per hours[‡]. Rare plant species in Tub Lao Spring forest include Magnoliaceae, Fabaceae, and Lythraceae. Several activities entice visitors to this area such as pic-nicking, hiking and enjoying the streams and waterfall.

2) Survey design and data

This study used data collected from the PGCP at Chulabhorn Dam in the Khon San sub-district, Chiyaphum Province, Thailand. A recreation survey is a face-to-face interview at publicly accessible recreation sites. In this study three sites include: 1) Chulabhorn Dam, 2) the Phu Khieo Wildlife Sanctuary, and 3) the Tub Lao spring. The days and hours of the inter-views were carefully chosen to gain sufficient data. The survey was conducted four times during weekends in winter (December 2015 - February 2016) to ensure a variety of visitors of both locals and outsiders. The “eyeball sampling technique” was used to select potential respondent at each site.

The on-site survey elicited the number of trips to a recreation site taken by the respondent in the last year, which is necessary information for estimating the

[†] Rai is a Thai measurement of land area. A Rai equals to 1,600 square meters.

[‡] Online Source:
<http://review.tourismthailand.org/tabla/>

recreation demand for ITCM. The interview questions comprised three sections, following Garrod and Willis (1999) on the significant implementation of the travel cost model. The questions in the first section were related to trip purposes, modes of transportation, and route of travel. We observed whether visitors had visited any other place before reaching the site. Moreover, details were acquired on the origin and destination of trips, the travel time and the respondent's postcode. However, we did not obtain visitors' complete itineraries because of the time limit of the survey. The next part of the survey gathered respondents' preferences regarding nature recreation that drives their travel. The visitors were asked to rate their views on the preferences of nature using a seven-point Likert scale.

Lastly, questions about demographic information such as age, gender, income, and so forth completed the last section of the survey. The survey was administered to a total of 260 visitors. After excluding multi-purpose trip (i.e. business combined with a study field trip) 246 sample observations were used for the analysis in this study. Over 90% of the total respondents were Thai; a few were foreign people familiar with the area. This was as the researchers expected. Of the respondents, 93 visitors had their trip's origin (home) located near the recreation sites and the rest of the visitors lived in the Northeast region; therefore, all of the respondents were defined as local visitors. A decomposed analysis of the respondents is provided in Table 1.

Table 1. Sampled population characteristics

	Sample size	Percentage
Recreation site		
Chulabhorn Dam	121	49.18
Phu Khieo wildlife sanctuary	15	6.10
Tub Lao Spring	110	44.72
Gender		
Female	143	58.13
Male	103	41.87
Age		
20-30	112	45.53
31-40	65	26.42
41-50	40	16.26
51+	29	11.79
Income (Thai Baht ⁴ per year)		
<10,000	89	38.7
10,001- 20,000	55	23.91
20,001- 30,000	37	16.96
30,001- 50,000	35	15.22
>50,001	12	5.22

A majority of the respondents stated that their main travel purpose during the outdoor recreation trip was visiting nature; hence, the travel cost incurred was only subject to their activities at the sites. More than half, 146 respondents (59.3%) came to the sites for camping and picnicking, some with a party of two (17.83%) and most with a group of 3 to 6 people)

(55.81%). Swimming and wildlife watching attracted many people, followed by hiking and spirituality. Boating was the least favorite activity at the recreation sites (see Table 2 for details), probably due to the dam regulations and a boat availability.

Mainly, the purposes of the leisure travel, the number of stops during the current trip, and the origin (i.e. home) were

⁴ 1 Thai Baht = 0.031 US dollar

Table 2. Activities at the recreation site (sample size of 246, multiple choices were allowed).

Spirituality	Picnicking	Hiking	Boating	Wildlife watching	Swimming
9 (3.7%)	146 (59.3%)	10 (4.1%)	5 (2.0%)	43 (17.5%)	101 (41.1%)

queried to find out if the respondents had visited places other than the original designation. A question on whether the recent trip to the recreation site was the primary purpose was asked to separate visitors in the dataset. The origin and destination of the trips were further asked; however, the full trip itinerary was not obtained from each visitor. The study found that 138 visitors reported they visited other recreation sites on the trip and 108 visitors had a single destination trip.

The respondents in this study had made at least three trips to natural recreation sites in the last year. The average respondent spent approximately 4.57 hours at the dam,

4.667 hours at the wildlife sanctuary and around 3.34 hours at the natural spring, as presented in Table 3. It is worth noting that the recreation site where visitors most often visited was inversely related to the time spent at the site. Among the three sites, visitors spent the longest time at the wildlife sanctuary, despite the fact that they visited this place the least often. On the contrary, visitors made an average of 4.8 trips to the Tub Lao spring and spent around 3.34 hours there per visit. The respondents made approximately 3.7 trips per year to the dam site and spent a pleasant four hours at this location.

Table 3. Travel time spending and the number of visiting at each recreation site

Average value	Chulabhorn Dam	Tub Lao Spring	Wildlife sanctuary
Visiting (no. of times)	3.764 (119)	4.836 (110)	2.867 (15)
Time spending (in hours)	4.570 (115)	3.343 (110)	4.667 (12)

Note: the number of observations is in parentheses

3) Travel cost model estimation

In this study, the recreation demand function and the value of recreation site access are estimated using the travel cost method. The dependent variable in the recreation demand model is the count data of the number of trips to a recreation site that individuals took over the last year. This study administered on-site surveys; thus, visitors who did not recreate at a study site were excluded. The TCM analysis assumes the number of trips as count integers; the trips' data are truncated at zero. Accordingly, estimation for the count data is appropriate for a Poisson regression model (Cameron & Trivedi, 1986; Greene, 2008). The count data model can be consistent with a process of utility maximization involving repeated

choices (Hellerstein & Mendelsohn, 1993). However, the Poisson regression assumes that the mean of the dependent variable equals its variance. A problem of overdispersion arises when the variance outweighs the mean, resulting in biased parameter estimates and standard errors (Hilbe, 2011). An alternative model, relaxing the equidispersion assumption, was introduced as the Negative Binomial regression model (NB) (Greene, 2008). The effect of multi-destination trips was performed corresponding to a Marshallian demand function as discussed in Loomis et al. (2000). Since the recreation value is presented in consumer surplus, it is not necessary to include the value of travel time explicitly. The definition of variables including in the following models describes in Table 4.

Table 4. Definition and descriptive statistics of variables used in the travel cost model.

Variable	Description	Mean	Std.Dev.	Min	Max
Dependent variable					
Q	Number of visits to a recreation site during the past 12 months	4.18	5.45	1	51
Independent variable					
Cost	Travel cost incurred during the current trip (Baht)	1,000	282.63	200	30,000
Traveltime	Time has taken on a travel trip to a site (hours)	1.50	1.50	0.08	8
Traveltime ²	Travel time squared (hours ²)	4.48	10.38	0.007	64
Nature	Preference to nature recreation asking "How do you prefer the nature recreation?", 1-7 rating scale	4.93	1.97	1	7
Gender	Gender of the respondent: 1 = Male, 0 = Female	0.56	0.49	0	1
Age	Respondents' age (years old)	31.50	15.12	18	73
Income	Annual income (Thai Baht)	15,000	2,120	5,000	50,000
Variables accommodate for multi-destination variables					
MD	Visitor have visited a multiple site in a trip: 1= Yes (56.10%), 0 = No (43.90%)	0.56	0.49	0	1
MDcost	Interaction between the travel cost and the MD variable	510	578.92	0	30,000
MDnature	Interaction between preference to nature recreation and the MD variable	2.67	2.80	0	7

For this paper, the travel cost model is written in the following manner. The general travel cost model is estimated

using the negative binomial model specified as the standard TCM in Equation (2) (Model 1).

$$Q = \exp(\beta_0 + \beta_1 cost + \beta_2 traval\ time + \beta_3 (traval\ time)^2 + \beta_4 nature + \beta_5 gender + \beta_6 age + \beta_7 income)$$

(2)

Since nearly 56 percent of survey respondents (138 visitors) are the multi-destination travelers, Equation (3) presents the recreation demand with the variable of multi-destination trips to explore the effect recreation consumption among recreation

sites has on the annual visits (Model 2). The dummy variable for multi-destination is included in the model. It equals 1 if the visitor planned on visiting more than one recreation sites in the trip and zero if it is a single destination trip. Equation (3) is as follows:

$$Q = \exp(\beta_0 + \beta_1 cost + \beta_2 traval\ time + \beta_3 (traval\ time)^2 + \beta_4 nature + \beta_5 gender + \beta_6 age + \beta_7 income + \beta_8 MDcost)$$

(3)

where $MDcost = MD * cost$ presents the interaction between travel cost and the MD variable. Equation (4) presents Model 3 with respect for the interaction of

preference for nature. It was tested to see if the slope of demand for the two groups of visitors would be different, resulting in different consumer surplus. Equation (4) is as follows:

$$Q = \exp(\beta_0 + \beta_1 \text{cost} + \beta_2 \text{travel time} + \beta_3 (\text{travel time})^2 + \beta_4 \text{nature} + \beta_5 \text{gender} + \beta_6 \text{age} + \beta_7 \text{income} + \beta_8 \text{MDnature}) \tag{4}$$

where $MDnature = MD * nature$ presents the interaction term determining the importance of preference for nature for MD trips. The estimated demand equations are applied to determine the consumer surplus for individuals in the sample. The

area under the demand function is the CS from the observed price in the dataset to infinity. The integral with respect to the travel cost and a vector of other variables (x) is represented in Equation (5) as follows:

$$CS = \int_{TC_0}^{\infty} (\text{travel cost}, x) dTC \tag{5}$$

The consumer surplus for a single destination trip is the absolute reciprocal of

β_1 (i.e. $\left| \frac{1}{\beta_1} \right|$) while the consumer surplus

for models with the dummy variable accounting for a multi-destination trip relies on the influence of travel cost or nature preferences. The investigation illustrates the welfare comparison among the models including the standard TCM (Model 1), and a TCM with interaction variables between the dummy of MD and the travel cost (Model 2) and the preference for nature (Model 3) while the only MD variable in TCM is also present (Model 4).

4. Empirical Results

The analysis of nature recreation in this study shows the comparison of across regressions presented in Table 5. At the first stage of the count data model, we show that the negative binomial regression was applied to estimate the factors that have influenced the number of trips to nature located adjacent to the protected forest area. The results show that the parameter capture on the overdispersion (alpha) presented at the bottom of the analysis was statistically significant. If the overdispersion parameter is zero, a negative binomial distribution is equivalent to a Poisson distribution. In our case, it indicates that the negative binomial regression is an appropriate estimation for

analyzing this dataset. In the standard Model 1, the estimated coefficients on the individual travel cost variables are statistically significant at a 5% level. The estimated coefficients of travel time and travel time squared are statistically significant at a 1% level in all models. This implies that as it takes more time to reach a recreation site the effect of travel time is stronger. Since the recreation sites in this area are close to one another, it makes sense to have MD trips, accordingly. As was expected, the more significant the travel time to a recreation site, the fewer trips are taken to the site. The importance of preference for nature shows a significant positive effect on the number of trips. The respondents who highly favored nature recreation services tend to visit the sites more often in all models. Furthermore, the effect of multi-destination trips was captured by the inclusion of the dummy variable in Model 2, Model 3, and Model 4. It appears that the effect of MD visitors on the number of trip to the multiple sites is significant in Model 4. The MD visitors make fewer trips to the sites than single destination visitors. The interaction with the travel cost for MD trips was demonstrated in Model 2. Once the models accounted for distinctions of MD trips, the expected relationship of travel cost for MD travelers are not present. The estimated coefficients on the travel cost variables are insignificant, and the estimated coefficient

of the interaction term ($MD*Travel\ cost$) is negatively insignificant. This general result implies that the combined action of travel cost has an insignificant influence for MD trips visitors. On the other hand, the effects of nature preference are stronger with the inclusion of dummy variables of MD trips in Model 3. The effect of the combined action of the two predictors is significant at a 5% level and also the estimated coefficient of travel cost is positive. This finding suggests that for MD travelers, more people are favorable toward nature services, and a greater number of trips are taken to recreation sites. It should be noted that despite the fact that the interaction term has a significant negative association, such relation influences the benefit of nature recreation

The benefit estimation for nature recreation in term of consumer surplus can be calculated as a reciprocal of the intercept coefficient of travel cost variable in every model. The consumer surplus per person is illustrated in Table 3. Differences in the recreational benefits were found in the three trip types. For the standard TCM (Model 1), each received a consumer surplus of 84 Baht. For Model 2, the combined interaction of travel time for MD trip visitors was introduced; as a result, it yielded an insignificant negative coefficient of travel cost. The consumer surplus in this case cannot be calculated. Later, in Models 3, the combined MD variable and nature preference adjusted the travel cost variable, increasing the value approximately by 92 Baht per person. Thus, the difference of CS indicates that the nature preference of MD visits produces a more significant benefit in nature recreation trips. For all models, the demographic variables are compared. The estimated coefficient of the gender variable shows a positive significance at a 5% level, meaning that male visitors are more likely to travel to nature sites; similar consequences occur when the MD observations are included, as well. The

negative sign of the age variable presented in all models. This indicates that the younger the individuals, the more trips are taken to recreation sites. For the income variable, it has an insignificant negative coefficient, which is often encountered in TCM studies. The time spent at the recreation site was originally tested, but it was insignificant and left out of the analysis.

5. Discussion

The findings of this study shed light on the significance of valuing the demand for nature recreation in Thailand. The coefficient of the travel cost incurred to reach a recreation site is negatively significant, as expected. The higher the cost paid by visitors, the lower the frequency of their visits to a recreation site. From the analysis, it may be inferred that there is high demand to visit for those who reside close to the recreation sites compared to those who live far away. This finding is in line with other such studies for recreation in low to middle-income economies (Rao & Balasubramanian, 2017; Khan 2004). In addition to travel cost, the positive effect of visitors' preference related to the recreation site necessarily leads to a higher number of trips. All regressions of recreation demand models confirmed that individuals' view of ecosystem services plays a significant role in affecting their visitation rate. This implies that if visitors perceive the benefits of recreation services, they will pay more to visit the recreation site. Previous studies found similar results for outdoor recreation trips such as whale watching (Loomis et al., 2000) and bird watching (Czajkowski et al., 2014). Similarly, visitation rates are influenced by preferences across activities such as hiking, camping, and sightseeing (Benson et al., 2013).

The next investigation was to determine the impact of multi-destination trips on the number of site visits and the estimates of recreational benefit. Considering the interaction terms for MD

visitors, the relationship of travel cost and nature preference variable is positively significant, while the coefficient of the

MD–travel cost is insignificant. On the contrary to Loomis et al. (2000), this finding shows that for MD trips, the travel

Table 5. Results of the negative binomial regression for recreation trips

Variable	Model 1	Model 2	Model 3	Model 4
Cost	-0.0119** (0.051)	-0.06947 (0.057)	-0.0109** (0.050)	-0.0179* (0.050)
Travel time	-0.5979*** (0.134)	-0.6184*** (0.135)	-0.5874*** (0.134)	-0.6046*** (0.134)
Travel time ²	0.0726*** (0.020)	0.0772*** (0.020)	0.0727*** (0.020)	0.0745*** (0.020)
Nature	0.0598* (0.060)	0.0501 (0.034)	0.0790** (0.034)	0.0510* (0.034)
Gender (male)	0.2509** (0.134)	0.2313** (0.134)	0.2298** (0.133)	0.2330* (0.134)
Age	-0.1424*** (0.059)	-0.1281** (0.060)	-0.1275** (0.060)	-0.1317** (0.059)
Income	0.0347 (0.031)	0.0307 (0.031)	0.0321 (0.031)	0.0346 (0.031)
MD				-0.204* (0.134)
MDcost		-0.0609 (0.038)		
MDnature			0.0493** (0.024)	
Constant	1.7530*** (0.290)	1.7772*** (0.290)	1.7450*** (0.289)	1.881*** (0.302)
Consumer surplus (per person per year)	84.034	N/A	91.743	55.866
Log Likelihood	-539.8901	-538.5918	-537.8659	-538.7386
Alpha	0.6643*** (0.082)	0.6543*** (0.081)	0.6472*** (0.081)	0.6527*** (0.081)
χ^2 -statistic	421.49	404.12	401.37	404.12
McFadden pseudo R^2	0.044	0.047	0.048	0.047
Number of observation	138	246	246	246

Notes: standard errors are presented in the parentheses. ***, **, * represent 1%, 5% and 10% levels of statistical significance, respectively.

cost does not appear to affect the frequency of visitation. This result may be because domestic visitors have easy accessibility to the local resources compared to the others. It thus can be inferred that the travel expense for MD trip visitors is not a necessary factor in this regard. Considering the importance of nature for MD trips visitors, the coefficient of the interaction variable statistically drives the

number of trips. This relationship implies that preference of visitors who take MD trips statistically influences the frequency of recreation trips. It can be inferred that for MD trips, visitors’ preferences have a stronger effect on trip decision, relative to travel cost. This may be because MD visitors have a lower overall travel cost than single destination visitors. Traveling

to recreation areas within the same setting complement the other recreation sites.

Regarding the change in the recreational benefit of the recreation area, the significant contribution of this study underscores the importance of the treatment of MD trips. The finding shows 9.17% of consumer surplus gain based on a small dataset that confirmed the impact of MD trips in nature recreation. Based on previous case studies in Thailand, the estimates of recreational values are higher than the finding of the current study. For example, the individual consumer surplus for visitors to Phu Kradueng National Park was 166.66 Baht (Boontho, 2008) and a visitor to Khao Yai National Park obtained 8,057 Baht per person (Pongkijvorasin & Chotiyanputta, 2013). Although the consumer surplus found in this study is relatively low, each visitor saw an increase in CS by 9.2% (from 84 Baht to 91 Baht) after the MD trips variable was taken into account. Several past studies have shown similar results on the difference of recreational benefits in term of consumer surplus while accounting for MD trips. The MD visitors gain 4.5 times greater consumer surplus in agritourism trips (Hill et al., 2013) and Loomis et al., (2000) found that the inclusion of MD trips results in a 74% increase in the average consumer surplus compared to single trips, ignoring the trip intentions.

The overall result of the demographic variables is inconsistent with previous evidence studied in Thailand. On the one hand, there is no a significant relationship between household income and demand for recreation. This may possibly imply that income factors cannot predict visitors' demand for recreation in the local areas. On the other hand, the dummy variable for gender (1 for male, 0 for female) has a positive significant coefficient. The male visitors tend to make trips to nature recreation sites more frequency than female visitors. The results on the age of visitors show a significant negative coefficient, implying that nature recreation attracts

more young visitors. These results are consistent with existing studies for domestic visitors in Thailand (Boontho 2008; Thampitak & Untong, 2011). Thus far, it is crucial for recreation managers to pay attention to the characteristics of the visitor, especially those with lower incomes, to consider appropriate activities to encourage multiple destination visitors to the nature recreation areas.

6. Conclusion

This study has explored how the preference for nature affects recreation value using the travel cost method (TCM). The results provide an essential contribution to recreation planning and resource management in nature-based settings such as the National Forest and other protected areas. This type of recreational setting in Thailand is commonly found surrounded by the dwellings of rural and agricultural residents, and most of the visitors live nearby. To estimate the recreation value (or use value of the ecosystem service) for visitors in this context, the travel cost method accounting for multi-destination trips is considered.

The results contribute to TCM research measuring the recreation value for nature-based setting in Thailand in the following ways. First, this finding shows that travel cost decreases with trip frequency to a recreation site. The visitors' preference toward nature positively influences the number of visits. Higher favorability toward nature drives visitors to a site more often. Regardless of the destination, the travel time is strongly linked to the number of trips. Further, travel time has no effect on trip frequency for MD visitors. Second, in addition to the general TCM model, the results shed light on multiple destination trips. It allows further analysis of the interaction of specific individual's travel behavior. The TCM models accounting for MD trip visitors show that preference, travel cost, travel time, and demographic variables preserve the same relationship,

but they present stronger relationships compared to a model ignoring the effect of a MD trip. Lastly, this paper demonstrates the significant findings on the differences in consumer surplus for MD trip visitors—that the estimated consumer surplus increases nearly 9.2% as a result of the interaction of preference toward nature and MD trips. Specifically, the MD trip visitors gain a greater CS than do single destination

visitors. In short, the evidence confirms that the preference for nature recreation plays a significant role in TCM when estimating consumer surplus for multiple destination visitors using the general TCM model. The adjusted model provides more accurate estimates of the recreation benefit than when the information on multi-destination trip visitors is neglected.

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