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Full Length Research Paper

Assessing the Recreational Value of Kakum National Park Through Individual Travel Cost Estimation

Daniel Kwabena Twerefou* and Daniel Kwasi Adjei Ababio

Department of Economics, University of Ghana, Ghana.

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A major problem confronting environmental economists is the difficulty in valuing environmental resources and other public goods such as recreational sites since there are no markets or markets are imperfect in situations where they exist. The Kakum National Park, officially opened in 1994, is one of the most important parks in Ghana that protects a vast rainforest including its bio-diversity, habitats and natural processes, and houses the only Canopy Walkway in Africa which allows visitors to explore a tropical rainforest canopy from suspension bridges. Since the establishment of the Kakum National Park, not much has been done to assess its value to recreationers using the appropriate economic valuation techniques. This study seeks to address these questions by adopting the simple formulation of the individual travel cost method to derive the monetary value of Kakum National Park as well as factors that influence visits to the park using a survey of 246 visitors. Our results indicate that the annual per person value of the site is about GH₵ 67.28 (US$ 46.40) which translates into an annual aggregate value of GH₵ 8,481,653.20 (US$ 5,849,416) in 2009. Regression analysis using the zero-truncated negative binomial method indicate that travel cost, gender, knowledge of composite sites are the most important factors that influence visitation to the Park.

Key words: Travel cost, non-market value, protected areas, National Parks.

INTRODUCTION

Throughout the world, nature-based recreation and tourism is considered as a sustainable means of preserving natural resources while providing a diversity of economic benefits to local communities and national economies (Wunder, 2000; Wood, 2002). Nature based tourism does not only provide recreation needs of individuals but also helps in maintaining the natural, cultural and institutional capital of a people as well as the biodiversity that exists. One problem that confronts environmental economists is that it is very difficult to value the services provided by the environment largely because there are no markets or markets are imperfect in situations where they exist. Thus, it is not easy to determine their value in conventional markets. Valuation of environmental resources is based on individual preferences. Usually, preferences of individuals are expressed through willingness-to-pay (WTP) and an aggregation of WTP reflects what is socially desirable. For some impure public goods such as recreation sites, which are accessed through established gate fees, market prices can be taken as the first approximation of benefit proceeds.

Kakum National Park (KNP), officially opened in 1994, is an important remnant of what once was a huge block of forest stretching across much of West Africa. The Park is home to many globally endangered species, including the forest elephant, bongo and yellow-backed duiker. It houses many birds, mammals, reptile and amphibian species and insect and butterfly species. The Park, created to conserve Ghana's rapidly vanishing tropical rainforests and wildlife, houses the only Canopy Walkway in Africa which allows visitors to explore a tropical rainforest canopy from suspension bridges and free platforms towering above the forest. There is growing concern worldwide about the destruction and degradation of natural ecosystems and the attendant loss of biodiversity. It therefore becomes very imperative to take into consideration environmental cost-benefit analysis in

*Corresponding author. E-mail: twerefou@yahoo.co.uk.

the development process. Failure to incorporate the true social costs and benefits may underestimate net conservation benefits and overestimate net development benefits which in turn might impose an irreversible damage to the natural recreational resources in favor of other developmental activities.

Since the establishment of the KNP, not much has been done to quantify the benefits in entirety using the appropriate tools. Research questions that arise are: what is the imputed value of the KNP? What factors influence visitation to the park? This study seeks to address these questions by adopting the simple formu-lation of the travel cost method (TCM) to derive the monetary value of KNP as well as the factors that influence visits. Analysis of these issues is important because it will help the government to have some knowledge of the imputed economic value of the KNPs and hence help in better planning and management of reserved forests, parks and other recreational sites.

LITERATURE REVIEW

Theoretical literature review

Various definitions have been given for economic valuation (Barbier et al., 1995; Willig, 1995). However, environmental economists and allied disciplines such as ecology in understanding economic valuation lay emphasis on human preference. In general, the total economic value (TEV) approach introduced by Pearce and Warford (1993) is the main framework used to classify the various values of an environmental resource. This framework posits that the TEV of an environmental resource can be classified as use value which can further be divided into direct, indirect and option values and the non-use value which include existence value and bequest values.

Using examples from forest resource, direct use values (DUV) refer to the value of consumptive goods such as food, timber, medicinal product, bushmeat and the value of non-consumptive uses such as recreational and cultural activities that are used directly by individuals. Indirect use values (IUV) are derived from ecosystem services such as micro-climatic, “sequestration” of carbon, sedimentation and flood damage control of forest that affects downstream agriculture, fishing, water supplies and other economic activities. Option values (OV) refer to potential direct and indirect use values which might be realised in the future. Forest resources which are under-utilised today may have high future value in terms of scientific, educational, commercial and other economic uses as more information becomes available. Non-use values (NUVs) include both existence value and bequest value and refer to the intangible benefits derived from the mere existence of a resource above and beyond any direct or indirect use value. While existence value refers to the value that people attach to the continued existence of certain species of wildlife found in particular forest areas (for example, bears or tigers). Bequest values arise when people place a value on the conservation of particular resources for posterity.

In environmental economics literature, techniques for valuing environmental resources can be broadly classified into two: revealed preference (RP) and the stated preference (SP) approaches. The main idea of the stated preference technique is to obtain information on the value of an environmental benefit by posing direct questions to consumers about their WTP for a resource or their willingness to accept (WTA) compensation for losing the resource. Two main stated preference technique are used -contingent valuation method (CVM) and the choice experiments (CE). The CVM developed by Mitchell and Carson (1989) elicits individual expressions of value from respondents for specified increases or decreases in the quantity or quality of a non-market good. Most CV studies use data from surveys which used different methods to ask questions about WTP or WTA. On the other hand, CE asks respondents to choose among alternative bundles of non-market goods, which are described in terms of their attributes, including a hypothetical price (Hanley et al., 1998; Adamowicz et al., 1998).

The revealed preference approach which can either be market-based or surrogate markets, uses individuals' behaviour in actual or simulated markets to establish the value of an environmental good or service respectively. The markets based methods rely on direct, observable market interactions for the measurement of individual's WTP to preserve environmental services. There are many methods but the factor of production and defensive expenditure approaches are widely used. The Factor of production approach monetizes the value of natural resource based on its value in the production process as a factor of production. One limitation of the method is that many goods and services produced by the environment are not sold in the markets. The defensive expenditure method measures the resources used to avoid the negative impacts of a perceived environmental damage and uses it as a proxy for the monetized value of the damage caused. Information acquired through surrogate markets which assumes that, certain non-market values reflect indirectly in consumer expenditure, in the prices of marketed goods and services, or in the level of productivity of certain market activities is used as the value of environmental resources in situations where there are no clearly defined markets. Two main approaches dominate - hedonic pricing and travel cost models. Hedonic pricing method is generally premised on the assumption that the market value of land or labour is related to the stream of net benefits including environ-mental amenities derived from it, and consequently uses two main techniques - the property value approach and the wage differential approach. Under this assumption, the value of the environmental amenity can be imputed from the observed land or labour market. A notable setback of the method is the assumption of competitive land market, full information of environmental amenities or hazard by both sellers and buyers and the huge data requirement.

The TCM first suggested by Hotelling in a letter to the US Department of Interior's Park Service and subsequently developed by Clawson to estimate benefits from recreation at natural sites is widely used to estimate use values of recreational sites. The method is premised on the assumption that the travel cost that people incur to visit a site represent the price of access to the site. Thus, individuals' WTP for a visit to a site can be estimated based on the number of trips they make at different travel costs. Based on the choice of the dependent variable - visits (V), there are two main variants - zonal travel cost method (ZTCM) and the individual travel cost method (ITCM). The ZTCM uses information on the number of visits to the site from different zones at different prices to construct the demand for the site and consequently the estimation of the economic benefits of the recreational services of the site. The ITCM defines the dependent variable as the number of site visits made by each visitor over a specific period, for instance, in a year. In our study, we use the ITCM due to its ability to produce precise results. Our empirical literature review will therefore focus on the TCM.

Empirical literature review

Empirical work on economic valuation using the TCM is quite vast but focused more on developed countries. Hanley (1989) used the TCM and the CVM to value Queen Elizabeth Park in Scotland. His results showed that WTP in TCM was less than what was obtained in the CVM. Though he could not establish which method presents the best estimates, the hypothetical situation which presents a weakness of the CVM suggested the existence of either overestimate or underestimate of the true values. This brings to the fore the weakness in CVM. Chakraborty and Keith (2000) used both standard and truncated count data TCM to estimate the economic value to participants in mountain biking in Moab, Utah. The empirical estimates for average trip demand per person per season were found to be 2.25 and 2.53 trips under truncated Poisson and truncated negative binomial models respectively. Consumer surplus per person per trip for both models was approximately US $585. The total annual use value for mountain biking in the Moab area was estimated to be US $1.33 million.

Rosenberger and Loomis (1999) estimated the value of ranchland to tourists visiting a resort town in the Rocky Mountains through a TCM that combines information on observed behaviour data from actual trips with contingent behaviour data on intended current visitation if the resource was converted to urban and resort uses. A random effects Poisson regression model was estimated using panel data. Their results indicate that twenty-five percent of the samples would reduce visitation and twenty-three percent of the sample would increase visitation if ranch open space were converted to urban and resort uses. The overall effect of converting ranch open space to resort and urban uses is no net change in average CS per trip for summer tourists in general.

Curtis (2002) used a count data TCM to estimate the demand and economic value of salmon angling in Co. Donegal, Ireland. Angling quality, age and nationality were found to affect angling demand, while estimated CS per angler per day was approximately IR£138 based on a truncated negative binomial model, allowing for endogenous stratification. Shrestha and Loomis (2003) conducted a meta-analysis of outdoor recreation economic values of the past 30 years in the US and found a mean predicted CS value of $47.10 per day with the original values extracted from existing recreation valuation studies ranging between $1.97 and $116.78. Past studies also indicated that pristine natural resources and wilderness sites are highly valuable. Loomis (2000) reported about two dozen wilderness recreation studies with the values ranging up to $218 per day. Park et al. (2002) reported $481.15 per trip CS value of snorkeling trips in Florida Keys using the TCM.

Bowker et al (1996) using the ITCM to measure the value of a river, estimated the CS for guided whitewater rafting on the Middle Fork of Salmon River using various empirical specifications. Their results indicated that the annual mean CS range from about $2476 to $3707 depending on the empirical model and specification chosen. On a per trip basis, the range was found to be between $1548 and $2083 which was approximately $258 to $349 per day. Mugambi et al. (2006) used the ZTCM to value the Kakamega Forest Reserve, managed by the Forest Department of Kenya and the Kakamega National Forest Reserve, managed by the Kenyan Wildlife Services. Their results indicate that annual recreational value of the part under Wildlife Services has high magnitude than that under the Forest Department and confirmed that areas of forest well conserved and protected yield high recreational benefits. Sohrabi et al. (2009) used the ZTCM to measure the WTP for a northern Iranian Forest Park and compared it to the value of extracted timber products of the neighboring forestry plan. Their results indicated that the park's recreational value was higher than the value of produced timber. The results led to the conservation of the forest than the harvest of timber.

A formulation of recreational demand that ignores the issue of substitute sites is truly misspecified. Caulkins et al. (1985) pointed out that ignoring substitute in a demand function results in biased estimates of the consumer surplus (CS). Rosenthal (1987) using data from a common database representing 60000-day users of US army corps demonstrated that the omitting of substitute prices from travel cost model causes a significant bias in CS estimates. According to Wing et al. (1989) omitting substitute prices have some welfare effects if the omitted price perfectly correlates to some captured prices. Researchers like Cesario and Knetsch (1982) and Sutherland (1982) used gravity/logit model to handle substitutes in the recreational demand model. Others such as Agnello et al. (1991) as cited in Grogger and Carson (1995) used a different technique to capture the issue of substitute sites. Due to the lack of data, this study uses a dummy variable to capture visitors' knowledge of substitute sites.

The issue of treatment of nonparticipants in travel cost analysis has generated some concern among many economists. Smith (1988) compares five methods for estimating travel cost recreation demand models with microdata. The models are distinguished by their treatment of selection effects that arise with on-site surveys. The comparison considers adjusting for selection effects in a variety of ways, including single and double selection rule models. The findings indicate that the treatment of selection effects alone was not important but rather the choice of an estimator did lead to large variations in per trip CS estimates. We will thus adopt the conventional formulation of treating all non-participants as placing a zero value on the site in question.

A study on valuation of an environmental good and specifically TCM will not be made complete without touching the functional form of the model. Ziemer et al. (1980) using the TCM established nearly a four-fold difference between CS based on a linear demand curve and that computed from a semi-log demand. Also, Adamowicz et al. (1989) used Monte Carlo simulation to compare the variance of CS for several functional forms for demand. Their results showed that the semi-log and linear forms fit the data well by statistical criteria confirming the outcome of Musser, Hill and Ziemer (1980). However, the coefficients of variation for CS generated by these forms were substantially larger than for the double log and linear-log forms.

Another important aspect of the TCM is the issue of which travel cost variant to use. Brown and Nawas (1973) found that aggregating data in the case of the traditional ZTCM tends to cause multicollinearity and difficulty in estimating the parameters of recreation demand functions and therefore results in efficiency losses. Willis and Garrod (1991) using both the ZTCM and the ITCM to evaluate forest recreation concluded that there is signi-ficantly different results for the two approaches but put more emphasis on the use of the ITCM. This therefore provides the basis for this study to adopt the ITCM method.

In a gist there exist differences in results based on methodological issues such as model specification, definition of variables, functional form specification, regression technique, payment vehicle, elicitation method and sample selection criterion. We solve to use the TCM because of its advantages when dealing with valuing national parks.

METHODOLOGY

Theoretical framework

We use the ITCM which defines the dependent variable as the number of site visits made by each visitor over a specific period, for instance, in a year and generally follows Taylor et al. (2000) procedure in carrying out a travel cost study. Mathematically:

V = f(C, X), (1)

Where V is visits to the site, *C* is visit costs and *X* are other socio-economic variables which are hypothesized to explain visits to the site due to individual differences.

In choosing a procedure to estimate the model, consideration was given to the fact that the dependent variable is truncated at a certain point and therefore Maximum Likelihood Estimate (MLE) is the best method suited for this type of data set. Specifically, we run a regression of visitation rate (V_{ij}) on other explanatory variables using the Zero-Truncated Negative Binomial method since non visitors were not sampled, meaning that each visitor will have a visitation rate of at least one and thus the model will be truncated from one. The truncated model for the recreation demand function was adopted from the general presentations by Greene (1993). We present a summary of the model here. Consider the trip generating function of an ITCM as:

$$V_{ij} = \beta X_i' + \varepsilon_i \qquad (2)$$

Where V_{ij} is individual *i*'s visit to site *j*, X_i is a vector of explanatory variables, β is a parameter vector to be estimated and ε_i is an error term.

We assume that $V_{ij}|X_i$ is normally distributed. That is $V_{ij}|X_i \approx N(\mu, \sigma^2) = N(\beta X_i', \sigma^2)$, where $\mu = \beta X_i'$ is the mean and σ is the standard deviation.

With truncated sampling, V_{ij} is observed only if $V_{ij} \geq 1$. This implies that $\beta X_i' + \varepsilon_i \geq 1$ or $\varepsilon_i \geq 1 - \beta X_i'$. Clearly, it it $E(\varepsilon_i) \geq 1 - \beta X_i'$, and not equal to zero. In fact, it is a function of *Xi*. Thus, the residual is correlated with the explanatory variable *Xi* and we get inconsistent estimates of the parameters β if we use ordinary least squares (OLS) method.

Given that V_{ij} is truncated from below at $V_{ij} \geq 1$, the probability density function of the truncated variable (V_{ij}) with mean $\mu = \beta X_i'$ and standard deviation σ is given as:

$$f(V_{ij}|V_{ij} > 1) = \frac{f(V_{ij})}{Prob\,(V_{ij} > 1)}$$

Notice that $Prob\,(V_{ij} > 1) = 1 - \Phi\left(\frac{V_{ij} - \mu}{\sigma}\right) = 1 - \Phi(\alpha_i)$

where;

$\alpha_i = \frac{1 - \beta X_i'}{\sigma}$ and Φ (.) is the standard normal cumulative density function. Thus,

$$f\left(V_{ij} \middle| V_{ij} > 1\right) = \frac{f(V_{ij})}{Prob\,(V_{ij} > 1)} = \frac{(2\pi\sigma^2)^{-1/2} e^{-(x-\mu)^2/(2\sigma^2)}}{1 - \Phi(\alpha_i)} = \frac{\frac{1}{\sigma}\phi\left(\frac{V_{ij} - \beta X_i'}{\sigma}\right)}{1 - \Phi(\alpha_i)} \quad (3)$$

where φ (.) is the standard normal probability density function,. It follows that the conditional mean

$$E\left(V_{ij} \middle| V_{ij} > 1\right) = \beta X_i' + \sigma \frac{\phi\left((1 - \beta X_i')/\sigma\right)}{1 - \Phi((1 - \beta X_i')/\sigma)} \quad (4)$$

And the regression variance is:

$$Var\left(V_{ij} \middle| V_{ij} > 1\right) = \sigma^2 (1 - \delta(\alpha_i)) \quad (5)$$

where;

$$\lambda(\alpha_i) = \phi(\alpha_i) / (1 - \Phi(\alpha_i)) \text{ if } V_{ij} > 1$$

$$\lambda(\alpha_i) = -\phi(\alpha_i) / \Phi(\alpha_i) \quad \text{If } V_{ij} < 1$$

and $\delta(\alpha_i) = \lambda(\alpha_i)(\lambda(\alpha_i) - \alpha_i)$

The conditional mean is therefore a non-linear function of *X* and *β* and so is the variance. Therefore, MLE is preferred to OLS for this type of data set. In MLE technique, we find the estimator *β* that maximizes the log-likelihood function which is simply the sum of logs of the density function (Equation 3). In a truncated model however, the marginal effect which is the partial derivative of Equation 4 is not equal to *β*, but rather β (1-δ(αi)). It is this value that is of great importance in the calculation of recreation benefit. We use STATA Version 10 to derive the parameters and the marginal effects of the MLE. The economic value of the park is the CS per predicted trip and estimated using the approach of Creel and Loomis (1990) as:

$$CS = -\frac{1}{\beta c}$$

where, βc is the coefficient of the travel cost.

Model specification

Many empirical researches indicate substantial efficiency gains in estimating outdoor recreation demand function using individual observations instead of traditional zonal averages (Brown et al., 1985; Willis and Garrod, 1991). However, using individual observations can lead to incorrect CS estimates unless they are on a per capita basis. Essentially, the problem with fitting a travel cost based on recreation demand function to unadjusted individual observation is that, such a procedure does not properly account for cases in which a lower percentage of the more distant population zones participate in recreational activity. In such cases, we obtain biased estimates of the travel cost coefficient. This leads to incorrect CS estimates. Thus, if the underlying demand function is to be estimated validly from the individual observations, then each observation needs to be adjusted on a per capita basis.

In empirical estimations of recreation demand models, analysts use a variety of functional forms such as linear, quadratic, semi-log and log-linear. None of these is theoretically superior to the others. In the literature, the most commonly used functional forms for demand functions are the linear and the semilog functional forms. Following the work of Creel and Loomis (1990), we adopt the linear specification on the basis of its desirable theoretical properties. Thus, from Equation 1 the specific econometric models used to describe the relationship between individual visits per year and the travel cost as well as other explanatory variables is given by:

$$V_{ij} = \beta_o + \beta_1 C_{ij} + \beta_2 A_i + \beta_3 Y_i + \beta_4 F_i + \beta_5 E_i + \beta_6 K_i + \beta_7 G_i + \beta_8 M_i + \beta_9 S_i + \varepsilon_i \quad (6)$$

Table 1 summarizes the measurement and expected signs of the variables.

Study area and data sources

The Kakum conservation area which is made up of the KNP and the Assin Attandanso Resource Reserve protects about 360 km^2 of Tropical Rainforest and habitat for many globally endangered species such as the forest elephant, bongo and yellow-backed duiker. It houses nearly 300 species of birds, 100 mammals, reptile and amphibian species and probably a quarter of a million species of insects including at least 600 butterfly species (unpublished tour guide manual of KNP). The Forestry Department managed the area primarily for sustainable timber until 1991 when a Protective Legislation was passed. The Ghana Natural Resources Conservation/ Historic Preservation Project launched in 1992 with the objective of achieving sustainable development of protected areas saw the development of the KNP.

The Park, officially opened in 1994, houses the only Canopy Walkway in Africa which allows visitors to explore a tropical rainforest canopy from suspension bridges and free platforms towering above the forest. The aim of the park is to protect the rainforest including its bio-diversity, habitats and natural processes and to promote economic development in the villages surrounding the Park. The park is easily accessible from Cape Coast but suffers from short length of stay. Since the launch of the park the number of visitors has increased consistently. Specifically, in 2005 about 75,792 people visited the park but the figure increased to 126,065 in 2009 at an average annual rate of 14.2%

Data for the study was obtained through a survey of visitors at the KNP. Non visitors are not sampled and are thus excluded from the study. Information collected include the number of visitors to the site, place of origin, socio-economic characteristics (income, age, education, sex and some measure of the subjective strength of preferences for the particular type of recreation being offered), duration of the journey, time spent at the site, direct travel expenses, values placed on time by the respondents, purpose of the visit (other than visiting the site), site substitutes and compliments.

The study made use of 224 randomly sampled individuals who visited the site from all over the world; allocation of the questionnaire was made to cover both peak and off peak periods. Prior to the implementation of the main survey, a reconnaissance survey was made to identify the major recreational activities of the site which fed into the development of the instruments. Training of enumerators was conducted on February 3, 2010 followed by a pilot survey by 10 visitors at the site. From the pilot, it was realized that respondents were more reluctant to provide info on income and household size and therefore the enumerators were given a refresher course on how to probe for that information. Final

Table 1. Measurement and expected signs of variables.

Variable	Explanation	Expected sign with the dependent variable
V_{ij}	Total number of visits by individual *i* to Kakum during the past twelve (12) months	
C_{ij}	Total travel cost associated with a round trip to and from Kakum in cedis	A negative sign is expected since travel cost is considered as a proxy for price in recreation demand analysis
A_i	Age of respondent *i* in years	A negative sign is expected since older people are relatively less interested in travelling longer distances for recreation than the younger ones
$Y_{i,}$	Disposable monthly income of visitor *i*	A positive sign is expected since income reflects the ability to pay for repeated trips to a site
F_i	Family size measured as the total number of people in the visitor's household	A negative sign is expected because a visitor with a large family size is likely to spend a relatively larger proportion of its income on consumption of composite goods than recreational activities
E_i	Visitor's educational level in years of education	A positive sign is expected because educated individuals are more likely to have recreation
K_i	Number of years that visitors *i* have known the site	A significant positive relationship is expected
G_i	Sex of visitor included as a dummy, where 1 for male and 0 for female	No a priori expectation of the sign between the two variables
M_i	Marital status of the visitor *i*	No a priori relationship between the two variables is expected
S_i	Knowledge of substitute site. Included as a dummy with 1 representing knowledge of a substitute site and 0 otherwise	A negative relationship is expected between knowledge of substitute site and the number of visits to the site under study

administration of the questionnaire was conducted from February to April, 2010.

RESULTS

Visitors from fifteen (15) countries visited the park during the period of data collection. About 40% of the visitors were from Europe followed by Ghanaians (35%) and North Americans (20%). The remaining 5% were from Japan, Australia, Nigeria and Cote D'ivoire. About 56% of the respondents were males with the remaining being females. Out of the 145 foreigners who visited the site about 54% were females. The ages of the respondents ranged between 14 and 65 years with the mean age being 33 years. Over 70% of the visitors who are above the mean age and nearly 80% of visitors above 50 years are foreigners. This could probably suggest that older foreigners have greater tendency to visit the park. Also, more than 65% of visitors who are below the mean age are Ghanaians, suggesting that younger Ghanaians value the park more. With regards to marital status about 59% of the visitors were single, 34% were married, 4% were widowed and 3% were divorced as indicated in Figure 1.

One reason that may account for the high patronage of single visitors could be loneliness at home or less family responsibility. This study confirms the hypothesis that educated people have stronger appreciation for leisure and the environment than the uneducated; as over 72% of the visitors attained tertiary education, 24% attained secondary education and only 4% attained primary or no education (Figure 2).

With regards to employment, about 41% are employed in the private sector, 21% in the public sector, 35% were students and nearly 3% are unemployed (Figure 3). One reason that may account for the high participation of private sector employees is that they may have high incomes to spend on leisure than those employed in the public sector. The total travel cost is the summation of

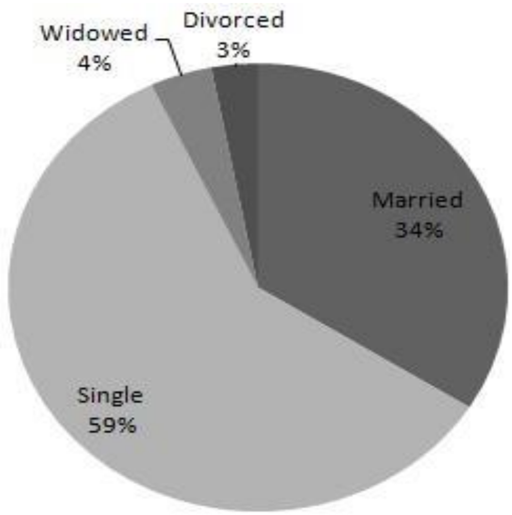

Figure 1. Marital status of respondents.

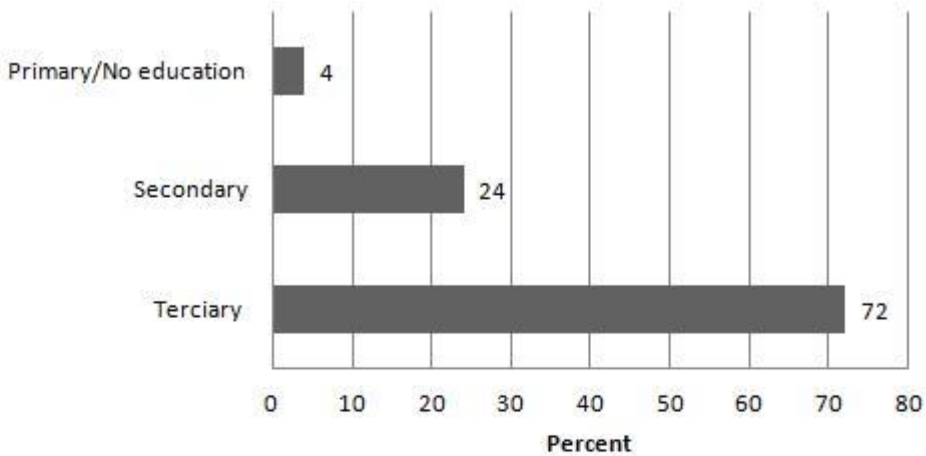

Figure 2. Educational status of respondents.

transport costs and gate fee. From our analysis the minimum and maximum travel cost was GH₵1.70 ($ 1.21) and GH₵800.20 ($571.57) respectively. The mean travel cost was GH₵ 52.73. The results also indicate that about 26% of the respondents were not aware of the existence of substitute sites leaving the overwhelming majority aware of the existence of substitute sites. Only about 26% of visitors who were aware of the existence of substitute sites were Ghanaians. This means that foreigners are more aware of the existence of substitute sites than Ghanaians.

The results of the zero truncated negative binomial estimation with significant variables are presented in Table 2. Initially, we included all the variables in Equation 1. Although, all the variables had the expected sign, income, family size, age, number of visits made to the park in the last 12 months, marital status, number of year the visitor has known the site and education were found to be insignificant and therefore dropped from the model. The insignificance of the income parameter estimate suggests that there is no income effect on the recreation demand for KNP. While the result of this study might appear implausible, it is not uncommon to encounter zero or even negative income effects in recreational travel cost models (Chakraborty and Keith, 2000; Grogger and Carson, 1991).

From the results, there is a negative relationship between the visit rate and the travel cost and a positive relationship between the knowledge of site and the visit rate. This result is consistent with theory of Clawson and Knetsch (1966) and Randal (1994) and other empirical works such as Yachkaschi (1975), Cooper (2000), Kavianpour and Esmaeili (2002). The positive intercept of the demand function indicates a normal demand curve for KNP. With the help of the visitation rate and the travel

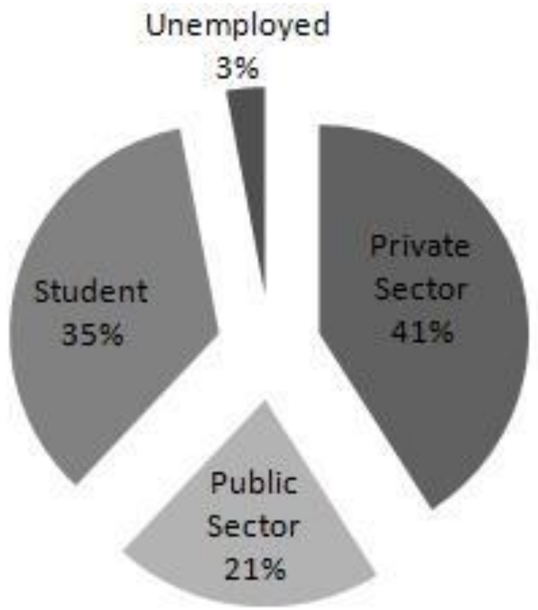

Figure 3. Employment status of respondents.

Table 2. Regression results of the significant variables.

Variable	Coefficient	Standard error	P>|Z|
Tcost (C)	-0.0180744	0.0039534	0.000
Gender (G)	-0.4160645	0.1864318	0.026
Knosite (K)	0.0407075	0.0123951	0.001
Constant	1.072368	0.3309396	0.001

Source: Authors' estimation.

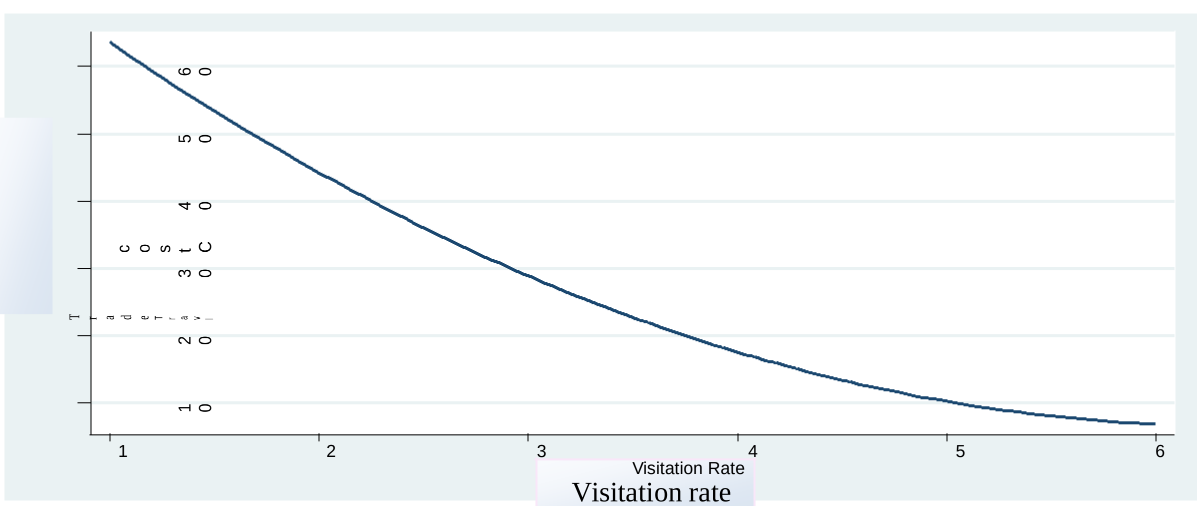

Figure 4. Recreation demand curve for KNP.

cost, we generate the visit demand curve and presented it in Figure 4.

The monetary value of KNP is found by calculating the per trip CS of the demand function and multiplying it by the total number of visitors to the park in a particular year. Following the work of Creel and Loomis (1990), the per trip CS was computed as: $CS = -\frac{1}{\beta c}$, where βc is the coefficient of the travel cost parameter. Thus, the trip (US$ $CS = \frac{1}{0.011315} = \text{GH₵ } 88.38$ 60.95) using exchange rate of US$ 1 = GH₵ 1.4

Certainly, not all this value can be attributed to on-site experience. Hence, there is the need to find a technique to evaluate how much of this value can justifiably be said to have been purely related to the on-site experience. The usual method is by asking visitors to allocate percentage points to the on-site and off-site experience to evaluate how much of the utility of the whole recreation experience is due to the on-site experience (Willis and Garrod, 1991). Thus, visitors were asked to allocate their total enjoyment into travel and on-site experience. The mean value of the on-site experience was calculated to be 76.13%. This means that per person annual value of the KNP for the on-site experience will be GH₵ 67.28 (US$ 46.40). Considering an annual visitation rate of 126,065 in 2009, the annual value of the park will be GH₵ 8,481,653.20 (US$ 5,849,416) in 2009.

Conclusion

The study sought to provide an economic value of the current recreational use values of KNP and to estimate the major determinants of visit to the park using a simple formulation of the TCM with a sample of 224 visitors to the park. Our estimates indicate that the annual per person value of the site is about GH₵ 67.28 (US$ 46.40) which translated into an annual aggregate value of GH₵ 8,481,653.20 (US$ 5,849,416) in 2009. This result have implication for public policy if government is making a cost-benefit analysis of using the park for any other alternative use since it provides information on the annual value that visitors put on the KNP. Regression analysis established that travel costs, gender, knowledge of composite sites are the most important factors that influence visitation to the KNP. It must be noted that this study uses a simple formulation of the TCM. A more complex model could be investigating by using the Geographical Information System software, employing techniques to treat non-participants in the TCM and opportunity cost of time.

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