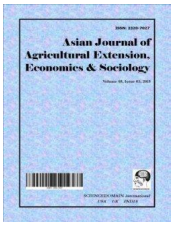

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Economic Valuation of Recreational Benefits from Sim's Park, The Nilgiris: A Travel Cost Approach

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Authors' contributions

This work was carried out in collaboration between all authors. Author PNK designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author PP managed the analyses of the study. Author RM managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

This paper aims to evaluate recreation use value and to identify the factor that determines the recreation use value of the Sim's park. Finally to estimate consumer surplus of visitor and happiness among visitors in the park. The Sim's park which is located in Conoor, The Nilgiris district of Tamil Nadu was purposively selected for the research study. The study was conducted for the year 2016-17. Primary data was collected from 90 sample visitors employing simple random sampling technique. Analytical tools used for the study was Individual Travel cost method and Multinomial Logit model. The results of the study revealed that by using log-linear trip generating analysis factors such as that travel cost, location, the age of the respondent, family size, family income, mode of transport and park quality are those that determine the visits to the park. Estimates in the research indicate that the Individual consumer's surplus was calculated at Rs.1757.68, which translated into an annual aggregate value of Rs.111.97 crores in 2017. Multinomial logit estimated as travel cost increased the probability of being very happy and

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happy was decreased when compared with probability of somewhat happy visitors. This insists on the importance of conservation of such recreational sites and helps to construct the policies.

Keywords: Recreation benefits; Sim's park; Travel cost method.

1. INTRODUCTION

In the contemporary world assigning a monetary value to an ecosystem plays a vital role. Ecosystem services (ES) is a contested framework [1] that is intended to capture the benefits of nature to society and human well-being through assessing monetary and non-monetary values of ecosystem functions [2,3]. The subcategory of cultural ecosystem services defined as the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences [2] is considered particularly difficult to operationalise because of its intangibility [4].

Recreation is useful for human utility. The demand for recreation is increasing day by day due to the rise in population, income, and mobility in many developing countries [5]. Tourism sector endows with recreation services. According to tourism ministry data (2015-16), the tourism sector is a leading driver of economic growth, and also a number of domestic tourist visits are high in Tamil Nadu while comparing to all other states in India indicating growing tourism demand. The garden/park attracts a large number of visitors and has emerged as major tourist destinations in the state. TANHODA (Tamil Nadu Horticulture Development Agency) [6] maintains 7 parks and garden.

Areas such as national parks/garden are recreational site overwhelmingly public spaces which have become the most vital tool for protecting the natural environment by preserving plant habitat, decreasing air pollution, and water filtration and it is also the place where people come for rest, relaxation and refreshment.

National parks/garden tends to be public goods that are not bought and sold and whose value not seen through the lens of market transactions. However, if no economic measure of their value is offered, they will often be discounted and is prioritised. Public goods and service values cannot be captured by conventional monetary valuation method in meaningful ways [4], non-monetary valuation methods are a best-suited method [7,8,9].

Non –market valuation method is based on assumptions of quantification and aggregation of individually perceived values. Recreational values are reflected in the perceptions of individuals who visit the site by spending time and/or money on recreational activities. Moreover, people who use the site's resources do not pay for these services, and hence it is impossible to use market prices directly to value these recreational benefits provided by the site. Hence, in this study, a surrogate market/ revealed preference method was used to value the recreational benefits.

With this background, the present study is carried out with the following objectives to evaluate the recreational use value of the park, to identify the factors that determine the recreational use value of the park, to estimate the consumer surplus of the individual visitor.

2. MATERIALS AND METHODS

In order to fulfil the objectives of the study, Sims Park was purposively selected, This park is situated in a deep ravine, make longer over an area of 12.14 ha at an elevation of 1780 to 1790 meters and also the park has undulating nature and possesses a number of admirable features.

The population of this study is infinite because the nature of visitation to Sim's park is continuous and made the establishment of an exact number of visitors to be difficult. The desired sample size was calculated following Godden [10] formula for determining sample on an infinite population. The formula specified as:

$$SS = \frac{Z^2 X\, P(1-P)}{M^2}$$

SS=Sample Size for infinite population, Z=Z value (1.96 for 95% confidence level), P=population proportion assumed to be 0.5 (50%) since this would provide the required sample size) and M=Margin of Error at 5% (0.05). Therefore this gives out the sample size of 384 respondents. About 23.5 per cent of the obtained sample size was selected considering time constraint along with convenience. Finally,

sample size selected for the study was 90 and then Simple random sampling technique was employed and Primary data were collected from 90 sample visitors. List of annual visits to the park was drawn from Assistant Director of Horticulture Office, Coonoor. The study was conducted for the year 2016-17. Map of the study area is shown in Fig. 1.

The travel cost method for valuing an environmental good was developed under the assumption that there is a weak complementary relationship between the demand for the environmental good and the private good travel. It was assumed that the individual's utility depends on the total time spent at the site, the quality of the site and the quantity of private good other than travel consumed [5,11]. The time spent on the site can be represented by the number of visits. Advantage of Travel cost method, It is based on market price that directly reveals people's preference for a good or service and it has been used to value a range of cultural goods or services and compare those values and Disadvantage is possibility of under evaluating people who have only short travel time [12], applicable to only a specific sites and cannot applied unique recreational site [13].

By observing how visitation rates to a site change, as the environmental quality of the site changes, the method also provides values for environmental quality itself. The central force that is coupled with the model is that if a consumer wants to use the recreational services of a site he has to visit it. The travel cost to reach the site is considered as the proxy price of the visit, and changes in the travel cost will cause a variation in the number of visits. The Individual Travel Cost Method (ITCM) would be used here. The visitors to sites are invited to provide information on the trip (cost, length, purpose, etc.) and socio-economic character such as (income, age, sex, etc). The dependent variable is the visitor rate (the number of visits by the individual in a period).

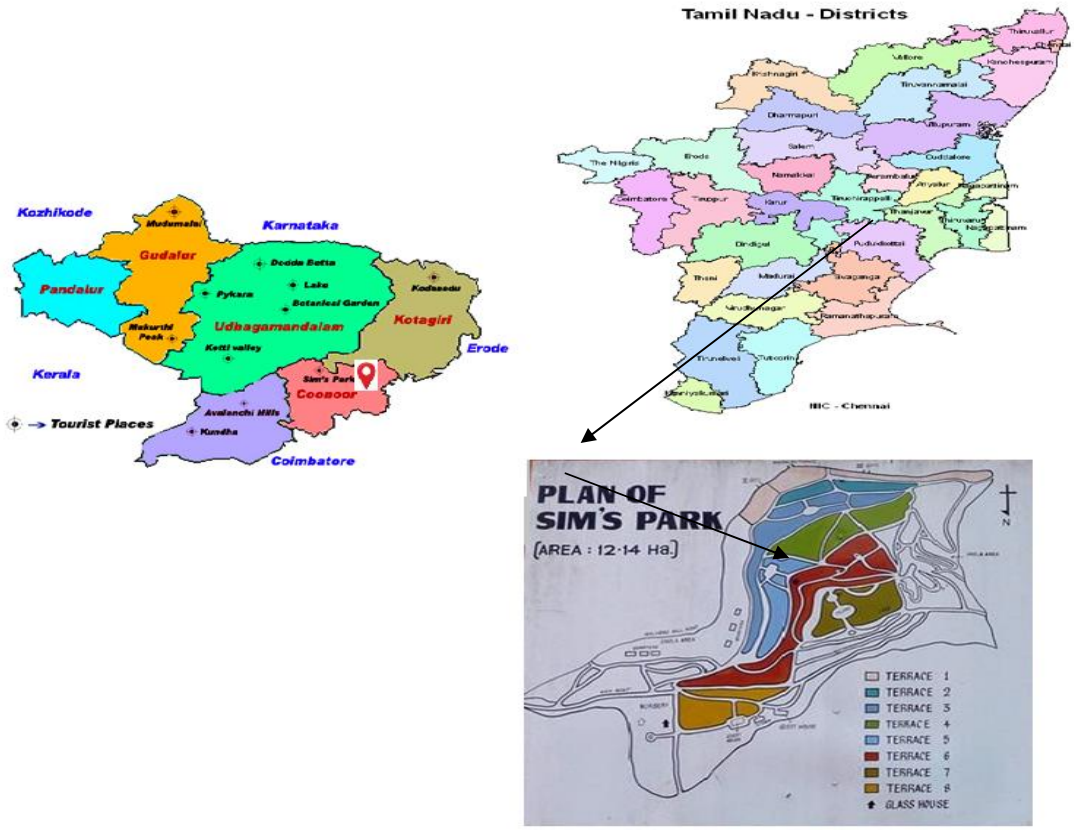

Fig. 1. Map of the study area

In mathematical terms the trip demand curve will be defined as:

$$V_{ij} = f(C_{ij}, X_i)$$

Where:

V_{ij} = Number of visits per year by the individual i to park j;
C_{ij} = visit cost incurred by individual i to park j;
X_i = all other factors determining individual i's visits (income, time, and other socioeconomic characteristics).

2.1 Description of Variable

S.No	Variable	Description	Unit
1	Age	21-30, 31-40, 41-50, 51-60, Above 60	No. of Years
2	Gender	Male=1, Female=0	Dummy Variable
3	Marital Status	Married=1, Unmarried=0	Dummy Variable
4	Family Size	Open ended question	Number
5	Location	Ratio of visitors from rural and urban areas. Rural = 1,Urban = 0	Dummy Variable
6	Education	Education groups: Illiterate, Primary level, Secondary level, Higher Secondary level, Bachelors and Graduates.	No. of Years
7	Income	Income groups: 0-10000, 10001-20000, 20001-30000, 30001-40000, 40001-50000, Above 50001	Rupees
8	Mode of Transport	Owned Vehicle, Hired vehicle and Public transport	Number
9	Cost of Travel	Total cost from home to Sim's Park.	Rupees
10	Site Quality	Very poor, poor, fair, good and excellent	Number

Source: Author's survey

2.2 The Empirical Model

$$\ln V = \alpha + \beta_1 TRAVCO + \beta_2 FINC + \beta_3 AGE + \beta_4 EDU + \beta_5 GEN + \beta_6 MARSTAT + \beta_7 FAMSIZE + \beta_8 MOT + \beta_9 LOC + \beta_{10} SQLTY + \varepsilon$$

where

V = Number of visits made by individual per year
TRAVCO = Individual total cost of visiting the site (Rs.)
FINC = Income of the household (Rs./Month)
AGE = Age of the respondent
EDUC = Education
GEN = Gender
MARSTAT = Martial status
FAMSIZE = Family Size
MOT = Mode of transport
LOC = Location
SQLTY = Site Quality
Ɛ = Error term

The ITCM produce demand curve by the individual's annual visits to the costs of visits. By Integrating demand curve consumer surplus for per individual (ICS) is obtained. Individual consumer surplus can be calculated by using the following formula [10,14].

$$CS = -1/\beta ij$$

Where, CS is the Consumer Surplus per person per trip and βij is the Coefficient of travel cost. The total annual consumer surplus obtained from the park can be calculated by multiplying the ICS with the number of visits made in a year [15].

Total recreational value in Sim's Park is calculated using the formula,

$$V_R = CS * V_n$$

Where,

V_R=Value of recreational services (Rs. per annum)
CS =Consumer surplus per visitor (Rs.)
V_n=Number of visitors per annum

2.3 Multinomial Logistic Regression Model

This model was used to assess happiness among visitors in sim's park. This was used by [16]. Fitted regression model:

$$Yi = \ln (P_j / P_1) = \beta 0 + \beta 1\ X1 + \beta 2\ X2 + \beta 3\ X3 + \beta 4\ X4 + \beta 5\ X5 + \beta 6\ X6 + e_i$$

Where,

Yi = Happiness (Very Happy; Happy: Some What Happy)
Xi, where i = 1, 2 …6, are independent variables.

2.4 Independent Variables Used

Independent variable	Coding
Age of household	Number
Income of household	Rupees
Quality of the park	Number
Mode of Transport	Number
Travel cost	Rupees
No of visits	Number

3. RESULTS AND DISCUSSION

As said earlier, a planned questionnaire was designed to collect the required primary data from the 90 visitors for the study. This section presents the descriptive statistics that were collected from their interview. Among the most important variables, gender, location, marital status, family type, age, the number of visits to the park, income of the respondents and quality of the park are included for the descriptive analysis. Based on the survey, socio-demographic characteristics of the respondents are presented in the Table 1.

The socio-economic profiles of the tourists arrived in Park are given in Table 1. Regarding Gender, from the 90 respondents, 66 representing (73.33 %) were males and 24 (26.67 %) were females. The rate of frequency of visits of an individual to sim's park varies 40 % visitors from rural areas and 60 % from urban areas with respect to the location. Regarding marital status, 63.3 % of respondents were married whereas 36.67 % of respondents were unmarried (single).

From the Table.2. With regard to the age group, 33.3 % of the respondents were below 30, 30.0% of the respondents were between the ages of 31-40, 23.33 % of the respondents were between 41- 50 years, 5.56 % is between 51-60 years and 7.78 %of the respondents were above 60. Overall, about 63.33 % of the visitors were less than the 41 years old indicating percentage of young people visiting sim's park is high and this may be due to reason that young people travel to long distances to spend leisure time in recreation sites.

Table 1. Socioeconomic details of respondents at Sim's Park

Particular		Frequency	Percentage
Gender	Male	66	73.33
	Female	24	26.67
	Total	**90**	**100.00**
Location	Rural	36	40.00
	Urban	54	60.00
	Total	**90**	**100.00**
Marital status	Single	33	36.67
	Married	57	63.33
	Total	**90**	**100.0**

Table 2. Sample respondents based on age group

Age group	Frequency	Percentage
Upto 30	30	33.33
31-40	27	30.00
41-50	21	23.33
51-60	5	5.56
Above 60	7	7.78
Total	90	100.00

Table 3. Details of education of the sample visitors

Education	Frequency	Percentage
Illiterate	6	6.67
Primary	8	8.89
Secondary	14	15.56
Higher secondary	20	22.22
Graduates	42	46.67
Total	90	100.00

The education level of the Tourists in Table 3 showed that in the sample most of the people were well educated. 46.67% were undergraduates, 15.56% people had a higher secondary level education. People with higher educational qualification support ecotourism for its luxuries without compromising the environmental quality.

From the Table 4, it is observed that 27.78 percent of respondents have about Rs.20001-30000 per month as their income and 25.56 percent of the respondents have a monthly income in the range of Rs.10001-20000. Some 15.56 percent of respondents have an income of Rs. 0-10000. As a whole, 75.56 % of the respondents have an income ranging from 0–30000.

The occupational status of the sampled respondents is given in Table 4 A. Mostly employees from the private firm have high visitation rate to Sim's park. From the sample, nearly 41.11 % of the people were from private firm followed by a government employee (22.22 %), business (16.67 per cent), students (11.11 %) and retired (8.89 %).

Details of the family size of the respondents are given in Table 5. The average family size of the respondents was three. More than 60 % of the sample respondents have less than four members in their family, while 28.89 % of the respondents have a family size of 4-6. Only three of the respondents have more than six members in the family.

Table 4. Sample respondents based on Income group (per month)

Income groups	Frequency	Percentage
0-10000	14	15.56
10001-20000	23	25.56
20001-30000	25	27.78
30001-40000	7	7.78
40001-50000	9	10.00
Above 50001	12	13.33
Total	90	100.00

Table 4 A. Details of the occupational status of the respondents

Occupation	Frequency	Percentage
Own Business	15	16.67
Govt Employee	20	22.22
Private Employee	37	41.11
Retired	8	8.89
Students	10	11.11
Total	90	100.00

Table 5. Details of the family size of the respondents

Family size	Frequency	Percentage
<4	61	67.78
4-6	26	28.89
>6	3	3.33
Total	90	100.00
Average family size=3		

Table 6. Details of number of visitors in a different mode of travel

Mode of travel	Frequency	Percentage
owned vehicle	35	38.89
Hired vehicle	26	28.89
public transport	29	32.22
Total	90	100.00

Details of Number of visitors in a different mode of travel are given in Table 6. It depicts clearly that people with own vehicle had high visitation rate when compared to people with a hired vehicle and people preferring public transport. From the survey distribution of people told that 45.56 % travelled from their vehicle, while 32.22 % were public transport and only 22.22 % of the people travelled with a hired vehicle.

It is evident from Table 7. Out of the total surveyed respondents, majority of the respondents (63.33 per cent) reported that they already visited sim's park and 36.67 % of them are visiting the park for the first time, 30 % of visitors have visited the park 1 time whereas 36.67 % of the visitors have visited the park 2 times and rest of one fourth of visitors has visited the park 3 and more than 3 times in the last 12 months. In particular, about 66.67 % of visitors have visited Sim's park for 1 or 2 times. People living closer to the park made many trips while those living far from the park made fewer trips results in connection to other studies [17].

Based on Table 8 It is found that majority (73.33%) of the respondents expressed their opinion about the quality of sim's park as excellent and good, one third (25.56 %) of the respondents opined as Fair. Only a meagre percentage (1.11 %) of respondents said as poor.

Purpose of visits of the respondents is presented in Table 9. It showed that Individual who visits the recreation sites like Parks, garden and forests may have single or multiple objectives of visiting the place through which they derive some kind of non- consumptive benefits (like recreation). Surveyed respondents were mostly preferred for relaxation (40 per cent). The other reasons were photography (27.78 per cent), scenic value (23.33 per cent) and educational tour (11.11 per cent). This indicated that the place had a very good non-consumptive value and many people prefer to keep this place as an option to derive the non-consumptive values like relaxation and aesthetic beauty.

3.1 Results of Travel Cost Analysis

The log-linear trip generating function was formulated using a number of visits per year as the dependent variable. The independent variables were socio-economic variables, travel cost and the quality of the site.

The estimated trip generation function is summarised in Table 10. The R square value found to be 0.78, indicating 78 per cent of the association in the endogenous variable is explained by the Exogenous variables.

Table 7. Sample Respondents based on the number of recreational trips

Particular		Frequency	Percentage
Previous visit to the Park	Yes	57	63.33
	No	33	36.67
	Total	90	100.00
Number of trips	1	27	36.67
	2	33	30.00
	3	20	22.22
	Above 3	10	11.11
	Total	90	100.00

Table 8. Distribution of visitors' perceptions regarding the quality of the park

Quality of park	Frequency	Percentage
Very poor	0	0.00
Poor	1	1.11
Fair	23	25.56
Good	36	40.00
Excellent	30	33.33
Total	90	100.00

Table 9. Purpose of visits of the respondents

Purpose of visits	Frequency	Percentage
For relaxation	34	40.00
For Scenic value	21	23.33
Photography	25	27.78
Educational tour	10	11.11
Total	90	100.00

To understand the implications of the results, Travel costs incurred by individuals are inversely related to an annual number of visits to the Sim's park, as expected. The negative sign implies that higher the total travel cost less frequently respondents visit Sim's park. It is evident that people living closer to the park made many trips while those living far from the park made fewer trips.

Table 10. Parameter estimates of trip generating function

Variable	Coefficient	p-value
Constant	0.073429	0.6158
	(0.145765)	
TRAVCO (β_1)	-0.00057***	4.14e-05
	(3.7419e-21)	
FINC (β_2)	0.0059***	1.88e-09
	(0.0007)	
AGE (β_3)	0.008696***	1.689e-07
	(0.0015)	
EDU (β_4)	0.018874	0.221
	(0.0153)	
GEN (β_5)	0.09076***	0.002
	(0.0292)	
MARSTAT (β_6)	0.11349***	0.001
	(0.0349)	
FAMSIZE (β_7)	-0.00147	0.890
	(0.0106)	
MOT (β_8)	-0.09902***	1.139e-08
	(0.0155)	
LOC (β_9)	-0.01935	0.450
	(0.0254)	
SQLTY (β_{10})	0.08448***	1.568e-06
	(0.0155)	
N=90		
Log likelihood=92.206		

Source: Primary survey and authors own estimation
*Note: *** Significance @ 1% probability level, ** Significance @ 5% probability level, * Significance @ 10% probability level. (Standard errors are presented in Parenthesis)*

The negative sign of the travel cost and the significance of the travel cost at one per cent level of significance are in accordance with the results of [18,19,20]. Family income is positively influencing the park visitation rates and recreational activities. On the other hand, the coefficient of respondent age and an annual number of visits to the park is positively related at 1 per cent level of significance. This implies that even old age people tend to visit the recreational activities of the park. The other independent variable is gender which is also positively related at 1 per cent level of significance which implies that more no. of males visits to the park. The coefficients of marital status were also found to be positively related with a dependent variable which implies that the visitation rate of a married person is more than the unmarried persons. Another crucial variable which is negatively related to annual visitation rate which implies that people visiting by own vehicle is less than the people visiting through public transport. The coefficients of dummy variable of perception about park quality which is found to be positive in association with a number of visits at 1 per cent level of significance this implies that if the quality of recreational services of the park was improved the visitors like to more visits to the Sim's Park.

The consumer surplus could be estimated by finding the absolute value of the reciprocal of the travel cost coefficient. The consumer surplus is the surrogate value of the net social benefit received from the sim's park. The consumer surplus per visit was estimated to be Rs. 1757.68. The total recreational value of the park was obtained by multiplying the total number of visitors by the consumer surplus per visit. The estimated total recreational value was Rs. 111.97 crores.

3.2 Happiness among visitors in Sim's Park

Happiness is increasingly considered as a proper measure of social progress and a goal of public policy and it is something that everyone feels in a different way. Measuring Happiness in the present study is based on the idea that how individual physically feels about the park and judges its quality to increase the progress of the park, since it belongs to a wider class of independent assessments of life, in current study to all sample respondents three closed questions were asked which was referred to as a primary scale of happiness measurement. Happiness is seemed to be affected by some of the factors, factors affecting happiness among visitors has been shown in Table 12.

Table 11. Recreational value of Sim's Park

Particulars	Value
Consumer surplus per visit	1757.68
No. of visitors per year	637066
Total consumer surplus	1119758167
Recreational value per annum (in Rs. Crores)	111.97

Table 12. Happiness among visitors in Sim's park

	Coefficient	Std. Error	z	p-value
Very Happy Vs Some What Happy				
Const	0.1303	2.3030	0.0566	0.9548
Age	0.0239	0.0313	0.7668	0.4432
Income	8.06114e-06	2.02278e-05	0.3985	0.6902
Quality of the park	-0.5840	0.3873	-1.5076	0.1316
Travel Cost	-0.0022	0.0007	-3.0683	0.0021***
Mode of transport	1.12803	0.4503	2.5047	0.0122**
No of Visits	0.5762	0.4286	1.3441	0.1789
Happy Vs Some What Happy				
Const	-0.9673	3.601	-0.2686	0.7882
Age	0.0467	0.0445	1.0502	0.2936
Income	-8.45902e-05	4.77517e-05	-1.7715	0.0765*
Quality of the park	-0.2409	0.6399	-0.3765	0.7065
Travel Cost	-0.0041	0.0021	-1.9975	0.0457**
Mode of transport	-0.5254	0.92834	-0.5660	0.5713
No of Visits	1.5356	0.6521	2.3548	0.0185**

*Note: *** Significance @ 1% probability level, ** Significance @ 5% probability level, * Significance @ 10% probability level.*

To know factors that influence happiness among visitors in park, a multinomial logit model was used [16]. Logistic regression compares the level of happiness to base the outcome of Some What happy. The model compares the probability level of being very happy and happy compared to that of somewhat happy. Visitors were asked whether they found happiness after entering into the Sim's park. Table 12 reveals that among very happy visitors, travel cost is negatively significant at 1 per cent level of significance and mode of transport coefficients were statistically significant at 1 per cent level of significance. As travel cost increased the probability of being very happy was decreased when compared with the probability of somewhat happy visitors. When the mode of transport has improved the probability of being very happy was increased when compared with the probability of somewhat happy visitors.

Among happy visitors income and travel cost coefficients factors were significant at 5 per cent level and 10 per cent level of significance and no of visits coefficient factors were positively significant at 5 per cent level of significance. As travel cost increased the probability of being happy was decreased when compared with probability of somewhat happy visitors. In this category, no of visits increases the probability of visitors being happy is more when compared with the somewhat happy category.

4. CONCLUSION

Parks are very important to many persons in the day to day life. In the 21st century, people are more attached to electronic gadgets and they lack in face to face communication and further work in the computerised world is so hectic and get more pressurised, to reduce their stress and get relief people in large number approaches to recreation sites.

Economic valuation of Sim's Park using ITCM indicated that that travel cost, location, the age of the respondent, family size, family income, mode of transport and park quality are the most important factors that determine the visits to the park.

It can be concluded that young age people visiting to park is high which shows younger generation interest to enjoy the benefits of

recreation sites, most of private employees visit the park to reduce their stress, since recreation service offered by sim's park is well satisfied majority of people revisit the park a negative result was reported by Vijayan and Job [19] study to reveal that majority of visitors deny to revisit as they the trip as a lifetime experience but they insist on recommending park as a place to visit their friends, loved ones and relatives. The results also showed that people nearby park visiting to park is high when compared to people at the far distance this similar result was also obtained by [14,21,22]. The study showed that Family income is positively influencing the park visitation rates and recreational activities. On the other hand, the coefficient of respondent age and an annual number of visits to the park is positively related at 1 per cent level of significance. This implies that even old age people tend to visit the recreational activities of the park. The other independent variable is gender which is also positively related at 1 per cent level of significance which implies that more no. of males visits to the park. The coefficients of marital status were also found to be positively related with a dependent variable which implies that the visitation rate of married person is more than the unmarried persons. Another crucial variable which is negatively related to annual visitation rate which implies that people visiting by own vehicle is less than the people visiting through public transport. The coefficients of dummy variable of perception about park quality which is found to be positive in association with a number of visits at 1 per cent level of significance this implies that if the quality of recreational services of the park was improved the visitors like to more visits to the Sim's Park. The consumer surplus per visit was estimated to be Rs. 1757.68. The total recreational value of the park was obtained by multiplying the total number of visitors by the consumer surplus per visit. The estimated total recreational value was Rs. 111.97 crores.

A policy implication that can be drawn from this study is that it helps the policy makers for planning a sustainable recreation strategy and also helps in more rapid progress in economic growth performance can be made achievable by contributing to the tourism sector. It is recommended that some of the additional facilities given by Sim's park management in order to attract more visitors to the sim's park. Hence people more visits to the park can enhance the optimal income and also take care of conservation practices.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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